COMPARATIVE ANALYSIS OF ESG VS. FINANCIAL INDICATORS ON PREDICTING BETA

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ABSTRACT

This research investigates the use of Environmental, Social, and Governance (ESG) performance and financial indicators in predicting companies' future financial outcomes. Specifically, we compare the significance of 2 Bloomberg ESG scores with 9 traditional financial ratios in forecasting stocks' betas, leveraging Random Forest Classifier Machine Learning Algorithm. Additionally, we provide valuable insights into the relative importance in each of the 11 Global Industry Classification Standard (GICS) sectors, differentiating their predictive power in bullish and bearish market conditions.

The study aims to address a fundamental question: Does prioritizing "doing good" through ESG practices align with "doing well" financially?

METHODOLOGY

Machine Learning Algorithm was chosen as the core methodology for this research. The main reason for the choice of methodology is their ability to identify patterns among variables in predictive tasks. This choice was driven by the need to explore potential patterns between ESG scores and beta, enabling a comprehensive investigation of their relationship.

FEATURES AND TARGETS

To build Machine Learning Algorithms, two types of variables were identified: features and targets. In this case, Beta was chosen as a target variable whereas feature variables included:

FEATURE VARIABLES		
Financial Indicators:	**Bloomberg ESG Scores**	**Other Information**
• Book Value / Share • Earnings / Share • Operating Income Growth • Price / Earnings • Profit Margin • Return on Common Equity • Return on Asset • Total Debt / Total Equity	• ESG Score • ESG Disclosure Score	• Industry • MarketCap

Figure 1

Given this study's objective of predicting beta's class (i.e. beta's range) rather than estimating its precise numerical value, I decided to use a classification model that would forecast beta's class, which is one of the listed in Figure 2.

Because market performance varies, classification of Betas can be different in each year. A box plot which represents the binning of beta for different years is shown in Figure 3.

Class Number	Class Name	Percentile
Class 1	Very low	0% - 25%
Class 2	Low	25% - 50%
Class 3	High	50% - 75%
Class 4	Very high	75% - 100%

Figure 2

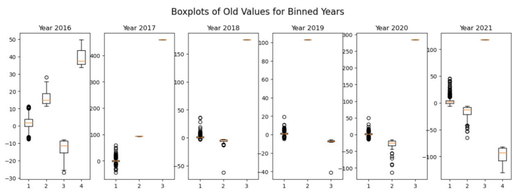

Figure 3

MODEL SELECTION

The Random Forest Classifier model was selected as the most appropriate from the list of potential algorithms. It is an ensemble learning model that combines multiple decision trees to improve accuracy and robustness, making predictions based on majority voting or averaging from individual trees.

Figure 4 represents one out of 100 trees in the forest for the "Utilities" sector in a bearish market:

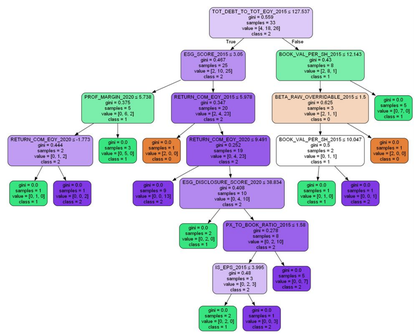

Figure 4

RESULTS

GENERAL RESULT

The application of the model to the general dataset yielded convincing results, with the model achieving an accuracy score of 93%. The model was trained using 1420 companies and tested on other 356 companies.

By analyzing the feature importance breakdown of the model in Figure 5, we observed that ESG Score and ESG Disclosure Score played a discernible role in predicting returns, contributing 7.6% and 6.3% importance, respectively. Although these values are slightly lower than the average mean of importance for all other financial indicators (8.0%).

Figure 5

RESULTS BY INDUSTRY & MARKET TYPE

To gain deeper insights, we examined the breakdowns for 11 GICS sectors and 2 market types, some of them are presented in Figure 6.

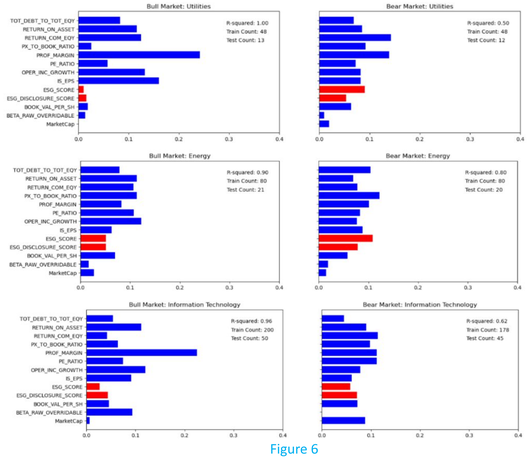

Figure 6

DISCUSSIONS

IMPORTANCE OF INDUSTRY TYPE

- There were instances where ESG measurements surpassed traditional indicators in terms of usefulness.
- Example: Consumer Discretionary in bearish markets, where the ESG Disclosure Score exhibited the highest importance.
- Even during bullish market conditions, this score remained among the top three in terms of importance.

IMPORTANCE OF MARKET TYPE

- In 7/11 industries - Communication Services, Financials, Information Technology, Industrials, Consumer Discretionary, Energy, and Utilities - ESG proved more valuable in bearish markets than in bullish ones.
- This suggests that ESG could play a more crucial role in decision-making during uncertain and weak market periods, particularly for dynamic industries.

In conclusion, while ESG Scores are not a magical source for predicting financial returns, our findings indicate that it holds significant potential and should be seriously considered when assessing company performance, especially during challenging times such as bear markets.

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