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EU corporate action as a driver for global emissions abatement: A structural analysis of EU international supply chain carbon dioxide emissions

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ABSTRACT

Global greenhouse gas emissions driven by European consumption increasingly occur outside European borders. These non-European sources of emissions remain linked to Europe via the international supply chains of European companies. Leading companies are now measuring their supply chain emissions and taking tentative steps to reduce them. If such activities were to become widespread, then an opportunity may exist for European industry to drive significant emissions abatement beyond European borders. This paper provides the first analysis into the maximum potential influence European industry has over its non-European supply chain emissions. The analysis is performed at the level of aggregate industry sectors using a global Multi-Regional Input–Output model. The Total Consumption Attribution method is used to estimate the potential influence of different European industries with detailed decompositions carried out using Structural Path Analysis techniques. The potential influence of European industry over non-European supply chain emissions is found to be greater than one gigatonne of carbon dioxide. The European manufacturing sector is found to have the greatest potential influence over non-European emissions via relatively short supply chains that entail few international border crossings. The results presented in this paper provide initial evidence in support of the development of European climate policies aimed at stimulating supply chain emissions reductions activities within European companies

1. Introduction

Our capacity to respond to the threat of climate change is impeded by a reluctance to act on remote (spatial and temporal) risks and by the global nature of the problem. Although progress at a global scale has been slow, three important developments have occurred in recent years that point to new possible directions in lieu of a unified global effort.

Firstly, there is increasing interest in emissions embodied in internationally traded goods and services. Greenhouse gas emissions released during the production of goods and services are said to be 'embodied' in those goods and services: for example, an automobile can be associated with embodied emissions arising from final assembly, metal production and forming, generation of electricity used in the production of all manner of intermediate products, etc. An estimated 22% of global CO_2 emissions (from fossil fuel combustion, cement production and gas flaring) in 2004 were embodied in international trade, with the general trend involving the release of emissions in developing countries to meet the consumption demands of developed countries (Peters et al., 2012). The observed carbon flows raise questions over the extent to which domestic emissions reductions have contributed to global emissions reductions (Jakob and Marschinski, 2013; Petherick, 2012). Aligning such consumption-based attributions of emissions with responsibility for climate change, effectively shifts the burden to the real drivers behind global emissions (Peters et al., 2011c). However, critics of this approach point out that less-developed regions are already compensated through the cost of goods sold, and that basing international climate policy on consumption accounts would present profound political and methodological challenges (Committee on Climate Change, 2013; Energy and Climate Change Committee, 2012). It remains unclear whether responding to the policy implications of these findings may help unlock the current stalemate in climate negotiations. However, the existence of strong supply chain linkages between production in one region and consumption in another, may present a conduit for emissions reductions that should be explored further.

Secondly, a growing number of jurisdictions (EU, Australia, California, China and South Korea among others) have introduced, or are in the process of planning, regional mechanisms that introduce a carbon price either through carbon taxes or cap-and-trade schemes (Grubb, 2012). The key instrument for tackling

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emissions at the EU level – the EU Emissions Trading Scheme – continues to expand its sectoral coverage with the recent inclusion of the aviation sector (European Commission, 2012a). The EU's vision of an international carbon market – developed through the linking of initially isolated cap-and-trade systems – has moved a step closer with plans to link the EU Emissions Trading Scheme with Australia's emissions trading scheme now in place (European Commission, 2012b), and future prospects of linking with a Chinese emissions trading scheme encouraged by recent agreements to collaborate on pilot projects (European Union, 2012). However, the EU Emissions Trading Scheme remains undermined by the repeated over-allocation of permits – partly due to unanticipated changes in output, for example following the 2008 financial crisis – and by fears of carbon leakage which see companies heavily compensated for their permit cost in an effort to prevent relocation of production (Energy and Climate Change Committee, 2012). The political realities of cap-and-trade remain far from their theoretical ideal. Although there are plans for both spatial and sectoral expansion of the EU Emissions Trading Scheme, the trading scheme remains focused on reducing emissions from energy intensive sectors within its bounds – not in instigating greater efficiency in the use of emissions intensive products along supply chains.

