ISSN 2616-5902 Vol. 5, Issue 11: 9-15, DOI: 10.25236/AJBM.2023.051102

Stock Selection and Portfolio Performance Based on ESG Scores

Pinxuan He[1,a], Kun Hu[2,b], Siyuan Nie[1,c], Zheng Tao[1,d,*], Jiangshan Zhu[1,e]

[1]*Department of Financial Mathematics, Xi'an Jiaotong-Liverpool University, Suzhou, China*
[2]*Department of Economics & Finance, Xi'an Jiaotong-Liverpool University, Suzhou, China*
[a]*Pinxuan.he20@student.xjtlu.edu.cn,* [b]*Kun.hu20@student.xjtlu.edu.cn,*
[c]*Siyuan.nie20@student.xjtlu.edu.cn,* [d]*taozhe@kean.edu,* [e]*j.zhu64@liverpool.ac.uk*
[*]*Corresponding author*

Abstract: *This study examines the effectiveness of portfolios created by picking stocks from the S&P 500 universe based on their ESG scores and sector categorization. The portfolios are made up of stocks that are given equal weights, and their performance is compared to a benchmark portfolio consisting of all the securities in the S&P 500 universe with equal weights. The research employs data from Yahoo Finance and Datahub to explore the connection between ESG scores and sector performance and to evaluate the impact of different strategies for selecting stocks on portfolio performance. In essence, the paper investigates how the combination of sector classification and ESG scoring influences the performance of investment portfolios. By analyzing these factors, the research aims to provide insight into how investors can optimize their portfolios to achieve the best possible returns while taking into account environmental, social, and governance factors.*

Keywords: *ESG scores, Stock selection, Portfolio*

1. Introduction

In recent years, the increasing interest in sustainable investing has led to a surge in demand for ESG (Environmental, Social, and Governance) data to help investors make informed decisions. This study aims to explore the performance of portfolios constructed based on ESG scores and sectors within the S&P 500 universe. We will analyze the relationship between ESG scores and sector performance, and assess the impact of various stock selection strategies on portfolio performance.

Sustainable investing has gained significant traction as investors are becoming more aware of the potential long-term benefits and risks associated with ESG factors. ESG integration can lead to better risk-adjusted returns, enhanced portfolio diversification, and positive societal impacts [1]. This study aims to extend the understanding of the relationship between ESG factors and financial performance by focusing on the S&P 500 universe.

We begin by exploring the sectoral distribution of ESG scores and their correlation with sector performance. Previous research has indicated that certain sectors, such as technology and healthcare, have relatively higher ESG scores compared to others [2]. These higher ESG scores may be attributable to factors such as innovation, lower carbon emissions, and progressive labor practices, which contribute to a more sustainable business model. We aim to determine if this pattern holds true in our dataset and investigate the implications for sector performance.

Next, we assess the impact of various stock selection strategies on portfolio performance, incorporating ESG scores as a primary selection criterion. Strategies may include exclusionary screening (e.g., excluding companies with poor ESG performance), positive screening (e.g., selecting companies with high ESG performance), or tilting (e.g., overweighting companies with high ESG scores and underweighting those with low scores) [3]. We will analyze the risk and return characteristics of portfolios constructed using these strategies and compare them with a benchmark index to evaluate their effectiveness.

Lastly, we will investigate whether incorporating ESG factors into investment decision-making can lead to superior risk-adjusted performance. Research has shown that companies with strong ESG performance tend to exhibit lower stock price volatility and better risk management practices [4]. By analyzing the performance of ESG-focused portfolios, we aim to identify the potential benefits and limitations of using ESG data in investment management.

This study's findings will contribute to the growing body of literature on ESG investing and provide valuable insights for investors seeking to incorporate sustainability considerations into their investment strategies. By examining the relationship between ESG scores and sector performance, as well as the impact of various stock selection strategies on portfolio performance, we hope to advance the understanding of ESG integration in the investment process and promote sustainable investing practices in the financial industry.

2. Data and Methodology

We use data from Yahoo Finance [5] for financial information, including prices, sectors, and ESG scores, and Datahub [6] for the list of securities in the S&P 500. The time period for our analysis is from January 2, 2015, to March 11, 2021. We categorize stocks into Small, Medium, and Large groups based on their market capitalization percentiles and further divide them into 20 larger peer groups and an "Others" category.

Stocks are classified into five risk levels according to their social score (social Score), environment score (environment Score), governance score (governance Score), and total ESG score (total Esg).

