

# *Is 'Being Green' Rewarded in the Market?: An Empirical Investigation of Decarbonization Risk and Stock Returns*

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## **Overview**

This paper aims to empirically investigate two questions on the market evaluation of decarbonization and to derive the implications for practitioners and policy makers.

Firstly, we ask if decarbonization or 'being green' is rewarded in the market. And, if it is, we examine how much and why. The recent studies show that more eco-friendly stocks outperform less eco-friendly stocks (Derwall et al. (2005), Cai and He (2014)) and carbon-efficient stocks outperform carbon-intensive stocks (ET Index (2015a), Oestreich and Tsiakas (2015)). By applying multi-factor asset pricing models, we examine whether these excess returns are the market's compensation for bearing additional risk or alpha. If they are well explained by well-known risk factors such as market, size, value, momentum, profitability, investment, and liquidity, then it helps us better understand the return-risk relationship related to decarbonization. If they turn out to be alpha, then it is more appropriate to delve into why they exist and how long these profit-generating opportunities will persist. To answer the first question, we form portfolios based on carbon-emission intensity and apply the methodology of multi-factor asset pricing models.

Secondly, based on the empirical results from the first question, we examine if and how much a negative externality caused by carbon emission is internalized in the financial market. By delving into this question, we can tell if the market price of decarbonization risk is in accordance with social optimum and derive policy implication related to the role of institutional investors that cares more about value-driven investment. We perform econometric analysis that associate the costs of externalities available from the Trucost database with excess returns of portfolios formed on carbon emission intensity.

The implication of our research can appeal to various groups: private investors, policy makers, and institutional investors. If our research adds clarification on the return-risk relationship related to decarbonization and the sources of risk, the clarification itself would encourage private investors to invest more toward decarbonization by reducing uncertainty and providing criteria for fund performance evaluation. Along with a more accurate market evaluation of decarbonization, understanding how much the risk-return relationship observed in the financial market is (in)consistent with social optimum in terms of externality also will benefit policy makers. Policy makers can design policies to reduce negative externality associated with carbon emission by mobilizing more funds toward decarbonization. And the role of institutional investors becomes important. Policy makers can induce institutional investors to re-allocate their capital on the basis of decarbonization, which will make firms more environmentally conscious and motivate them to adopt low-carbon activities, assets, and technologies. More investment funds flowing toward decarbonization also will motivate the invention and adoption of new clean technology, contributing to a more eco-friendly economy.

## **Methods**

Multi-factor asset pricing models (Fama-French 3 factor, 5 factor models, etc)

Panel regression

## **Results**

First, we understand the relationship between investment on decarbonisation and types of firms (in terms of industry, corporate governance, financial performances, etc).

Second, we understand the return-risk relationship related to decarbonisation, evaluated in financial markets.

Third, we provide a guideline for investors interested in decarbonisation and clean energy.

## **Conclusions**

We empirically investigate the relationship between firms' decarbonisation effort and financial performances. More specifically, by applying multi-factor asset pricing models, we examine whether these excess returns are the market's compensation for bearing additional risk or alpha. Our research will provide information on how and how much carbon risk is priced in the market and shed light on what would be the implication of decarbonizing portfolios.

## **References**

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