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**Impact of ESG disclosure Score on Investment Portfolio
Performance**

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Abstract

The study evaluates the performance of investment portfolios with high and low environmental, social and governance (ESG) scores, considering both developing and developed economies. Three different allocation strategies are employed, and performance is measured using cumulative returns, standard deviation, and Sharpe Ratios over the period from January 2018 to June 2023. Stocks are categorised into high score (> 60) and low score (< 40) groups. The investigation ascertained whether high or low ESG-score investment strategies yield better financial performance and whether this outcome is influenced by the economic environment. Findings reveal that high ESG-score portfolios showcase superior performance in emerging markets, while low ESG-score

portfolios demonstrate outperformance in developed economies. This distinction suggests that the effectiveness of ESG-based investment strategies varies based on the economic context.

Keywords: *ESG scores, portfolio performance, asset allocation, investment strategy*

JEL classification: C2, C5, G11, G14

1. Introduction

The development of Environmental, Social, and Governance (ESG) scoring has evolved significantly. In the 1960s and 1970s, socially responsible investing (SRI) emerged, focusing on avoiding investments in unethical activities like tobacco and arms manufacturing. By the 1980s, corporate social responsibility (CSR) gained traction, with companies beginning to report on social and environmental impacts voluntarily. The 1990s saw the introduction of the term ESG and the realisation that these factors could impact financial performance, leading to the launch of the Dow Jones Sustainability Index in 1999. The 2000s marked the development of structured ESG frameworks and guidelines, such as the Global Reporting Initiative (GRI) standards. In the 2010s, ESG factors became more integrated into mainstream investment analysis, spurred by the growth of dedicated ESG rating agencies like MSCI and Sustainalytics. The adoption of the Paris Agreement and the UN Sustainable Development Goals in 2015 further drove ESG integration into corporate and investment strategies. The EU's 2018 Action Plan on Sustainable Finance aimed to channel more capital into sustainable investments and improve transparency in ESG disclosures.

ESG considerations have become integral to investment decision-making globally, reflecting a company's stance on environmental stewardship, social responsibility, and governance (Kulal et al., 2023). These factors encompass aspects such as carbon emissions, diversity and inclusion, executive compensation, and board governance. Despite being a relatively new field, the integration of ESG criteria into investment practices significantly impacts portfolio performance and aligns with sustainable profitability and growth objectives.

This article addresses the intersection of sustainability and investment theory by examining the interplay between ESG disclosure scores and the financial performance of investment portfolios to shed light on the implications of ESG investing in developed and emerging markets. The

findings have the potential to inform the investment strategies of asset managers and investors regarding the effects of ESG scores on financial performance in differing economic contexts. Using securities from a developed economy (US) and securities from an aggregation of emerging markets (Brazil, India, and South Africa), this article explores the performance of three different investment allocation strategies, namely the equally weighted (EW), minimum variance (MV), and risk parity (RP) approaches with high and low ESG scores, in both market milieus. The Equally Weighted (EW) strategy assigns an equal weight to each asset in the portfolio. For example, in a portfolio of ten assets, each asset would comprise 10% of the total portfolio value. This approach is simple and ensures diversification but does not consider the risk or return characteristics of the assets. The Minimum Variance (MV) approach assembles a portfolio that has the lowest possible volatility (variance) given a set of assets. This is achieved by optimising the asset weights based on their individual volatilities and correlations with each other, resulting in a portfolio that minimises risk by assigning higher allocations to lower-volatility assets. The Risk Parity (RP) strategy allocates weights to assets such that each asset contributes equally to the overall portfolio risk. Unlike EW, which ignores risk, and MV, which minimises risk, RP ensures that risk contributions are balanced, often resulting in more diversified risk exposures across different asset classes, with lower allocations to higher-risk assets and higher allocations to lower-risk assets.

This article proceeds with a review of the relevant literature in Section 2, while Section 3 sets out the data collection and analytical methodologies employed. Section 4 presents the results of the research and Section 5 presents an in-depth discussion of the findings. Section 6 concludes.

2. Literature Review

The evolving landscape of global finance has been heavily influenced by the rise of ESG considerations, and as these principles have embedded themselves in investment strategies and decisions – the literature has begun to uncover the relationship between ESG factors and corporate financial performance.

2.1 EW Portfolio

The EW portfolio, also termed ‘naïve diversification’, assigns equal weights to each constituent security regardless of intrinsic risk and return (Bessler, Taushanov, & Wolff, 2021). EW portfolios can produce better performance than some optimising models. DeMiguel, Garlappi, & Uppal (2006) found that even small errors in asset return estimation can result in large portfolio weight differences, so “allocation errors” using the EW strategy turn out to be smaller than those arising from optimisation models.

2.2 MV portfolio

The MV portfolio (Markowitz, 1952) set out a mathematical framework which identifies the assets weights which generate the leftmost point of Markowitz’s (1959) efficient set (maximal returns more than the relevant risk-free rate per unit of risk), i.e., the lowest portfolio risk for the chosen assets.

2.3 RP portfolio

The RP portfolio distributes market risk equally among constituent portfolio assets. This approach is unlike conventional asset allocation methods which typically involve forecasting asset expected returns combined with a mean-variance optimisation. The RP strategy combines securities only through risk diversification (Qian, 2011) by assigning lower weights to securities that display greater levels of volatility and higher weights to securities with lower volatility (Chaves, Hsu, Li, & Shakernia, 2010).

2.4 ESG scores and financial performance

Pulino et al. (2022) analysed ESG disclosures among Italy's largest listed firms from 2011 to 2020. They found that better ESG disclosures generally improved firm performance, including EBIT and ROA. However, initial capital investments to mitigate emissions initially impacted ROA negatively.