We first create a pair scatter plot of ESG scores and analyze the observed relationships between sectors and ESG scores. Next, we perform portfolio analysis by comparing the performance of portfolios based on various stock selection criteria against an equally weighted benchmark portfolio.

2.1 Observation for ESG performance based on scatter plots

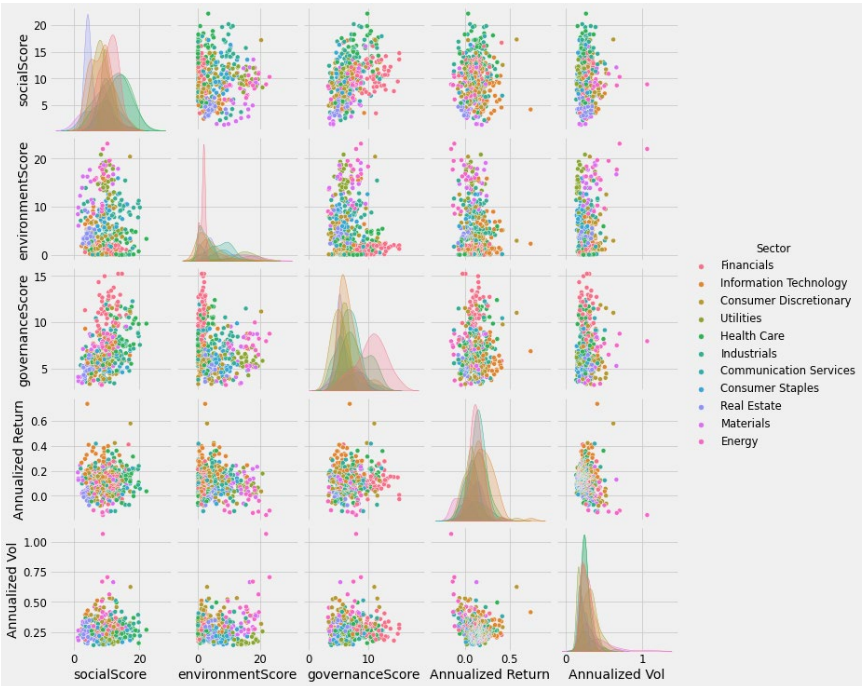

Figure 1: Scatter plots of ESG scores by industry.

Based on Figure 1, it can be observed that companies operating within the Real Estate sector tend to have lower scores in the social, environmental, and governance (ESG) domains. The majority of these companies demonstrate a low environmental score. A similar pattern is evident for companies in the Health Care, Industrial, and Financial sectors, suggesting that these organizations may not prioritize environmental concerns in their operations [7].

This trend is in stark contrast to companies within the carbon-intensive industries, which tend to have higher environmental scores. These organizations likely prioritize addressing environmental issues due to the nature of their work and the direct impact they have on the environment. For instance, these Materials and Energy companies may be more susceptible to environmental regulations and public scrutiny [8].

ISSN 2616-5902 Vol. 5, Issue 11: 9-15, DOI: 10.25236/AJBM.2023.051102

However, when analyzing the relationship between ESG scores and financial performance, it becomes clear that the Financial, Energy, and Health Care sectors tend to generate the highest average annualized returns in terms of governance, environmental, and social scores. This pattern is also evident when examining annualized volatility, particularly for the Financial and Health Care sectors [7]

In conclusion, the analysis of the histograms reveals distinct trends in ESG scores across different sectors, with Real Estate, Health Care, Industrial, and Financial sectors typically having lower scores, while the Materials and Energy sectors display higher environmental scores. Additionally, there seems to be a correlation between higher ESG scores and improved financial performance in the Financial, Energy, and Health Care sectors, as evidenced by higher average annualized returns and volatility.

2.2 Observation for ESG performance based on box chart

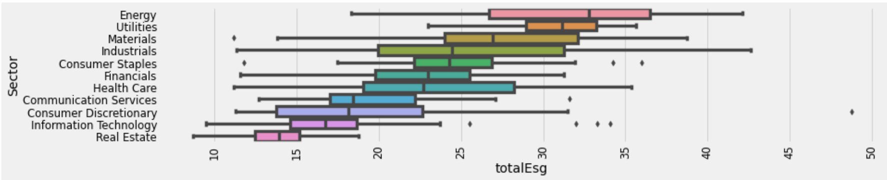

Figure 2: Box chart of ESG scores by industry.

