

Exploring the Link Between Stock Price Volatility and ESG Scores

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- **One of the most pressing investor questions is how environmental, social, and governance (ESG) risks translate into performance volatility for individual stocks. In this article, we tackle that question using the State Street Global Advisors proprietary ESG framework, R-Factor™.**
- **Existing studies largely focus on stock price *returns* rather than financial risk,¹ and prior attempts to test ESG as a driver of price volatility have shown mixed results. After running our analysis, we found that stocks with stronger ESG criteria have better financial-risk profiles — even when adjusted for other factors. Our data also shows that companies with better ESG performance are more resilient in high-volatility environments. While this study exhibits this resiliency, this analysis is only tackling a specific universe, leveraging one individual ESG scoring mechanism, and focusing on a defined timeline. Hence, this relationship might not be relevant in all cases, and might vary due to macroeconomic events and more definite criteria and constraints.**

Our Take: A Correlation Between ESG and Financial Risk Is Worth Exploring

In the past few years, several studies have analyzed the impact of ESG criteria on equity returns and financial risk. The results of these studies can be roughly categorized as follows:

- The ESG profile has a statistical relationship with equity returns.
- Either the ESG profile has no statistical relationship with returns, or this relationship can be explained through style factor exposures.
- The ESG profile has a statistical relationship with financial risk and is a source of financial uncertainty.

However, to date, the literature on ESG has largely focused on the impact of ESG exposure on returns, and little has been done to directly assess the impact on risk. If we consider risk as any form of uncertainty, and further recognize that ESG by its very nature is influenced by corporate activities that impact stakeholders, then it stands to reason that there is a direct link between the management of the dimensions of E, S, and G, and the range of potential impacts on stakeholders. We then posit that companies neglecting to manage their ESG exposures may be exposed to higher future risk — particularly stock price performance risk — than their more ESG-focused counterparts.

For example:

- A firm that produces high levels of emissions during a manufacturing process may be exposed to potential future legislation that might impose a carbon tax.
- A firm treating its employees or suppliers poorly may face a backlash from its consumers and see its sales plummet.
- A firm with poor governance may get involved in a scandal that ultimately causes its downfall.

Despite the wide range of scenarios related to ESG issues, these examples show that ESG events may have a meaningful impact on firm value and can prompt future uncertainty. Furthermore, the long-term and infrequent nature of ESG events, combined with the difficulty in modeling potential outcomes, suggests that the risks reflected in ESG exposures may impact the expectations for future stock price volatility. We would expect lagging ESG management to show up at least partly in statistical measures of expected risk.

A Review of Existing Data

While our paper focuses on the relationship between ESG and risk, we also briefly review prior literature on the potential return implications of tilts towards better-ESG stocks. Many academic studies argue that, if anything, stocks that rank poorly on ESG factors may post *higher* returns. The economic intuition there is that some investors are unwilling to hold companies with poor ESG exposures, and this reduction in the demand for shares may translate into lower prices today and higher returns in the future. In other words, investor preferences matter, and investors' demand has an impact on stock prices, as discussed, for example, in Fama and French (2007).² This view is generally validated by empirical work. Hong and Kacperczyk (2009)³ find that "sin stocks... have higher expected returns than otherwise comparable stocks." Similar evidence can be found in Fabozzi et al. (2008)⁴ or Statman and Glushkov (2009).⁵

Nonetheless, another strand in literature suggests that improvements in certain dimensions of ESG, most notably governance, may correlate with better returns. For example, Gompers et al. (2003)⁶ constructed the Governance Index (G-Index) based on the number of provisions that may decrease shareholder rights (golden parachutes, staggered boards, etc.). The study finds that firms with higher values of the G-Index and, presumably, poorer governance, realize lower average returns.

However, subsequent research has suggested that the relationship between governance and returns may not be quite as strong as previously believed (e.g., see the discussion in Larcker et al., 2007⁷).

Similarly, Bebchuk et al. (2013)⁸ replicate the Gompers et al. (2003)⁹ study, finding similarly strong return patterns in the same sample but no return predictability out of the sample one decade later. Bebchuk et al. (2013)¹⁰ interpret these findings as evidence of investors' learning about stocks' ESG profiles and incorporating that information into prices.

