UROP1000: Green Finance and Sustainable Investments

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Abstract:

The importance of Environmental, Social, and Governance (ESG) factors in company valuation has grown significantly in recent years. However, the existing approach often relies on a narrow, quantitative-focused methodology, which may limit the incorporation of a wider range of ESG factors and their potential impact on company valuation. This research project aims to complement the current ESG assessment framework with a more comprehensive methodology that analyzes the ESG risks and opportunities of each company based on its ESG reporting. The goal is to understand how a company's specific ESG initiatives can affect its valuation in the financial market. This initial phase focuses on large data collection, which will be further analyzed and interpreted using AI/ML techniques.

I. ESG Reporting: Common Practices and Metrics

In recent years, the public has increasingly demanded greater transparency from companies regarding their environmental, social, and governance (ESG) initiatives. In response, companies have been producing annual ESG reports to showcase their efforts in these areas. These reports typically cover a company's business operations and their impact on the environment, social issues like workplace diversity and community engagement, and governance practices.

ESG reporting serves multiple purposes. Beyond showcasing a company's commitment to sustainability and social responsibility, it also plays a crucial role in protecting its reputation and influencing its valuation in the financial market. Companies often follow established reporting frameworks, such as the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB), to structure their ESG disclosures and avoid accusations of greenwashing.

After a company publishes its ESG report, the document is assessed by various rating agencies such as MSCI and ISS (Institutional Shareholder Services), NGOs, and government bodies. These assessors use different metrics and methodologies to evaluate the company's ESG performance, leading to potentially divergent scores. Understanding the underlying inputs and weightings each assessor uses is essential for stakeholders and the general public to interpret the scores properly.

The use of ESG data extends beyond just public perception. In the capital markets, credit rating agencies such as Moody's and Fitch have been integrating ESG assessments into their credit rating decisions over the past few years. They carefully analyze the risks and opportunities presented by a company's ESG practices and how these might impact its future operations and finances. The resulting credit rating can then influence a wide range of financing decisions, specifically determining the borrowing cost of a company. With this impact, companies can be motivated to improve their ESG practices to get more convenient financing options.

As the focus on ESG evolves, institutions must update their assessment metrics to ensure they capture the latest developments. They may also need to adjust their inputs and weightings to align with their objectives. This ongoing refinement of ESG evaluation methods highlights the dynamic nature of this field and the need for a more holistic approach to ESG reporting analysis.

II. ESG Scoring Assessment: The Need for a More Holistic View

While ESG reports provide valuable information about a company's sustainability efforts, the scoring systems used to assess these reports can be subject to subjectivity and bias. Furthermore, many ESG initiatives are inherently difficult to quantify, such as new green policies or community engagement programs. This challenge can lead to the inclusion of subjective elements in the scoring while lacking of comprehensive perspective regarding qualitative description, potentially inflating a company's ESG performance.

From the decision-making perspective, particularly in the investment field, the ESG report and scoring may not provide the clearest guidance. With numerous ESG aspects discussed in the report, it can be unclear which policies or initiatives should be prioritized when valuing a company. Moreover, the qualitative descriptions of ESG actions can be challenging to incorporate into financial models, despite their potential to significantly impact a company's future performance.

To address these limitations, researchers are exploring more comprehensive approaches to ESG reporting analysis. By leveraging artificial intelligence (AI) and machine learning (ML) techniques, they aim to uncover patterns and reduce biases in interpreting ESG reports and other company disclosures, such as earnings call transcripts. These advanced analytical methods can help identify leading indicators and develop more robust valuation models that better capture the financial implications of a company's ESG practices.

III. The Aim of this Research

With the rising research that utilizes AI/ML in the realm of green finance, we want to participate in this opportunity as well. This research focuses on applying AI/ML techniques to analyze ESG reports in the context of the financial markets. As ESG has become an increasingly integral consideration in company valuation, many financial institutions, including asset management firms and individual investors, are placing greater emphasis on ESG factors when making investment decisions.