Gompers, Ishii, & Metrick (2003) found that firms with strong corporate governance, indicating robust shareholder rights, correlated positively with stock returns. Their strategy of buying stocks with high

governance scores and shorting those with low scores yielded annual abnormal returns of 8.5%.

Friede, Busch, & Bassen (2015) synthesised findings from over 3,700 results across 2,200 studies, revealing that the majority (over 2,100 studies) support a positive correlation between ESG factors and corporate financial performance. This contrasts with about 150 portfolio studies showing neutral or mixed results, underscoring ESG's potential to enhance financial outcomes, especially in emerging economies.

Eccles, Ioannou, & Serafeim (2014) studied 180 US firms categorised into "low sustainability" and "high sustainability" groups. Over 18 years, high sustainability firms integrating ESG factors outperformed low sustainability firms in stock market performance and accounting measures, defying market expectations. The study also linked mandated ESG disclosures to higher firm valuations across diverse markets (China, Denmark, Malaysia, and South Africa).

Cheng, Ioannou, & Serafeim (2014) explored the link between strong corporate social responsibility (CSR) performance and improved access to finance. Their research suggested that firms with high CSR scores benefit from reduced agency costs due to increased stakeholder engagement and decreased informational asymmetry from enhanced transparency. Their broad cross-sectional analysis indicated that firms with strong CSR practices face fewer obstacles when seeking finance.

Ioannou & Serafeim (2015) examined how CSR ratings influence sell-side analysts' investment recommendations. Their study, spanning 15 years and focusing on publicly listed US firms, initially found that robust CSR performance was associated with more pessimistic investment recommendations due to perceived higher agency costs. However, as the business landscape shifted towards a more stakeholder-focused approach, analysts' perceptions evolved, leading to a more optimistic outlook on firms with high CSR ratings over time.

Almeyda & Darmansya (2019) found statistically significant positive relationships between ESG disclosure and firm performance, specifically return on assets and return on capital, in a panel data analysis of G7 real estate companies from 2014 to 2018. In contrast, Atan et al. (2016) conducted a comparative study on the effect of ESG disclosures on firm performance in Malaysia and Denmark. They analysed the top 100 largest companies in each country's stock exchange and concluded that there was no association between ESG disclosure scores and financial performance in either country.

3.Data and methodology

Using securities selected based on ESG disclosure scores, portfolios were constructed to explore the impact of these ESG disclosure scores on portfolio performance in a developed and developing economies.

Brazil, India, and South Africa are united economically as emerging markets with diverse economies, characterised by rapid industrialisation and significant growth potential. They are all members of the BRICS association, promoting economic cooperation and political dialogue among major developing economies. These countries share common economic challenges such as income inequality, infrastructure deficits, and the need for sustainable development. Rich in natural resources, they leverage their large populations and diverse industries (Brazil's agriculture, India's IT services, and South Africa's mining) to drive economic growth. They are also active in global economic governance and engage in South-South cooperation, emphasising mutual support and development among developing nations. The GDP of the five emerging economies which constitute the BRICS alliance is currently (2024) growing the fastest amongst global emerging economies. The three economies selected for this study included Brazil, India, and South Africa. The indices chosen for the analysis were then the IBOVESPA (Brazil), the NIFTY 500 (India), and the JSE ALSI (South Africa). Russia and China were excluded because of restrictive data accessibility and scarcity. Brazil, India, and South Africa have amenable and accessible data availability, collectively accounting for 30% of the Dow Jones Emerging Market Index (S&P Global, 2023).

Developed economy (US) data were assembled from the S&P 500.

High-ESG portfolios in the US included S&P 500 stocks with ESG scores >60 from 2018 to 2023, while low-ESG portfolios comprised stocks with scores <40. The same criteria applied to assemble portfolios in emerging markets (IBOVESPA, NIFTY 500, JSE ALSI), with data converted to dollars for comparison.

Monthly price data and market capitalisation data for all stocks (spanning January 2015 to June 2023) were used as this period contains the market turbulence as the result of the COVID-19 pandemic and the subsequent economic recovery, as well as the geopolitical instability precipitated by Russia's invasion of Ukraine beginning in early 2022. A rolling period of three years of data was used to calculate covariance matrices. Each portfolio comprised 30 stocks, reflecting a realistic simulation of an asset manager's diversified investment portfolio.

Portfolios were split into highest and lowest-ESG scores, alongside further divisions based on market capitalization for both US and emerging markets. The high-ESG group (>60 score) comprised the top 30 stocks by market cap to form a high-ESG/high market cap portfolio. Conversely, the low-ESG group (<40 score) included the top 30 market cap stocks, creating a low-ESG/high market cap portfolio. Annual rebalancing occurred based on both ESG scores and market cap data throughout the observation period.

The EW standard deviation, (EW volatility, σ_{EW}) is $\sigma_{EW} = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (r_t - \mu)^2}$ where μ is the average return measured over the sample comprising T samples, and r_t is the t^{th} sample value (or return, in this case). The exponentially weighted moving average (EWMA) approach weighs return data such that, the longer ago in the past an event occurred, the lower the weight assigned to that datum. The iterative formula governing the evolution in time of the EWMA volatility is $\sigma_{EWMA} = \sqrt{\lambda \sigma_{t-1}^2 + (1 - \lambda) r_t^2}$ where σ_{t-1}^2 is the previous period's variance, r_t^2 is the current period's squared return and λ is a market-specific decay factor, calculated from market-specific data (JP Morgan, 1996).

2.1 EW Portfolio

For n assets, the vector of weights, $\mathbf{w}_{EW}$, assigned to the n portfolio constituents are $\mathbf{w}_{EW} = \frac{1}{n}$. This is the portfolio that maximises the Herfindahl index, $\mathcal{H} \equiv 1 - \mathbf{w}'\mathbf{w}$ such that $0 \leq \mathcal{H} \leq 1/n$. $\mathcal{H} = 0$ represents a maximally concentrated portfolio and $\mathcal{H} = 1/n$ a fully diversified one.