Given mixed evidence on whether ESG drives individual stock returns, it is not too surprising that data does not show a definitive link between ESG and mutual fund returns. ESG and socially responsible investing (SRI) equity funds tend to have similar return trends as conventional equity funds. One recent example is Borgers et al. (2015),¹¹ which demonstrates that mutual funds with "sin stocks" realize somewhat higher returns, but the return differences are not statistically significant. Another significant study is Giovanni et al.,¹² which shows that return differences between ESG funds and conventional funds can be explained by their exposures to established style factors.

Our Analysis: The Relationship Between ESG and Financial Risk

The Choice of R-Factor™
as Measurement Tool

To measure the ESG profile of a stock, we used its R-Factor™ score over the period of March 2017 — February 2022. R-Factor™ is an ESG scoring system developed by State Street Global Advisors that leverages multiple data sources and aligns them to widely accepted, transparent materiality frameworks to generate a unique ESG score for listed companies (see: [Reinventing ESG Through a Transparent Scoring System](#)). It measures the performance of a company's business operations and governance as it relates to financially material ESG challenges facing the company's industry.

We created R-Factor™ based on two key constructs: financial materiality and multiple data sources. Both pillars make R-Factor™ a perfect candidate to measure ESG exposure in portfolios for this study. We look at each in turn:

- **Financial Materiality** Financially material ESG factors are those that are core to a business and have been shown to contribute to long-term operating performance. As we aim to discover the relationship between ESG and financial risk, a model that only utilizes data with financial consequences for an industry is required. R-Factor™ uses the Sustainability Accounting Standards Board (SASB) framework based on material ESG factors that account for developments in a broad array of areas, such as:
 - **Environment** *including emissions, energy management, waste management*
 - **Social Capital** *including data security, product safety*
 - **Human Capital** *including labor practices, employee health and safety*
 - **Business Model** *including business model resilience, physical impact of climate change*
 - **Leadership & Governance** *including regulatory environment, systemic risk management*
- **Multiple Data Sources** R-Factor™ was created using around 900 metrics from five data providers, thereby reducing the provider bias and noise. ESG data sources have low correlation with each other, and our multi-source framework ensures exposure to a wider array of future uncertainties.

The Universe of Stocks

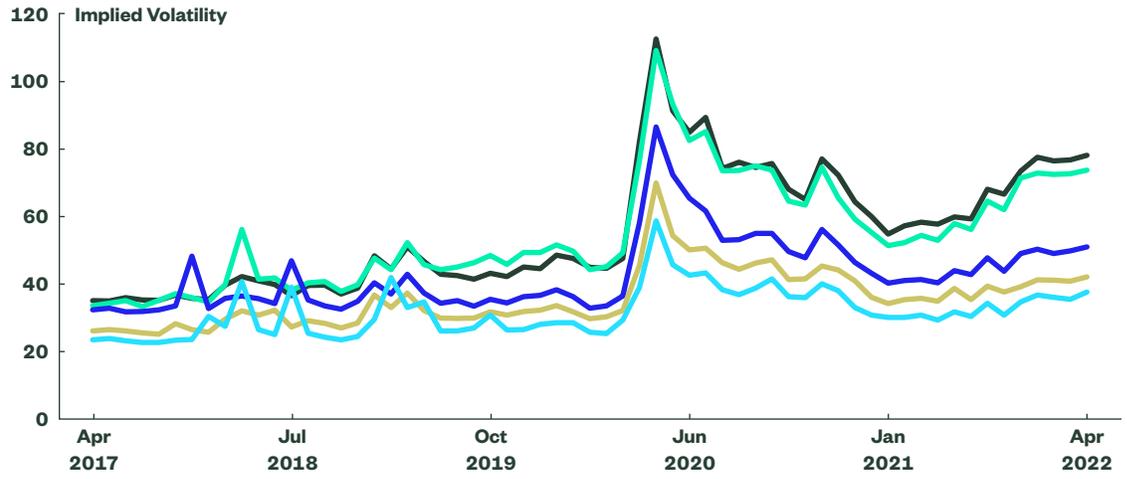
Our investigation covers 4,860 stocks from developed and emerging markets. To measure the expected financial risks of these stocks, we use the at-the-money (ATM) implied volatility of stocks using active liquid-call put contracts in near months. Implied volatility is a proxy for future expectation of uncertainty and a standard measure of expected risk. As we aim to capture future uncertainties in stocks with poor ESG profiles, we argue that implied volatility is more suitable for this exercise than other statistical measures of risk or historical measures of volatility.