Recognizing the need for a more systematic and objective approach to quantifying the financial impact of ESG initiatives, the researchers aim to uncover the relationship between a company's financial performance and its sustainability outcomes. By analyzing a large dataset of company ESG reports, the study will leverage natural language processing (NLP) and other AI/ML methods to identify patterns, risks, and opportunities that may not be readily apparent through traditional analysis. We are also motivated to examine the firm's exposure to the risks and opportunities of ESG at the company-specific level instead of generalizing the exposure to the industry or sector level.

The ultimate goal is to develop leading indicators and a comprehensive valuation formula that incorporates both ESG-related and non-ESG financial metrics. This approach could provide a more holistic understanding of how a company's sustainability practices affect its financial performance, thereby informing investment decisions and guiding companies in their ESG management strategies.

IV. The Approach of This Research

To achieve the research objectives, the study will employ a combination of textual analysis and literature review. The initial phase, spanning approximately one and a half months, will focus on a comprehensive literature review to deepen the understanding of ESG analysis and data collection.

We do a literature review by examining prior studies that have utilized keyword discovery and dictionaries-based approaches to capture a company's exposure to climate change-related risks, opportunities, and regulatory impacts and how these factors influence equity market pricing. Two main references that we already studied are *"Corporate Climate Risk: Measurements and Responses"* (by Qing Li, Hongyu Shan, Yuehua Tang, Vincent Yao) and *"Firm-Level Climate Change Exposure"* (by Zacharias Sautner, Laurence van Lent, Grigory Vilkov, Ruishen Zhang). Both of these researches focus on measuring a firm's exposure to climate change based on their responses including green job creation and investment. These insights inform the researchers' approach to leveraging textual data from ESG reports for their analysis.

Concurrently, we are focused on collecting ESG (Environmental, Social, and Governance) report data for companies listed on the S&P 500 index from 2013 to 2022. This comprehensive data collection is a crucial aspect of the project, as it will enable the researchers to analyze the ESG performance and trends of these large, publicly traded companies over a 10-year period. To gather this data, we are utilizing the Refinitiv terminal, a widely used financial and ESG data platform. Through the Refinitiv terminal, we can access the available ESG report links for each company on the S&P 500 index and then download the corresponding ESG reports. However, we have encountered some technical challenges during this data collection process. Specifically, we have faced issues related to limited GPU (Graphics Processing Unit) usage and timeout errors which can occur when the data download from a specific URL takes longer than the allotted time, causing the process to fail. These technical obstacles required us to modify our approach and find ways to address these issues, such as implementing strategies to handle the limited GPU usage and timeout errors more effectively. Despite these challenges, we have collected at least half of the overall companies' ESG report files for each year, which is a significant accomplishment. To complete the data collection, we are now considering an alternative approach, which involves using a Python script to automate the Google search process and retrieve the remaining ESG reports.

Once the data collection is complete, the researchers will proceed with the textual analysis using AI/ML techniques. While the specific algorithms have not yet been determined, the team is considering a multi-faceted approach. This may include a greater focus on the social and governance aspects of ESG, in addition to the environmental component. We would also like to incorporate relevant financial metrics to explore the potential correlations between ESG practices and a company's financial performance. We believe incorporating the right financial metrics on top of risk and opportunities gained from the company’s ESG practices can strengthen our analysis to arrive at the pricing formula.

By combining insights from the textual analysis and financial data, the researchers aim to identify leading indicators and develop a comprehensive valuation formula that can better capture the impact of a company's ESG initiatives on its stock prices and overall financial standing.

V. Conclusion and Future Outlook

Although this research is still in its early stages, we are enthusiastic about exploring the intersection of green finance and sustainable investment. We hope to complement existing ESG analysis by offering a unique perspective and potential applications of our findings.

Through this study, we aspire to uncover new patterns or indicators within ESG data that could significantly influence a company's valuation, such as its stock price performance. By identifying these leading indicators, we aim to provide companies with guidance on the ESG practices that warrant greater attention and management, ultimately contributing to more informed decision-making in the financial markets.

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