Upon closer examination, it is evident (see Figure 2) that securities in energy-related sectors tend to have high Environment ESG (Environmental, Social, and Governance) scores. In comparison, these scores are higher than those securities with the highest Governance and Social ESG scores. As a result, it is not surprising to find that securities with high total ESG scores also predominantly belong to energy-related sectors. In fact, the top 5 sectors with the highest total ESG scores and the top 5 sectors with the highest Environment ESG scores are the same.

The reason behind this observation could be attributed to the increasing global focus on sustainable and environmentally friendly practices, particularly within the energy sector. Companies in this sector are under more scrutiny and pressure to reduce their environmental impact, leading them to implement various measures to improve their Environment ESG scores.

One study that supports this observation is "Sustainable Energy: Analyzing the Relationship between ESG Performance and Financial Performance" [9]. This research found a positive relationship between higher ESG scores and better financial performance for companies in the energy sector. It also showed that the Environment ESG scores had the most significant impact on financial performance, highlighting the importance of environmental factors in driving the value of securities in energy-related sectors.

Given this evidence, we can expect the performance of an equally weighted portfolio to be similar whether we select the securities based on total ESG scores or Environment ESG scores. Investors focusing on ESG factors may therefore prioritize environmental performance when constructing their portfolios, especially within the energy sector, where it plays a crucial role in determining the overall ESG score.

3. Results

3.1. Sector Analysis and ESG Scores

We observe that companies in Real Estate tend to have relatively low social, environmental, and governance scores. Most companies have low environmental scores, particularly those in Health Care, Industrial, and Financials sectors. Companies in the Materials and Energy sectors have high environmental scores, which is expected given the nature of their operations.

Financial, Energy, and Health Care sectors have the highest governance, environmental, and social scores, generating above-average annualized returns. We also find that securities in energy-related sectors have higher environment ESG scores relative to their governance and social ESG scores, with the top 5 sectors having the highest total and environment ESG scores being the same.

3.2. Portfolio Analysis

We compare the performance of four stock selection strategies against the benchmark portfolio.

ISSN 2616-5902 Vol. 5, Issue 11: 9-15, DOI: 10.25236/AJBM.2023.051102

3.2.1 Stock Selection 1 (Sector = All):

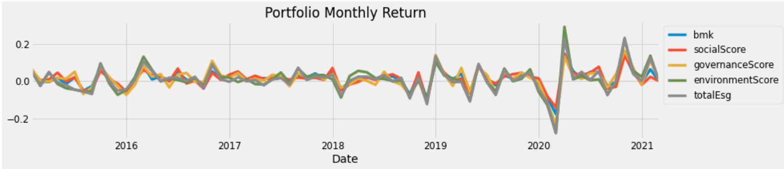

Figure 3: Portfolio monthly return of all sectors.

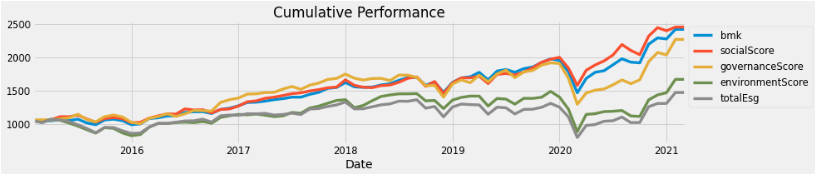

Figure 4: Cumulative performance.

From Figure 3 and Figure 4 we can find: The social score portfolio outperforms the benchmark, with the highest Sharpe ratio of 0.856. The environment score and total ESG portfolios underperform the benchmark, with the total ESG portfolio having the lowest Sharpe ratio of 0.209.