The Behavior of High- Versus Low-ESG Cohorts

We divided the universe of stocks into five quantiles, first at the global level, and then at the sector-industry-neutral level. Figures 1, 2, and 3 show the implied volatilities of each quintile. Figure 1 illustrates that the top and bottom ESG quintiles have significantly different implied-volatility profiles, with the most volatile firms belonging to the bottom ESG quintile. Figures 2 and 3 show that industry- and sector-neutral quintiles exhibited similar implied volatility distribution differences. However the established style factors may contribute to the difference in risk profiles. In the analysis later in this piece (Figure 6), we will also control for established equity factors, namely value and size.

Figure 1
Implied Volatility Is Higher for the Bottom ESG Quintiles

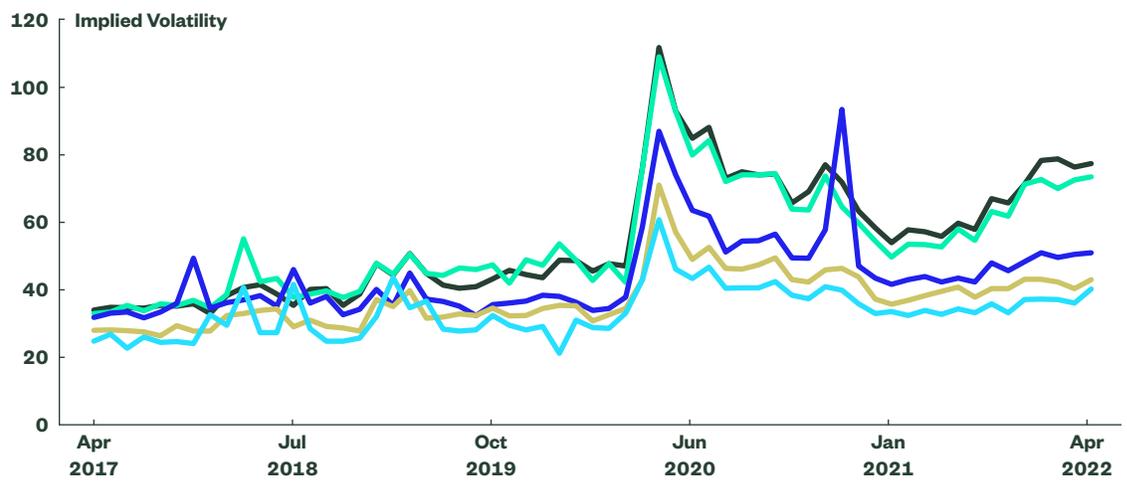
- Q1 (poor ESG score)
- Q2
- Q3
- Q4
- Q5 (best ESG Score)



Source: State Street Global Advisors, as of December 1, 2022.

Figure 2
Implied Volatility: Sector-Neutral

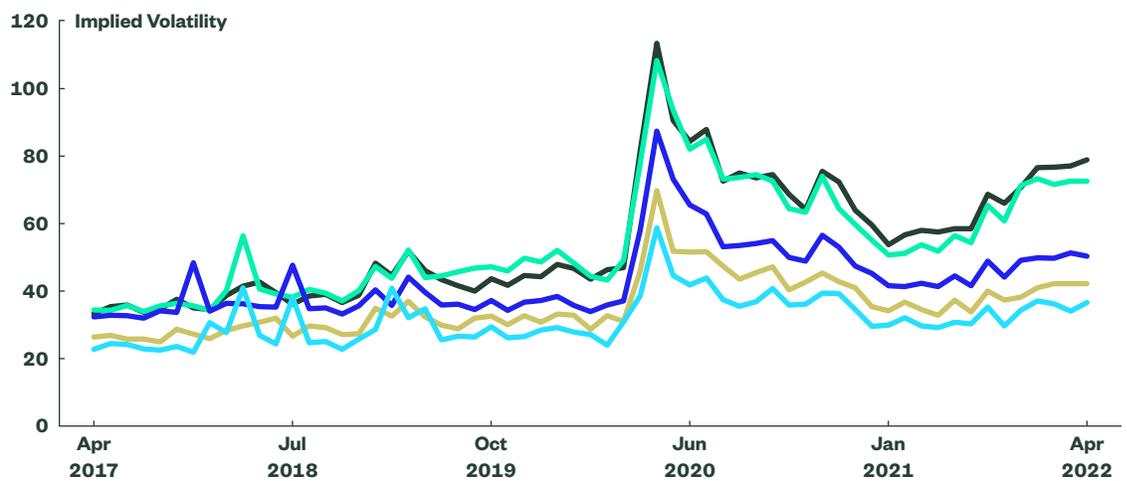
- Q1 (poor ESG score)
- Q2
- Q3
- Q4
- Q5 (best ESG Score)



