***EXAMINING THE ENVIRONMENTAL IMPACT OF EUROPEAN UNION EMISSIONS TRADING SCHEME (EU-ETS) - AN INPUT OUTPUT APPROACH.***

LAWAN Usman Ali, Student - CEPMLP, University of Dundee, Phone: +2348050928956, email: usco\_ali@yahoo.com

## Overview

The consequences of environmental challenges resulting from climate change manifestation are not a new subject of debate among scholars, NGOs and Intergovernmental Institutions. Climate change occurrences are enhanced by increasing concentration of greenhouse gases (GHGs) in the atmosphere, with carbon dioxide (CO2) emission being the main contributor. Policy makers around the globe have device various market based instruments such as carbon taxation and carbon emissions trading to successively control GHGsemissions. In line with the above, the European Union (EU) launched the world’s first cap-and-trade program for carbon emissions in 2005 - the European Union’s Emissions Trading Scheme (EU ETS). However, serious concerns have been raised about the scheme’s ability to reduce emissions in a cost-effective manner due to the inherent uncertainties associated to Emissions Trading. Moreover, this mechanism might not necessarily guarantee emissions reduction unless its value reflects positive socioeconomic and environmental impacts.

This paper analyses the environmental impact of the EU ETS. Using the environmentally extended input–output (EEIO) techniques, it evaluates the impacts of the scheme on EU energy use and CO2 emissions. The paper employ a disaggregate measurement of the EU energy related CO2 emissions in 22 economic sectors and 6 (six) fossil fuel use to estimate the price effects and environmental impact of EU ETS in the EU-15 Member countries.

This paper is structured into five parts. Part 2 examines Kyoto target and its implementation in EU-15, with an emphasis on the mechanisms and operations of the EU ETS. Part 3 explain the environmentally extended input-output (EEIO) model and the data preparation. Part 4 yields the results of the exercise and offers result interpretation. Part 5 presents the conclusion.

## Methodology

This study employs the input-output methodology to evaluate the economy-wide environmental impact and price effect of an emissions trading scheme in the EU. The work utilizes the environmentally extended input-output model to calculate the CO2 emissions intensity for each industrial sector (i.e. the total carbon content of their product), which allows for a computation of the price effect after emission trading. Following the information provided by Eurostat’s ESA 95 input-output tables, the study analyse twenty two (22) producing sectors and six (6) types of fossil fuels (Lignite, Peat, Lignite Coke, Natural Gas, Liquid Fuels and Diesel Oil) in the EU-15 Member countries.

## Results

The energy related CO2 intensity shows that energy intensive sectors such as Electricity, Metal Ore, Transport and other mineral product are those with the highest CO2 intensities.

The observed change in demand resulting from emissions prices maintained the pattern followed by the CO2 intensities with the energy intensive sectors (i.e Metal Ore, Electricity, Basic Metals and Transport) suffering the highest price effects both in percentage and absolute terms.

The environmental impact (in percentage) of carbon emissions trading in the EU resulting from a change in final demand illustrate that an average emissions price of €22 per tCO2 will lead to a 0.17%, 0.12%, 0.27% and 0.09% reduction in emissions from metal ore, basic metals, electricity and transport sectors respectively.

## Conclusions

The paper has provided input-output matrixes disaggregate estimation of EU-15 energy-related CO2 emissions and the effects of EU ETS allowance prices levied in EU during 2005. These results were largely derived from the calculation of the 2005 EU energy related CO2 intensities through an input–output demand model.

The empirical analyses of EU CO2 emissions and of the allowance price effects have reiterate the need for a comprehensive market base strategy in EU climate change policies. The results also signify the need to improve the overall efficiency of the EU energy system, and not only focus on the actual CO2 emitters. Moreover, the study has found the emissions trading mechanism to be a viable and efficient instrument, both in environmental and economic terms.

## References

*Kyoto Protocol to the United Nations Framework Convention on Climate Change*, adopted in New York on 9 May 1992

*Emissions Trading Master Agreement for the EU Scheme* (Draft developed by the International Emissions Trading Association (IETA) Version 2.1 (2005)

*Tracking Progress towards Kyoto and 2020 Targets in Europe*, EEA Report No7, 2010

Alfred, E., and Cornelia. O., *Kyoto, Europe?—An Economic Evaluation of the European Emission Trading Directive,* European Journal of Law and Economics, 19: 17–39, 2005

Arnold, T., et al., *Environmentally extended input-output tables and models for Europe,* Institute for Prospective Technological Studies European Commission - Report EUR 22194 EN (2006)

Convery F. J. and Redmond L., *Market and Price Developments in the European Union Emissions Trading Scheme*, Review of Environmental Economics and Policy, volume 1, issue 1, winter 2007, pp. 88–111

Denny, E. A., and Joskow P. L., *The European Union’s Emissions Trading System in perspective,* PEW Centre on Global Climate Change (2008)

Ekins, P., and Barker, T., *Carbon Tax and Carbon Emission Trading,* Jounal of Economic Survey Vol. 5 No. 3 (2001)

Endres, A., and OHL, C., *Kyoto, Europe? - An Economic Evaluation of the European Emission Trading Directive,* European Journal of Law and Economics, 19: 17–39, 2005

Hasselknippe, H. and K. Røine eds., *Point Carbon - ”Carbon 2006.”,* Carbon Market Insights, Copenhagen, 2006. Available from www.pointcarbon.com

James T., and Fusaro C., P*., Energy & Emissions Markets Collision or Convergence?* (Clementi Loop, Singapore: John Wiley & Sons (Asia) te Ltd, 2006)

Labandeira, X., and Labeaga, J. M., *Estimation and Control of Spanish Energy-Related CO2 Emission: an Input-Output approach,* Journal of Energy Policy 30 (2002) 597-611

Machado, G., et al., *Energy and carbon embodied in the international trade of Brazil: an input–output approach,* Journal of Ecological Economics 39 (2001) 409–424

 Nicholas, L., et al., *State and Trends of the Carbon Market 2011*, Carbon Finance Report at the World Bank 2010

Rueda-Cantuche, J., et al., *A Symmetric Input-Output Table for EU27: Latest Progress,* European Commission - DG Joint Research Center, IPTS - Institute for Prospective Technological Studies, Edificio EXPO, C/Inca Garcilaso s/n, 410092.

Sijm, et al., *CO2 Price Dynamics: The Implications of EU Emissions Trading for the Price of Electricity,* Energy Research Centre of the Netherlands (2005) ECN-C-05-081

Wrake, M., *Emissions Trading: The Ugly Duckling in European Climate Policy?* Swedish Environmental Research Institute (2009) B1856