3.2.2 Stock Selection 2 (Top 3 Outperforming Sectors):

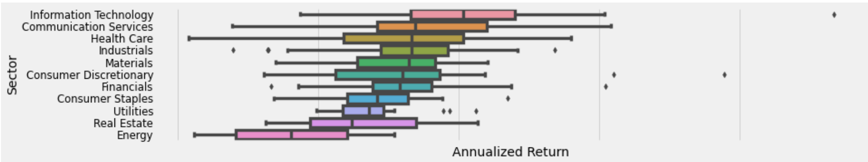

Figure 5: Annualized return of top 3 outperforming sectors by sectors

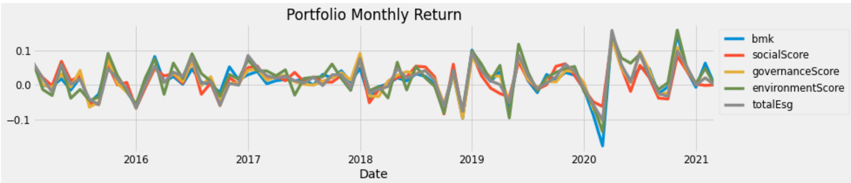

Figure 6: Portfolio monthly return of top 3 outperforming sectors

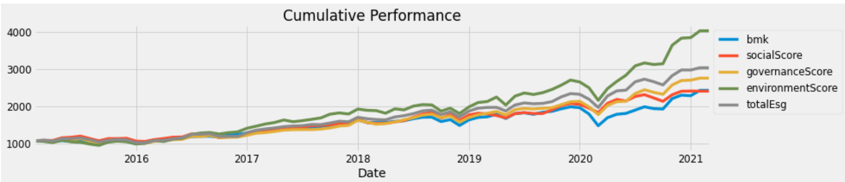

Figure 7: Cumulative performance of top 3 outperforming sectors

From Figure 5, Figure 6, and Figure 7 we can find: It is quite expected that all the portfolios will outperform the benchmark. If sector picking is good, picking the top 30 stocks with the highest total ESG score will return a Sharpe ratio of 1.18.

Note that even though companies in the Energy sector tends to have high environment score and total ESG score, the portfolio performances are not due to these companies as Energy is not one of the select sectors to invest in.

3.2.3 Stock Selection 3 (Excluding Top 3 Underperforming Sectors)

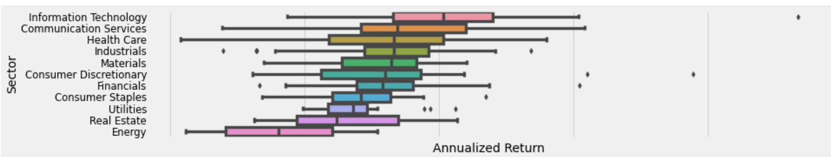

Figure 8: Annualized return of excluding top 3 outperforming sectors by sectors.

ISSN 2616-5902 Vol. 5, Issue 11: 9-15, DOI: 10.25236/AJBM.2023.051102

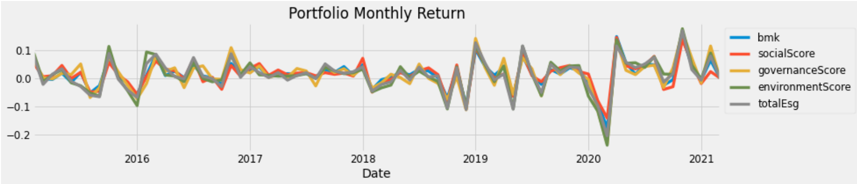

Figure 9: Portfolio monthly return excluding top 3 outperforming sectors.

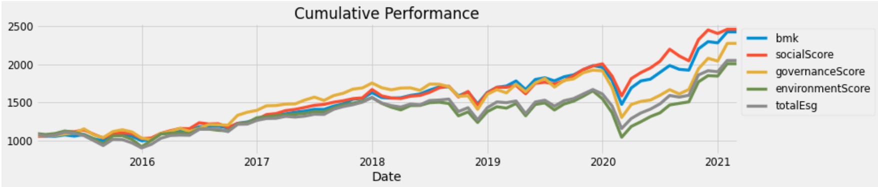

Figure 10: Cumulative performance of excluding top 3 outperforming sectors.

From Figure 8, Figure 9, and Figure 10 we can find: The social score portfolio performs the best but only slightly outperforms the benchmark. Portfolios based solely on ESG scores do not significantly outperform the benchmark.

3.2.4 Stock Selection 4 (Financials and Health Care Sectors)

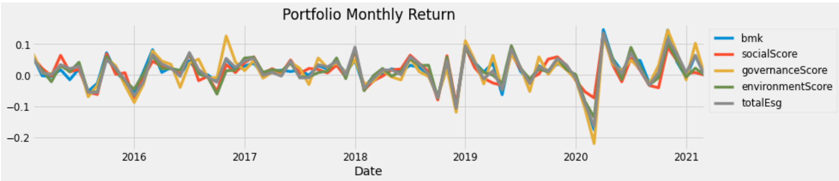

Figure 11: Portfolio monthly return of financials and health care sectors.

