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How integrated is the European carbon derivatives market?☆

Paolo Mazza[a,*], Mikael Petitjean[b]

[a] IESEG School of Management, 3 rue de la Digue, 59000 Lille, France
[b] Louvain School of Management & CORE, Université Catholique de Louvain, 151 Chaussée de Binche, 7000 Mons, Belgium

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ABSTRACT

We assess the integration dynamics on the European carbon futures market at both the intraday and daily levels. We focus on EUA futures contracts that can be traded on three trading platforms: the Intercontinental-European Climate Exchange (ICE-ECX), the NASDAQ OMX and the European Energy Exchange (EEX). We analyze trading activity for three contract maturities and find that the ECX and EEX platforms exhibit a reasonable level of integration. The price discovery process does not occur at the daily level but rather at the hourly frequency. We conclude that this market still needs to be closely monitored by the regulatory authorities.

1. Introduction

After the ratification of the Kyoto protocol, European governments introduced in 2005 the European Emission Trading Scheme (EU ETS) in spite of substantial political and ideological conflicts. Some governments were indeed reluctant to make concessions, fearing that their leading industries

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* Corresponding author.
E-mail addresses: p.mazza@ieseg.fr (P. Mazza), mikael.petitjean@uclouvain.be (M. Petitjean).

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could be deeply impacted by a change in the regulatory framework. By creating such a scheme, the European Union can today be considered as a worldwide pioneer in environmental finance.

The goal of the EU ETS is to limit the emissions of greenhouse gases (GHGs) by setting a ceiling on gas emissions for energy-intensive industries. In order to reach that objective, the EU ETS has been divided into four phases: 2005–2007 (phase I), 2008–2012 (phase II), 2013–2020 (phase III), and 2021–2028 (phase IV). During phases I and II, each country subject to the EU ETS needed to implement a National Allocation Plan (NAP) based on its sectorial capacity to pollute. Governments assessed the amount of CO_2 emitted by companies based on their respective country. Then, they created their own industry-specific benchmark, that is, the so-called NAP. The European Commission acted as a regulator and approved each NAP. At the starting of phase III, a EU-wide cap has been established for all the countries of the EU ETS, which made national level plans obsolete. This EU-wide cap is reduced by 1.74% each year in order to slowly move to renewable energy.

From a microeconomic perspective, each company has emission quotas to reach and, at the end of the year, they must cancel out the total amount of allowances equivalent to their emitted GHGs in tons all along the year. If their GHG emissions exceed the number of allocated allowances, they must purchase allowances in the carbon market. If they do not violate their allocated emission ceiling (because of an investment in cleaner technologies), they are able to sell their surplus credits. If surplus could not be banked from one year to another in phases I and II, phase III has introduced this possibility which improves flexibility for companies. At the end of each year, if a company is not in possession of enough allowances to cover all its emissions, it is required to pay heavy fines. Phase III has also expanded the use of auctions for the allocation of carbon allowances, as opposed to a free allocation mechanism. The objective is to phase out free allocation in a near future as pollution should be financed by the most polluting entities.

Carbon markets are now much more divided geographically than they used to. Before phase III, trading schemes around the world included the New Zealand Emissions Trading Scheme (NZ ETS), the New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS) in Australia, the Regional Greenhouse Gas Initiative (RGGI), the Western Climate Initiative (WCI), California's (AB32). After the starting of phase III, the number of international emissions trading schemes has dramatically increased and we now count 17 already in force emissions trading systems. Beside these operating ETS, there are 15 more emissions trading schemes under development. To date, the world's biggest and leading infrastructure in terms of trading volume is the EU ETS. Not surprisingly, the most traded carbon-related financial assets in the world are the EUAs (European Union Allowances). Bloch (2011) indicates that EUAs represent 70% of the CO_2 traded in the world. The EU ETS is now covering almost 45% of the total emissions of the EU countries.

The EU ETS also allows the trading of two other assets related to the flexibility mechanisms and defined under the Kyoto protocol, i.e., the Emission Reduction Units (ERUs) emitted by Joint Implementation projects (JI) and the Certified Emission Reductions (CERs) issued by the Clean Development Mechanism (CDM). These mechanisms intend to lower the overall costs of achieving the emission targets. They take into account the fact that it could be cheaper for a company to meet Kyoto protocol's requirements in terms of emission reduction by investing abroad. As a matter of fact, the ultimate goal is to reduce the emission of GHGs at a global level; the location of the GHG emissions does not matter much as long as some "clean initiatives" are taken somewhere in the world. On the one hand, the home country (or the investor) can fill in its deficit of emission permits. On the other hand, the host country (or the subsidiary) benefits from the transfer of technologies and foreign investments.

All these assets give the same right to its holder, i.e., the right to emit the equivalent of one metric ton of CO_2 in the atmosphere. Assets (such as EUAs) emitted during one phase can be banked in another phase but not borrowed from future phases.

As suggested by Newell et al. (2013), carbon markets have grown at such a fast pace, started in such a complicated financial environment (including the 2008 global financial crisis), and faced such critical issues, that it is indeed legitimate to wonder whether these markets function properly and are ultimately sustainable. At the start, market participants were considering the price as a good indicator of allowances scarcity. However, in April 2006, EUA prices plummeted by more than 54% in a couple of days and ended up being worth nearly 0. The main cause of this lethal downturn was the over-allocation