

European Carbon Market Connectedness and Risk Contagion: A Study of Return and Volatility Dynamics Between European Union Allowances (EUAs) and Financial Markets Between 2013 and 2025 and their Potential for Portfolio Diversification

Carlos Arcila Barrera^{a,b}, Emre Usenmez^{c,*}

^a*University of Cambridge Institute for Sustainability Leadership, 1 Regent Street, Cambridge, CB2 1GG, UK*

^b*Sigma Advanced Capital Management, 203 N La Salle Dr, Chicago, 60601, IL, USA*

^c*Gonville & Caius College, University of Cambridge, Trinity Street, Cambridge, CB2 1TA, UK*

Abstract

This paper uses Diebold-Yilmaz model to analyze the return and volatility connectedness between the European carbon market and the financial markets from the commencement of the 3rd phase of the EU emissions trading system in 2013 to the 4th phase until January 2025 in order to ascertain the impact of fixed income, equity, commodities, and energy markets, as well as exogenous shocks and the recent reforms introduced under the Fit for 55 package and RePowerEU Plan. We examine the static and dynamic characteristics of the connectedness network and find that the return and volatility behavior of the European carbon market are primarily driven by their own fundamental factors. Thus it is largely independent of other financial markets except for coal and natural gas, and except during periods of financial stress where a relatively short-lived increase in the connectedness with other financial markets is observed. With such characteristics, EUAs can offer diversification benefits, especially for non-energy portfolios.

Keywords: Carbon markets, emissions trading system, connectedness measures, risk diversification

*Corresponding author

Email addresses: ca577@cantab.ac.uk (Carlos Arcila Barrera), eu229@cam.ac.uk (Emre Usenmez)