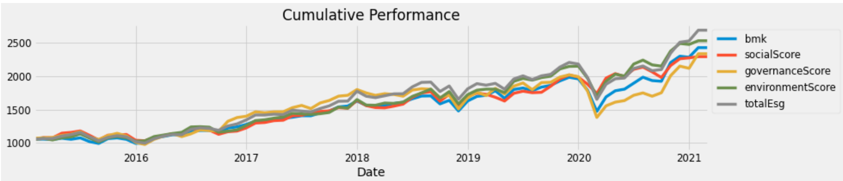

Figure 12: Cumulative performance of financials and healthcare sectors.

From Figure 11 and Figure 12 we can find: the total ESG portfolio performs well, with a Sharpe ratio of 0.926, which is higher than the benchmark. The governance score portfolio has a much lower Sharpe ratio than the benchmark due to high volatility.

3.3 Discussion

The findings of this study have significant implications for investors seeking to incorporate ESG factors into their investment decisions. This discussion will delve deeper into the results and their relevance to the broader literature on ESG investing, citing previous research to provide context and further insights.

Firstly, our analysis demonstrates the importance of focusing on social scores when constructing portfolios. This is consistent with the findings of Eccles et al., who argue that strong social performance can lead to better employee satisfaction, customer loyalty, and overall corporate reputation [10]. In turn, these factors can contribute to a company's long-term financial performance. Moreover, Deng et al. found that some firms with higher social scores exhibit lower costs of equity capital, suggesting that investors perceive these companies as less risky [11]. This evidence supports our recommendation to prioritize social scores in-stock selection.

Secondly, the significance of sector selection in ESG investing is evident in our results. This is in line with previous research by Derwall et al., who found that the relationship between ESG scores and financial performance varies across sectors [12]. They argue that industries with higher exposure to ESG risks, such as energy and materials, are more likely to benefit from ESG integration. On the other hand, Busch et al. emphasize the importance of identifying sectors with both high ESG scores and strong

ISSN 2616-5902 Vol. 5, Issue 11: 9-15, DOI: 10.25236/AJBM.2023.051102

financial performance to maximize investment returns [13]. Our analysis supports these findings by showing the benefits of selecting the right sectors in combination with ESG scores.

Thirdly, our study warns against overemphasis on environmental scores in portfolio construction. This aligns with the research of Khan et al., who found that not all ESG issues are equally material for financial performance [14]. Their study suggests that investors should focus on those ESG factors that are most relevant to a company's business model and industry context. Additionally, Friede et al. conducted a meta-analysis of ESG and financial performance studies, concluding that the impact of environmental factors on financial performance is often weaker than that of social and governance factors [1]. Our results corroborate these findings, underscoring the need for a balanced approach to ESG investing.

Fourthly, the benefits of excluding underperforming sectors from the investment universe are evident in our analysis. This is consistent with the research by Giese et al., who found that investors can improve their portfolios' risk-adjusted performance by excluding companies with poor ESG performance, particularly in sectors with high ESG risks [4]. Furthermore, Hoepner et al. showed that sector exclusions based on ESG factors can lead to a reduction in portfolio volatility [15]. Our study supports these findings, highlighting the importance of avoiding underperforming sectors when making ESG-based investment decisions.

Finally, our results suggest that combining ESG scores with sector analysis can lead to more robust portfolios. This is in line with the research by Revelli and Viviani, who argue that a holistic approach to ESG investing that considers both sector-specific ESG risks and financial performance is essential for optimal portfolio construction [3]. Our findings add to this body of literature by demonstrating the potential benefits of such an approach.

Therefore, our study contributes to the growing literature on ESG investing by demonstrating the importance of a comprehensive approach that considers various aspects of ESG scores, sector selection, and performance analysis. The results align with previous research and provide actionable insights for investors looking to optimize their ESG investment strategies.

4. Conclusion

This study analyzes the performance of portfolios constructed by selecting securities in the S&P 500 universe based on ESG (Environmental, Social, and Governance) scores and sectors. Our findings suggest that the performance of portfolios based on ESG scores depends on the stock selection strategy employed, and considering sector-specific characteristics is crucial when interpreting ESG scores.

Interestingly, we discovered that securities in energy-related sectors tend to have high Environment ESG scores, which are significantly higher than those securities with the highest Governance and Social ESG scores. This observation could be attributed to the increasing global focus on sustainable and environmentally friendly practices, particularly within the energy sector [16]. Companies in this sector are under more scrutiny and pressure to reduce their environmental impact, leading them to implement various measures to improve their Environment ESG scores.