Source: State Street Global Advisors, as of December 1, 2022.

Figure 3
Implied Volatility: Industry-Neutral

- Q1 (poor ESG score)
- Q2
- Q3
- Q4
- Q5 (best ESG Score)

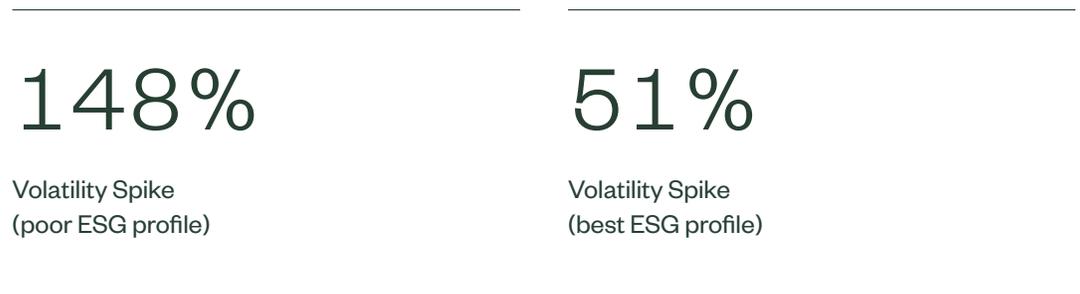


Source: State Street Global Advisors, as of December 1, 2022.

Our study also allows us to examine the difference in risk profiles between quintiles 1 (poor ESG characteristics) and 5 (strong ESG characteristics) during the high-volatility regime induced by the COVID-19 pandemic.¹³ This follows an introductory look at this topic in [COVID-19 and ESG: Four Dimensions](#), which State Street Global Advisors released in April 2020.

We observed a statistical difference in risk profiles among quintiles over the period. Firms with better ESG profiles experienced relatively moderate spikes in expected risk outlook compared to firms with poorer risk profiles (Figure 4).

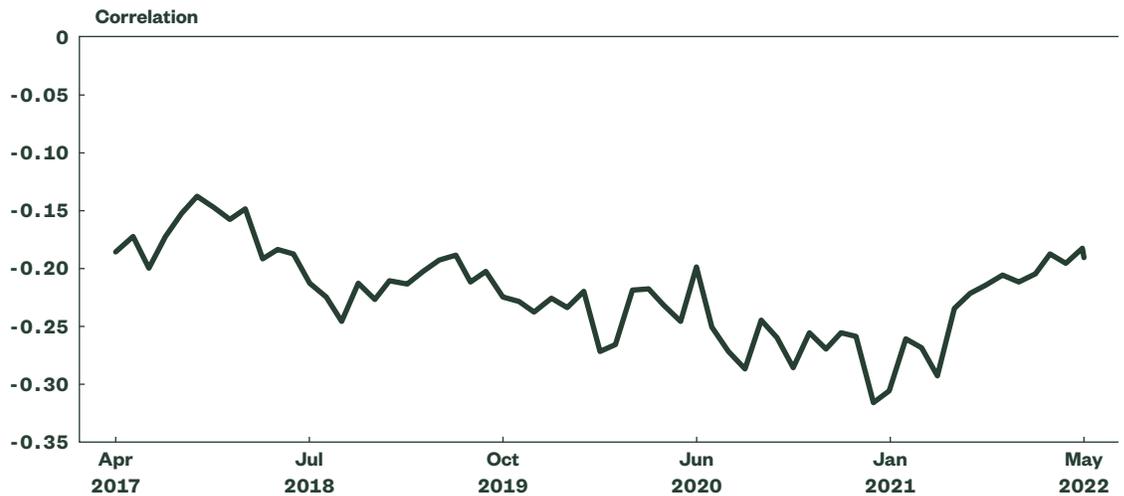
Figure 4
Firms With Better ESG Profiles Exhibited Lower Spikes in Volatility During the Pandemic



Source: State Street Global Advisors. Period March 1, 2020 to February 28, 2022.