2.2 MV portfolio

MV portfolio weights are calculated using $\mathbf{w}_{MV} = \frac{\Sigma^{-1} \mathbf{1}}{\mathbf{1}' \Sigma^{-1} \mathbf{1}}$ where $\mathbf{w}_{MV}$ are the MV portfolio weights, Σ^{-1} is the inverse of the $n \times n$ covariance matrix of relevant asset returns, $\mathbf{1}$ is a $n \times 1$ vector of 1s.

2.3 RP portfolio

Inverse volatility weighted portfolios allocate smaller weights to highly volatile assets and larger weights to lower volatile assets. The weights of individual portfolio assets are thus proportional to the reciprocals of their individual volatilities $w_{RP}^i = \frac{\frac{1}{\sigma_i}}{\sum_{i=1}^n \frac{1}{\sigma_i}}$ where σ_i is the volatility of the i th return series, n is the number of return series in the sample and w^i is the weight allocated to the i th asset.

3. Results

The study period spans from January 2018 to June 2023, covering economic cycles of expansion and contraction. This timeframe enables an examination of whether high- or low-ESG investment strategies provided benefits such as downside protection during crises or upside potential during economic growth phases.

3.1 EW Portfolio

The EW portfolio has been found to yield superior returns (MSCI Inc., 2015). This method assigns an equal weighting of 3.33% to each of the 30 stocks in both high- and low-ESG score portfolios.

3.1.1 US EW portfolios

Low-ESG portfolios consistently outperformed high-ESG counterparts in monthly returns, with the lowest-ESG portfolio achieving the highest average return (16.85%). High-ESG portfolios, in contrast, showed lower average monthly returns (6.73% for the highest-ESG). Despite the higher returns of low-ESG portfolios, they exhibited comparable or lower levels of risk relative to high-ESG portfolios in developed economies.

Figures 1 and 2 illustrate these trends: Figure 1 shows cumulative returns of US EW portfolios over the period, while Figure 2 presents the exponentially weighted moving average of volatility for each portfolio. Figure 1 shows cumulative returns for US EW portfolios from January 2018 to June 2023. The lowest ESG score portfolio had the highest returns at 86.84%, outperforming the highest ESG score (44.94%) and low-ESG high market cap (43.12%) portfolios. The high-ESG high

market cap portfolio had the lowest returns at 31.90%. Both high-ESG and low-ESG portfolios showed similar patterns and pre-pandemic fluctuations. The COVID-19 market crash in February 2020 caused all portfolios to drop significantly, with both high-ESG portfolios going negative. The lowest-ESG score portfolio surged from April 2020 to April 2021, increasing from 27.82% to 101.29% in cumulative returns.

Following the pandemic, all portfolios saw significant cumulative return growth until January 2022, but they declined after the Russia-Ukraine conflict. The low-ESG score and high market cap portfolio experienced a substantial 25% drop in cumulative returns from March to June 2022.

Figure 2 depicts how the standard deviation (risk) of each portfolio moved similarly, reflecting broader market conditions. Early 2019 saw a slight increase in volatility followed by a decrease throughout the year. The COVID-19 pandemic in February 2020 caused a significant spike in risk levels across all portfolios, coinciding with a downturn in returns. The highest ESG score portfolio saw the largest volatility increase, with its standard deviation rising over 60% from 3.77% to 6.20% between January and April 2020. Conversely, high market cap portfolios had smaller volatility spikes, with the high-ESG score and high market cap portfolio showing the least impact, with about a 30% increase in standard deviation during the same period.

After February 2020, all portfolios had higher standard deviations than pre-pandemic levels. Volatility decreased in 2021 but rose again in 2022 due to the Russia-Ukraine conflict. The high-ESG and high market cap portfolio reached its highest risk level of 5.78% in November 2022, while the highest-ESG portfolio's standard deviation rose to 5.85%, nearing its February 2020 peak of 6.20%.

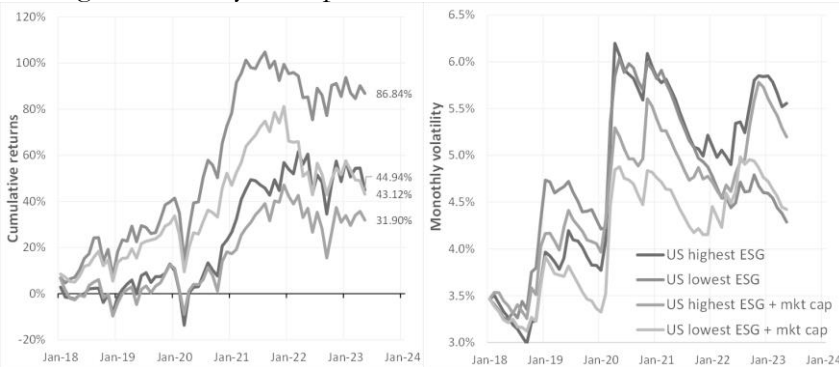


Figure 1 (left panel): Cumulative returns of US EW portfolios Jan 2018 – Jun 2023 and **Figure 2** (right panel): standard deviation of US EW portfolios Jan 2018 – Jun 2023.

The analysis of Sharpe Ratios for four portfolios revealed that low-ESG portfolios consistently outperformed high-ESG ones. The low-ESG and high market cap portfolio had the highest average Sharpe ratio (1.71), followed by the high-ESG and high market cap portfolio (1.13). The lowest-ESG portfolio outperformed the highest-ESG portfolio with an average Sharpe ratio of 0.92 compared to 0.75.

