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Opt for emissions intensity metrics

Emissions intensity is a more appropriate metric for assessing individual firms' carbon efficiency than correlations between unscaled carbon emissions and stock market performance, and the latter should be interpreted with caution.



Credit: Emissions from the power plant, JüNick/stock.adobe.com (Unique document ID F879F476E5E94A15 93D13044A4EB7D60).

Firms are incentivized to reduce carbon emissions and improve efficiency in order to demonstrate environmental responsibility and the potential to innovate. Moreover, carbon emissions have been strongly associated with critical financial performance metrics such as stock returns, operating profitability, and asset value relative to market valuation^{1,2}. Investors are particularly keen to understand whether emissions reduction by portfolio firms can lead to better returns. However, this relationship is usually assessed based on absolute emissions rather than on emissions intensity relative to firm size, with an inherent assumption that emissions estimated by data vendors—who collect, aggregate, and sell the data—are accurate.

Jitendra Aswani at Harvard University and colleagues conducted a comprehensive analysis of the relationship between carbon emissions, stock returns, and operating performance in US firms from 2005 to 2019³. They critically examined and re-evaluated how different assumptions and methodologies influenced conclusions drawn in earlier studies. Specifically, they delved into two economic arguments. The first argument is risk-driven, suggesting that the pressure to address climate change may lead to higher costs of capital for firms with high emissions, as a result of potential carbon taxes or pollution cleanup costs. The second argument centers on investors' tastes and considers that some investors may avoid industries that cause significant harm to society^{4,5}.

Aswani and colleagues find that the relationship between stock returns and emissions in the US is primarily driven by vendor-estimated emissions, and not by actual firm-disclosed emissions. This distinction is crucial because over 70% of emissions figures in standard US emissions databases are vendor-estimated³. As such, previously identified links between financial performance and carbon emissions may reflect an association between stock returns and

firm fundamentals such as the size, financial strength, and long-term viability of the firm, rather than emissions themselves. If so, it is important to distinguish between total emissions and emissions intensity, with the latter being a more appropriate metric for assessing a firms' carbon efficiency³. The study revealed no significant correlation between emissions intensity and stock returns.

Caution is, therefore, required when interpreting the correlations between carbon emissions and stock market performance. Investors, policymakers, and academics should carefully consider how they assess potential links between carbon emissions and stock returns. As carbon pricing and the need for precise emissions data become more commonplace, these findings highlight the critical need to expand emissions disclosure and improve data quality.

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References

1. Matsumura, E. M., Prakash, R. & Vera-Muñoz, S. C. Firm-value effects of carbon emissions and carbon disclosures. *Account. Rev.* **89**, 695–724, <https://doi.org/10.2308/accr-50629> (2014).
2. Bolton, P. & Kacperczyk, M. T. Global pricing of carbon-transition risk. *J. Financ.* <https://doi.org/10.2139/ssrn.3550233> (2022).
3. Aswani, J., Raghunandan, A. & Rajgopal, S. Are carbon emissions associated with stock returns? *Rev. Financ.* <https://doi.org/10.1093/rof/rfad013> (2023).
4. Pedersen, L., Fitzgibbons, S. & Pomorski, L. Responsible investing: the ESG-efficient frontier. *J. Financ. Econ.* **142**, 572–597, <https://doi.org/10.1016/j.jfineco.2020.11.001> (2021).
5. Pastor, L., Stambaugh, R. & Taylor, L. Sustainable investing in equilibrium. *J. Financ. Econ.* **142**, 550–571, <https://doi.org/10.1016/j.jfineco.2020.12.011> (2021).

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Author contributions

P.P. conceptualized and wrote the article.

Competing interests

The author declares no competing interests



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