Moreover, we see the divergence in volatility between strong- and weak-ESG cohorts becomes meaningfully stronger over the pandemic period, which points to the quality and information in ESG data strengthening over time, and the maturing of ESG data. We measured the correlation between ESG score and implied volatility (Figure 5). During 2017, the correlation between the ESG scores and implied volatility was around -0.2. This has decreased to -0.3 in 2022.

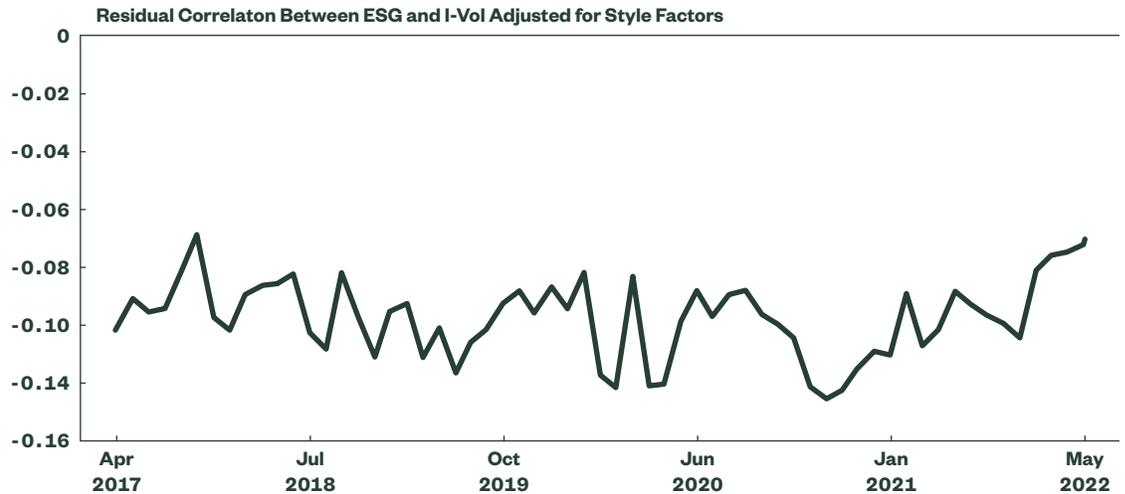
Figure 5
ESG-Volatility Correlation Strengthens With Time



Source: State Street Global Advisors, as of December 1, 2022.

Notably, we observed that a large portion of the relationship between our proprietary ESG scores and financial risk can be explained through other factors such as size and value, as well as the fundamental characteristics of securities. However, we observed a statistically significant component of a residual negative relationship between higher ESG scores and future expected risk of securities over the last five years. We also detected better resilience characteristics of higher-ESG-score firms in the periods of higher market volatility induced by the global pandemic.

Figure 6
**ESG-Vol Relationship
 Exists When Controlling
 for Style Factors**



Source: State Street Global Advisors, as of December 1, 2022.

Conclusion

As investors seek more and more data about the impacts of ESG on portfolio performance, we took a closer look at the relationship between ESG and volatility. We used our proprietary R-Factor™ scoring model to break a large universe of stocks into top- and bottom-ESG quintiles, and we found that the top quintiles had lower implied volatility and better resilience during the COVID-19 pandemic, one of the most difficult periods for the global market.

Of course, the performance of poor-ESG stocks may sometimes outpace that of strong-ESG stocks for a variety of reasons, such as a sector coming in or out of favor. Nonetheless, we believe that this data supports our view that ESG is an important consideration for investors seeking to minimize risks and to find growth opportunities in difficult markets.

We look forward to continuing to provide insights to investors who seek to understand ESG and its impacts on portfolios.

Endnotes

- 1 We define financial risk as price volatility, or implied volatility, which we calculate as a percentage.
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- 13 The pandemic period is defined as March 1, 2020, to February 28, 2022.

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