3.1.2 *Developing economy EW portfolios*

In developing economy portfolios, the highest-ESG score portfolio had the highest average monthly return (3.01%) but varied widely (-23.01% to 12.64%) with standard deviation ranging from 3.99% to 10.68%. High-ESG score and high market cap portfolios had an average monthly return of 1.68%, fluctuating between -21.61% and 9.49%, with standard deviation between 3.89% and 10.07%, and both the lowest-ESG score and low-ESG score and high market cap portfolios posted negative average monthly returns (-10.59% and -5.37% respectively).

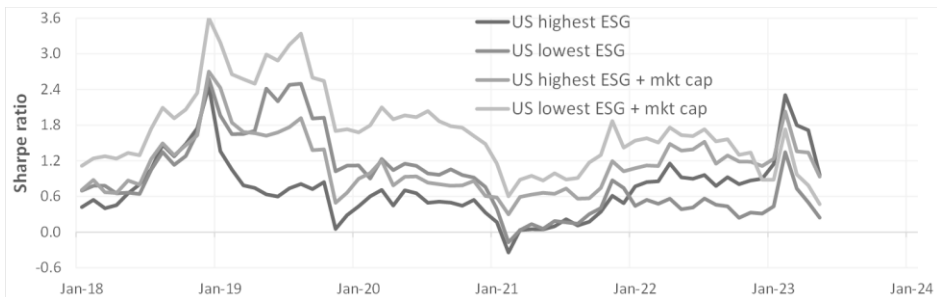


Figure 3: Sharpe Ratios of US EW portfolios Jan 2018 – Jun 2023.]

Figure 4 displays cumulative returns of developing economy EW portfolios, while Figure 5 shows standard deviation levels for the same portfolios. High-ESG portfolios outperformed low-ESG counterparts: highest-ESG and high-ESG and high market cap portfolios achieved cumulative returns of 31.74% and 19.62%, respectively, whereas lowest-ESG and low-ESG and high market cap portfolios had returns of -5.69% and 3.15%, respectively.

From January 2018 to January 2020, high-ESG score portfolios had modest positive cumulative returns, while low-ESG score portfolios, especially the lowest-ESG one, suffered significant losses (-34.86%). During the COVID-19 crisis, all EW developing economy portfolios plummeted, with the lowest-ESG portfolio reaching -60.27% cumulative

return by March 2020. Post-pandemic, high-ESG portfolios recovered swiftly into positive territory by the end of 2020, whereas low-ESG portfolios took until mid-2021 to return to positive returns.

Between January 2018 and January 2021, high-ESG score portfolios showed similar returns, but the highest-ESG score portfolio began to outperform the high-ESG and high market cap portfolio thereafter. In 2022, low-ESG score portfolios had slightly negative cumulative returns, while high-ESG score portfolios, particularly the highest-ESG score portfolio, saw significant declines from 65.86% to 24.60% between March and September 2022 due to the Russia-Ukraine conflict. These results contrast somewhat with findings in US portfolios, suggesting higher returns from high-ESG score stocks in emerging markets and better performance from lower-ESG score stocks in developed markets.

Emerging market portfolios, particularly the lowest-ESG score portfolio, consistently exhibited higher volatility compared to US portfolios (Figure 5). The onset of the COVID-19 pandemic in February 2020 led to a sharp increase in volatility across all emerging market portfolios. Post-pandemic, these portfolios continued to experience higher volatility compared to their US counterparts. Specifically, from January to April 2020, high-ESG score and high market cap, as well as low-ESG score and high market cap portfolios, saw significant spikes in standard deviations (142.73%, 142.62%, and 123.80% respectively), while the lowest-ESG score portfolio increased by 98.80% from January to June 2020.

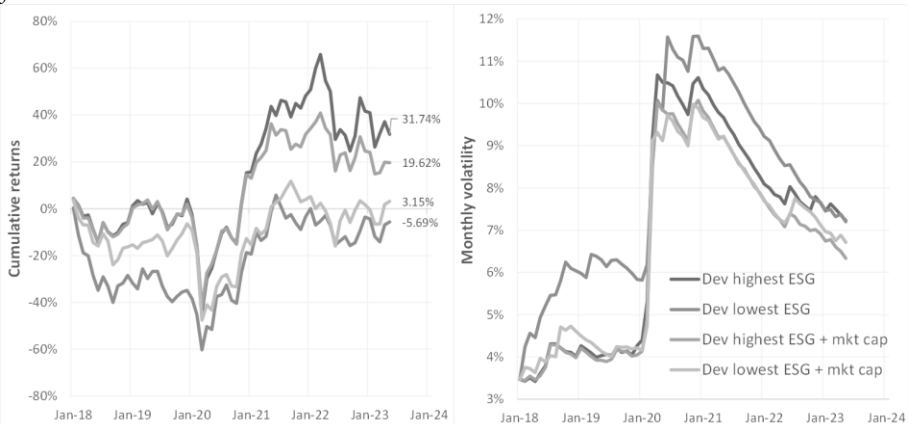


Figure 4 (left panel): Cumulative returns of developing economy EW portfolios Jan 2018 – Jun 2023 and **Figure 5** (right panel): standard deviation of developing economy EW portfolios.

Post-pandemic, although standard deviations decreased, they remained elevated from mid-2020 to June 2023, indicating higher risk levels despite substantial cumulative return increases. Figure 6 shows Sharpe Ratios for developing economy portfolios, offering insights into risk-adjusted returns over time.