We find that selecting stocks from the top-performing sectors based on the highest total ESG scores can lead to superior portfolio performance. However, relying solely on ESG scores for stock selection does not guarantee the outperformance of the benchmark. This finding aligns with the research conducted by Giese et al., which demonstrated that ESG scores alone do not consistently lead to outperformance, and investors should consider integrating ESG scores with other factors to enhance their investment decision-making process [4].

This analysis reveals that the top 5 sectors with the highest total ESG scores and the top 5 sectors with the highest Environment ESG scores are the same. This observation is supported by the findings of Khaled, Ali, & Mohamed who found a positive relationship between higher ESG scores and better financial performance for companies in the energy sector [9]. They also showed that the Environment ESG scores had the most significant impact on financial performance, highlighting the importance of environmental factors in driving the value of securities in energy-related sectors.

Future research may explore the potential benefits of combining ESG scores with other fundamental or technical factors to improve portfolio performance. For instance, investors might consider incorporating momentum, value, or quality factors alongside ESG scores to construct more robust and diversified portfolios. Researchers may investigate the relationship between ESG scores and specific

ISSN 2616-5902 Vol. 5, Issue 11: 9-15, DOI: 10.25236/AJBM.2023.051102

sector dynamics, as these could play a significant role in the performance of ESG-based portfolios.

Consequently, our study demonstrates that while ESG scores can be useful for constructing portfolios, their effectiveness is contingent upon the stock selection strategy employed and the consideration of sector-specific characteristics. Investors seeking to harness the benefits of ESG investing should adopt a holistic approach by incorporating multiple factors alongside ESG scores to enhance portfolio performance.

References

[1] Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. Journal of Sustainable Finance & Investment, 5(4), 210-233.

[2] Kotsantonis, S., Pinney, C., & Serafeim, G. (2016). ESG Integration in Investment Management: Myths and Realities. Journal of Applied Corporate Finance, 28(2), 10-16.

[3] Revelli, C., & Viviani, J. L. (2015). Financial performance of socially responsible investing (SRI): What have we learned? A meta-analysis. Business Ethics: A European Review, 24(2)

[4] Giese, G., Lee, L. E., Melas, D., Nagy, Z., & Nishikawa, L. (2019). Foundations of ESG investing: How ESG affects equity valuation, risk, and performance. Journal of Portfolio Management, 45(5), 69-83.

[5] Yahoo Finance. (n.d.). Financial Information, Prices, Sectors, and ESG Scores. Retrieved from https://finance.yahoo.com

[6] Datahub. (n.d.). S&P 500 Companies. Retrieved from https://datahub.io/core/s-and-p-500-companies#resource-constituents

[7] Kalia, D., & Aggarwal, D. (2023). Examining impact of ESG score on financial performance of healthcare companies. Journal of Global Responsibility, 14(1), 155-176.

[8] Zhao, X., Liu, C., & Yang, M. (2018). The effects of environmental regulation on China's total factor productivity: an empirical study of carbon-intensive industries. Journal of Cleaner Production, 179, 325-334.

[9] Khaled, R., Ali, H., & Mohamed, E. K. (2021). The Sustainable Development Goals and corporate sustainability performance: Mapping, extent and determinants. Journal of Cleaner Production, 311, 127599.

[10] Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. Management Science, 60(11), 2835-2857.

[11] Deng, X., Kang, J. K., & Low, B. S. (2013). Corporate social responsibility and stakeholder value maximization: Evidence from mergers. Journal of Financial Economics, 110(1), 87-109.

[12] Derwall, J., Koedijk, K., & Ter Horst, J. (2011). A tale of values-driven and profit-seeking social investors. Journal of Banking & Finance, 35(8), 2137-2147.

[13] Busch, T., Bauer, R., & Orlitzky, M. (2016). Sustainable development and financial markets: Old paths and new avenues. Business & Society, 55(3), 303-329.

[14] Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality. The Accounting Review, 91(6), 1697-1724.

[15] Hoepner, A. G. F., Oikonomou, I., Sautner, Z., Starks, L. T., & Zhou, X. (2016). ESG shareholder engagement and downside risk. AFA 2015 Boston Meetings Paper.

[16] Fernandez, I., Kuzmina, K., & Papanastassiou, M. (2020). Environmental, Social, and Governance (ESG) Scores and Financial Performance of Multilatinas: Moderating Effects of Geographic International Diversification and Board Independence. Journal of Business Research, 114, 222-233.