Finally, corporate and product carbon footprinting activities have gained widespread momentum thanks to initiatives such as the Carbon Disclosure Project and new standards and guidelines including Publicly Available Specification 2050 and the Greenhouse Gas Protocol (PriceWaterhouseCoopers, 2012; Sinden, 2009; WRI and WBCSD, 2004). The level of disclosure of emissions information to investors and other stakeholders, including the public, is unprecedented. Leading companies are integrating climate change factors into their wider business strategy (both near-term and long-term), reportedly motivated by regulation (current and anticipated), cost reduction, brand enhancement, new revenue opportunities, stakeholder pressure, customer behaviour and reputational risk (PriceWaterhouseCoopers, 2012). This includes putting pressure on their suppliers. For example, the Carbon Disclosure Project Supply Chain Program (consisting of 49 member companies including Wal-Mart, PepsiCo, Unilever and Dell) provides a process for prompting disclosure of supplier emissions. Most of the companies within the program already reward suppliers that employ carbon management practices and over a third intend to reject suppliers that do not (Accenture, 2012). Interpreting this as an indicator of widespread corporate commitment to the voluntary reduction of supply chain emissions requires caution: beyond the Carbon Disclosure Project Supply Chain Program, such activities are far from commonplace; and, the financial commitment needed to measure and disclose emissions and to initiate supplier engagement processes is insignificant compared to that required to act on this information and drive emissions reduction across the value chain. This is especially the case if efforts to reduce emissions conflict with other business objectives.

All three trends are of particular importance to Europe. The region is heavily dependent upon emissions intensive imports. Europe remains connected to the sources of these emissions through the supply chains of its companies, who are leading carbon disclosure initiatives and making some efforts to reduce their supply chain emissions. Existing mechanisms through which European environmental policy has sought to decrease emissions are in turmoil and failing to address the true global nature of the problem. In the face of these trends, understanding the potential influence of EU companies over global emissions is of interest both because it demonstrates the potential impact of collective voluntary action of EU companies and because it may offer an alternative conduit for targeting policy for emissions abatement.

The term *corporate action* is used in this study to refer to the range of possible activities an enterprise could engage in that would result in a reduction in its associated supply chain emissions (for example, such activities could include: rewarding suppliers that employ carbon management practices and rejecting those that do not; exerting pressure on suppliers to reduce the embodied emissions content of purchased products; research and development into new products that require less emissions-intensive inputs; facilitating the diffusion of low carbon technology through supply chains; and, collaborating with suppliers in the development of improved production processes and logistics). Furthermore, in this analysis, where a group of enterprises together engage in such activities (e.g., all enterprises ascribed to a particular industry sector), this is referred to as *collective corporate action*. All emissions released from an enterprise's (or group of enterprises') complex network of upstream supply chains presents the *maximum potential influence* the enterprise has (those enterprises have) over global emissions reductions by engaging in corporate action.

Specifically, this paper seeks to address the following questions: What is the maximum potential influence of EU-based collective corporate action over emissions reductions from non-EU supply chains? Where would these reductions occur, and with which sectors and regions would EU companies have to initially engage to drive action to bring about these savings? How easy is it to influence non-EU emissions sources?

To address these questions a method for calculating the maximum potential influence, or "reach", of EU-based collective corporate action, and for evaluating the ease with which this influence can be exerted is required. Alternative methods for re-attributing global emissions on a consumption basis are outlined in Sections 2.1–2.3 in terms of their suitability for estimating reach. Methods for decomposing aggregate measures of reach are presented in Section 2.4 that form the basis of the investigation into the ease with which influence can be exerted. Section 2.5 then sets out the data and model to which these methods are applied in order to generate the results reported in Section 3. Finally, both the limitations and policy relevance of the analysis are discussed in Section 4.

2. Methods and data

The production of goods and services in the global economy entails the release of CO_2 emissions into the atmosphere as an externality of fossil fuel combustion and industrial processing. National and international policy aimed at tackling climate change requires these emissions, in addition to other important anthropogenic sources and sinks of greenhouse gas emissions that are beyond the scope of this analysis (such as land use change and household emissions), to be quantified so as to establish national responsibilities for the problem, set appropriate reduction targets, and to identify areas of the economy where mitigation efforts should be focused (Peters et al., 2012).

Two attribution methods for quantifying emissions at the national level are in common use: (a) territory-based accounts, such as the national greenhouse gas inventories required by the United Nations Framework Convention on Climate Change, that attribute emissions to countries holding administration over territory from where they are physically released; and (b) production-based accounts, such as those included in the System of Environmental-Economic Accounts, that attribute emissions according to a principle of residency in order to achieve consistency with the System of National Accounts (for example, production-based accounts involve an adjustment to territory-based accounts to reflect emissions caused by residents while abroad and the inclusion of aviation and shipping emissions from