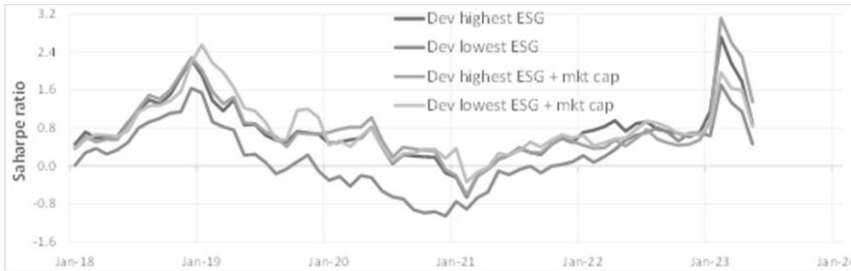


Figure 6: Developing Economy EW Sharpe Ratios Jan 2018 – Jun 2023.

Sharpe Ratios follow highly correlated movements over the observation period, and the period of post-pandemic recovery is characterised by relatively low Sharpe Ratios across because of large increases in volatility. The lowest-ESG score portfolio had the lowest average Sharpe Ratio of 0.22, while the other three portfolios had similar average Sharpe Ratios between 0.75 and 0.80.

3.2 MV portfolios

The MV portfolio strategy focuses on minimising standard deviation by strategically selecting and weighting securities to reduce their joint correlations (Clarke, Silva, & Thorley, 2006). This approach, favoured by pension funds or risk-averse investors seeking safe investments to mitigate financial losses during market downturns, may not maximise returns.

3.2.1 US MV Portfolios

Figure 7 indicates that the high-ESG score and high market cap portfolio returned 45.37%, while the low-ESG score and high market cap portfolio returned 19.10% over the period. Cumulatively, the lowest-ESG score portfolio outperformed the highest-ESG portfolio with returns of 33.99% and 28.47% respectively. This highlights the uncertainty in the performance superiority between high- and low-ESG score strategies in developed economies.

High-ESG score portfolios initially had negative returns before the pandemic and experienced significant downturns in early 2020. Despite a strong recovery post-pandemic, these portfolios showed higher volatility compared to low-ESG score portfolios, which maintained stable performance. This volatility led to a decline in cumulative returns for high-ESG score and high market cap portfolios from July to September 2022, while low-ESG score portfolios remained steady. This period coincided with increased Russian missile strikes on Ukrainian ports critical for grain and food exports (Secieru, 2022).

Figure 8 supports Figure 7, showing that both low-ESG score portfolios consistently had lower volatility than high-ESG score portfolios throughout the period. Low-ESG portfolios generally saw decreasing standard deviation with a slight increase during the COVID-19 turmoil. Specifically, the lowest-ESG portfolio increased by 11.31% in standard deviation from January to April 2020, while the low-ESG and high market cap portfolio rose by 7.84% over the same period. In contrast, the highest-ESG portfolio increased by 28.4% in volatility from January to April 2020, and the high-ESG and high market cap portfolio saw a 38.5% rise in standard deviation throughout 2020.

The volatility levels for low-ESG score portfolios steadily decreased for the remaining observation period and remained largely unaffected throughout 2022. In contrast, both high-ESG portfolios experienced spikes in volatility, coinciding with the downturn in returns toward the end of 2022.

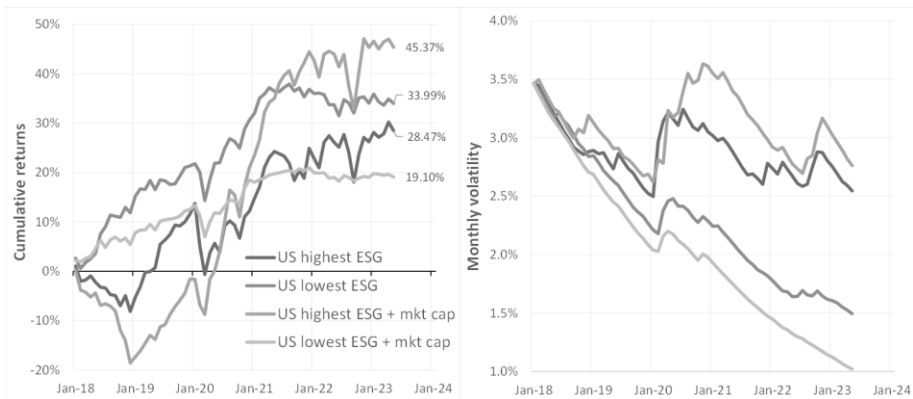


Figure 7 (left panel): Cumulative returns of US MV Portfolios Jan 2018 – Jun 2023 and **Figure 8** (right panel): standard deviation of US MV portfolios.

Figure 9 shows the Sharpe Ratios of US MV portfolios. Low-ESG score and high market cap portfolios produced the highest average Sharpe Ratio of 0.87.

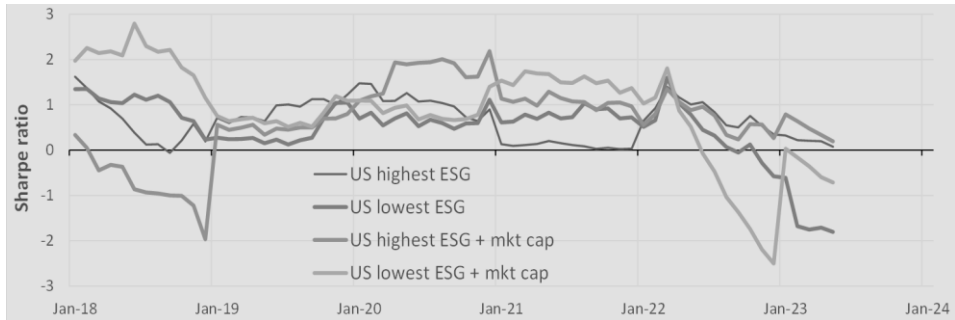


Figure 9: Sharpe Ratios of US MV portfolios Jan 2018 – Jun 2023.

Despite experiencing the greatest increase in risk during 2020, high-ESG score and high market cap portfolio produced the highest Sharpe Ratio throughout 2020 implying that the relative increase in risk was offset by superior risk-adjusted returns.

3.2.2 *Developing Economy MV Portfolios*

High-ESG score portfolios outperformed low-ESG counterparts in cumulative returns: highest-ESG score portfolio 88.94%, high-ESG and high market cap 44.05%. Lowest-ESG score portfolio -45.64%, low-ESG score and high market cap 0.27%.

Over the period from January 2018 to January 2020, all portfolios experienced negative cumulative returns. During the onset of the COVID-19 pandemic, there was a significant decline across all portfolios, with the highest-ESG score portfolio dropping notably by 21.07% from January to March 2020. Post-pandemic recovery favored high-ESG score portfolios, particularly the high-ESG score and high market cap portfolio, which achieved a cumulative return of 53.86% by January 2022. In contrast, low-ESG score portfolios struggled to recover and generally maintained negative cumulative returns throughout the entire period.

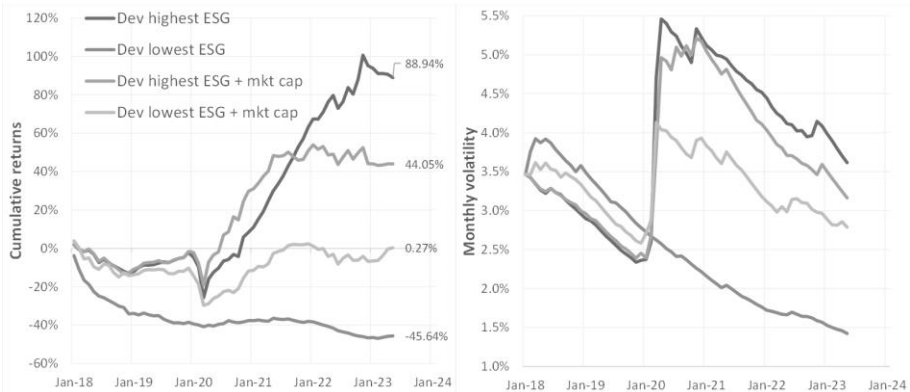


Figure 10 (left panel): Cumulative returns of developing economy MV portfolios Jan 2018 – Jun 2023 and **Figure 11** (right panel): Standard deviation of developing economy MV portfolios.

Figure 11 depicts the volatility trends of various portfolios over the observation period. Before the pandemic, all portfolios initially decreased in volatility, followed by a sharp increase during the COVID-19 market crash. The highest-ESG score portfolio saw the most significant spikes, with volatility rising from 2.37% to 5.46% in early 2020. The high-ESG score and high market cap portfolio also experienced an increase from 2.40% to 4.98% during this period. In contrast, the lowest-ESG portfolio's volatility continued to decrease over time, while the low-ESG and high market cap portfolio showed increased but less pronounced volatility compared to high-ESG portfolios.

Despite the higher risk, high-ESG score portfolios achieved superior risk-adjusted returns, with average Sharpe Ratios of 0.60 and 0.68 for the highest-ESG score and high-ESG score and high market cap portfolios, respectively. In contrast, low-ESG score portfolios exhibited lower Sharpe Ratios of -0.21 and 0.28 for the lowest-ESG score and low-ESG score and high market cap portfolios, respectively.

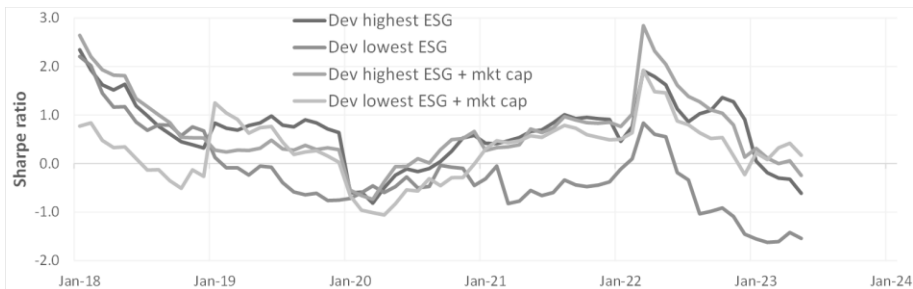


Figure 12: Sharpe ratios of developing economy MV portfolios Jan 2018 – Jun 2023.

3.3 RP portfolio

The RP portfolio allocation strategy that determines the weightings of securities within a portfolio through the volatility of their returns. This approach gives lower allocation to securities that exhibit higher risk and gives greater weight to securities that display lower risk to ensure the risk contribution of each asset within a portfolio is the same (Chaves, Hsu, Li, & Shakernia, 2010).

3.2.3 US RP Portfolios

In Figures 13 and 14, low-ESG portfolios consistently outperformed high-ESG portfolios in returns. The lowest-ESG portfolio achieved the highest cumulative return at 94.48%, followed by the low-ESG and high market cap portfolio at 47.01%. In contrast, the highest-ESG and high-ESG and high market cap portfolios had returns of 36.20% and 28.71%, respectively.

From January 2018 to January 2020, high-ESG portfolios briefly turned negative but rebounded to pre-pandemic highs of 17.03% and 13.78%, while low-ESG portfolios achieved higher returns, reaching highs of 39.66% and 30.75%, respectively. Early 2020 saw declines across all portfolios, with low-ESG portfolios dropping by around 25% and high-ESG portfolios by about 20%. Post-pandemic recoveries were swift until early 2022, with the lowest-ESG portfolio showing the most significant growth.

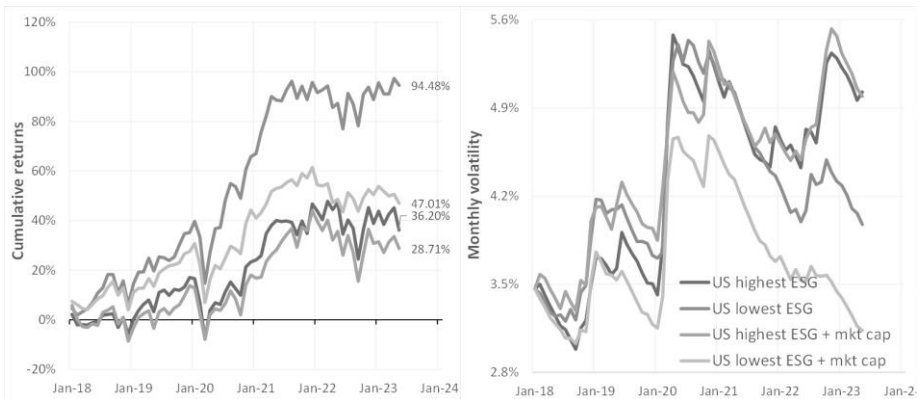


Figure 13 (left panel): Cumulative returns of US RP Portfolios Jan 2018 – Jun 2023 and **Figure 14** (right panel): standard deviation of US RP Portfolios Jan 2018 – Jun 2023.

The low-ESG score and high market cap portfolio showed lower volatility overall. Early 2020 saw a spike in volatility across all portfolios, especially in the highest-ESG score portfolio, which jumped from 3.42% to 5.48% in four months. By late 2022, both high-ESG portfolios had higher volatility due to declining cumulative returns. Figures 13 and 14 highlight that low-ESG score portfolios consistently achieved better cumulative returns with less volatility. These trends align with the Sharpe Ratios in Figure 15 for US RP portfolios, where initially, low-ESG score portfolios had notably higher Sharpe Ratios than high-ESG score portfolios. Post-pandemic, all portfolios displayed similar Sharpe Ratios, with low-ESG score portfolios consistently showing slightly better risk-adjusted returns.

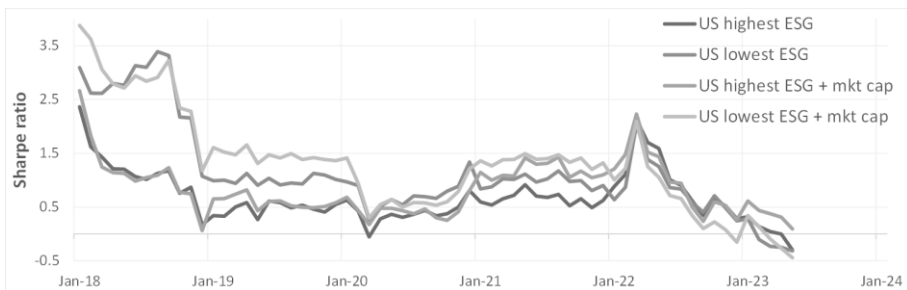


Figure 15: Sharpe Ratios of US RP Portfolios Jan 2018 – Jun 2023

Over the observation period, low-ESG score portfolios consistently showed higher average Sharpe Ratios (1.15 for lowest-ESG and 1.30 for low-ESG + high market cap) compared to high-ESG score portfolios (0.68 for highest-ESG and 0.84 for high-ESG + high market cap).

3.2.4 Developing economy RP portfolios

Figure 16 compares cumulative returns: highest-ESG and high-ESG + high market cap portfolios peaked at 17.38% and 15.25%, respectively, while lowest-ESG score and low-ESG + high market cap portfolios struggled with returns of -22.20% and 4.40%. The lowest-ESG score portfolio consistently underperformed, exacerbated by a 30% crash during the COVID-19 market shock. Post-pandemic, high-ESG portfolios peaked at 43.50% and 29.66% by March 2022 before declining in Q2 2022, while low-ESG + high market cap portfolios peaked at 12.39% in September 2021 before a prolonged downturn.

Figure 17 shows standard deviation trends: the lowest-ESG score portfolio consistently had higher volatility. Pre-pandemic, volatility levels were similar among portfolios except for the lowest-ESG score. All

portfolios saw significant standard deviation increases during the COVID-19 crash, with larger spikes in developing economy RP portfolios. The highest-ESG portfolio spiked most, rising from 4.11% to 10.12% from December 2019 to April 2020, while high-ESG + high market cap and low-ESG + high market cap portfolios also saw increases, albeit less pronounced.

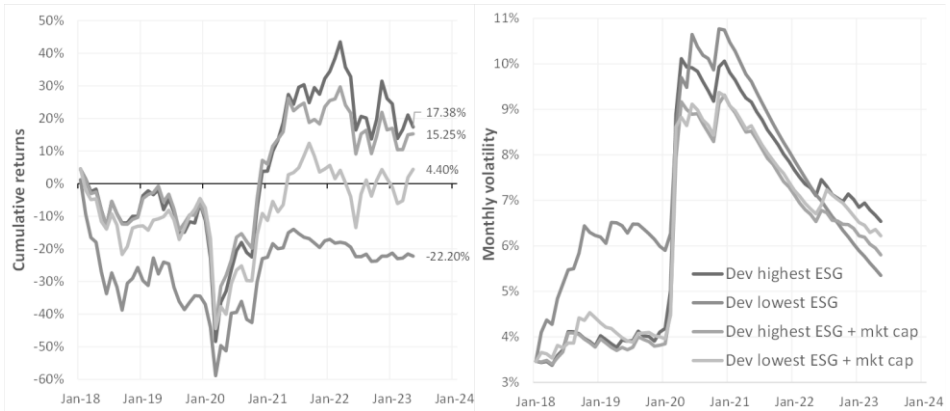


Figure 16 (left panel): Cumulative returns of developing economy RP portfolios Jan 2018 – Jun 2023 and **Figure 17** (right panel): Standard deviation of developing economy RP portfolios.

Figure 18 shows increased risk across all portfolios in early 2020, coinciding with downturns in returns. Despite strong post-pandemic performance, this period was marked by heightened volatility.

Regarding Sharpe Ratios, the lowest-ESG score portfolio averaged negative over the period, while the others maintained similar ratios. This suggests that despite higher cumulative returns for high-ESG score portfolios, the low-ESG score, and high market cap portfolio may have generated greater excess returns relative to its risk, leading to a higher average Sharpe Ratio.

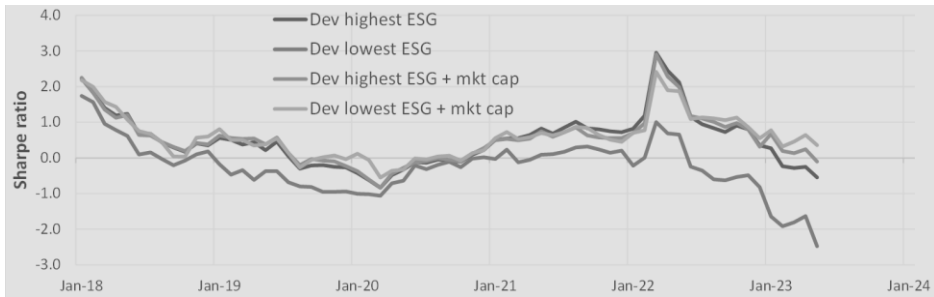


Figure 18: Sharpe Ratios of developing economy RP portfolios Jan 2018 – Jun 2023.

4. Discussion and Analysis

High ESG disclosure scores lead to better performance in emerging markets, while portfolios with lower ESG scores perform better in developed economies like the US (Clarke, Silva, & Thorley, 2006). US portfolios, whether equal-weighted (EW), risk-parity (RP), or minimum-variance (MV), consistently show that low-ESG score portfolios outperform high-ESG score portfolios in terms of cumulative returns, standard deviation, and Sharpe Ratios.

In developing economies, higher ESG scores consistently lead to superior financial performance across EW, MV, and RP portfolios, achieving higher cumulative returns with lower risk compared to lower ESG score portfolios. Higher ESG scores correlate positively with financial performance in emerging markets, suggesting that investing in firms with strong ESG credentials can be advantageous. Conversely, lower ESG scores may offer greater financial benefits in developed economies, where risk profiles differ. Investing in lower ESG score securities in emerging markets can heighten investment risks due to potential neglect of societal obligations and weaker governance. Robust ESG scores, on the other hand, signal strong governance and social responsibility, enhancing investor trustworthiness.

In developed economies, stability reduces volatility, with investors often prioritising returns over ESG considerations. Friede, Busch, and Bassen (2015) found a strong positive correlation (65.4%) between higher ESG scores and improved corporate financial performance in emerging markets. In contrast, developed regions like Europe and Asia/Australia showed weaker positive associations (26.1% and 33.3%, respectively) with ESG and financial performance, along with some negative associations (14.3%).

In developed markets, there is less literature supporting the superior financial performance of low ESG investment portfolios. Studies suggest

that societal norms and ethical considerations drive investors away from 'sin' stocks, despite their traditionally higher expected returns. Hong & Kacperczyk (2009) argue that ethical investors avoid these stocks, leaving them embraced by larger institutional investors seeking greater returns.

Firms prioritising higher ESG scores may forego potential excess returns as they adopt a broader stakeholder perspective, contrasting with firms concentrating on maximising shareholder value with less emphasis on ESG criteria. Investing heavily in ESG initiatives can yield long-term benefits, but the upfront costs of transitioning to sustainable practices may strain short-term financial metrics.

In developed economies, stringent regulatory environments around ESG standards necessitate substantial investments for compliance, which can influence short-term financial performance.

Studies show that ethical mutual funds initially yield lower returns compared to conventional ones (Bauer, Koedijk & Otten, 2005). High ESG venture capital funds accept a 4.7% lower internal rate of return than traditional funds to align with ESG standards (Barber, Morse, & Yasuda, 2021). Companies face increasing pressure to meet ESG standards and maintain socially responsible images. Investors in socially responsible mutual funds prioritise ESG alignment over financial returns (Riedl & Smeets, 2017).

Research by Dimson, Karakas & Li (2015) shows that companies with higher ESG scores tend to perform better financially over the long term. They report positive abnormal returns of 2.3% in the first year and 7.1% in the following year for firms engaged in ESG activities. These companies demonstrate improved operational performance, profitability, efficiency, shareholder relations, and governance. Strong ESG standards also act as risk mitigation tools, helping firms navigate economic downturns more effectively. Robust ESG credentials contribute to long-term operational efficiency by reducing costs associated with energy consumption and sustainable resource usage. Increased investor demand for socially responsible investments further facilitates funding opportunities for ESG-compliant firms from banks and investors.

5. Conclusion and Suggestions for future research

This article analyses how ESG (Environmental, Social, and Governance) disclosure scores affect investment portfolio performance in both emerging and developed economies. In developed markets like the US,

portfolios with low ESG scores consistently show higher cumulative returns and lower risks across various strategies.

In emerging markets, portfolios with high ESG scores generally outperform those with low scores across strategies like EW, MV, and RP, achieving better returns with lower risk. However, the study's limited sample size restricts broader conclusions about developed and developing economies. Future research should expand the stock universe for a more comprehensive analysis, consider optimal risk-adjusted portfolios, and delve into specific E, S, and G factors' impacts. Incorporating Fama-French models could also provide deeper insights into portfolio returns.

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