

MEASURING CLIMATE CHANGE THE ECONOMIC AND FINANCIAL DIMENSIONS



Measuring Carbon Emissions of Foreign Direct Investment in Host Economies

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Measuring Carbon Emissions of Foreign Direct Investment in Host Economies

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Introduction (1)

- Foreign Direct Investment (FDI) effects on host economies are numerous and complex but common themes in the literature point to
 - rising wages;
 - productivity and knowledge spillovers to domestic firms;
 - exports diversification and introduction of new industries and
 - increasing growth
- Environment and sustainability effects of FDI are unclear; but some have argued that:
 - If demand for environmental quality increases as incomes rise, then as FDI increases incomes, environmental damage falls
 - Countries with low incomes tend to set low pollution standards to attract resource seeking as well as pollution intensive FDI leading to FDI that increases emissions
 - FDI deploys new technologies that are cleaner than domestic producers, thus supporting improvements in the environment of the host country

Introduction (2)

- In this paper, we develop a framework for estimating possible effects of FDI on emissions in host countries using industry level information on production, trade, investment, and carbon emissions.
- Framework aims to provide estimates to address the following key questions:
 - What is the effect of greenfield investment and capacity extension resulting from FDI on emissions in host economies?
 - What is the effect of the operations of foreign owned enterprises on emissions in host economies?
 - What effect does international trade activity of foreign owned enterprises have on emissions in host economies?

Methodology and data (1)

... FDI benefits host economies by expanding capacity through greenfield investments or new investments in existing operations, which results in carbon emissions in the production units involved in the creation of the new capacity or expansion of existing capacity.

Indicator	Concept	Methodology	Data Source
Carbon emissions in supply to Gross Fixed Capital Formation of FDI	The direct and indirect amount of carbon dioxide emitted into the atmosphere from the production used in Gross Fixed Capital Formation (GFCF) funded by FDI.	<ul style="list-style-type: none"> (1) In each industry take the Output multipliers for each contributing industry from the World Input-Output table (Output Multiplier) (2) Calculate a carbon emission intensity (Carbon emissions / output) (3) Multiply the Carbon emission intensity by the output multiplier by the final use of GFCF by the FDI ratio to GFCF 	IEA production-based emissions, OECD Input Output Database and FDI financial flows database

Methodology and data (2)

... Increased capacity increases the scale of economic activity, results in export diversification, and leads to structural changes in the economy through the introduction of new industries but also generates carbon emissions in the host economy.

Indicator	Concept	Methodology	Data Source
Carbon emissions embodied in Multinational Enterprises (MNEs) Output/Exports (2 indicators)	The direct and indirect amount of carbon dioxide emitted into the atmosphere from output/exports of MNEs.	<p>(1) In each industry take the output multipliers for each contributing industry by ownership from the Activities of Multinational Enterprises Inter Country Input-Output table (Output Multiplier)</p> <p>(2) For each industry by ownership calculate a carbon emission intensity (Carbon emissions / output)</p> <p>(3) Multiply for a given industry the Carbon emission intensity * output multiplier * output/exports</p>	IEA production-based emissions, Intercountry Input Output Tables from the OECD Activities of Multinational Enterprises database.

Limitations

■ Data:

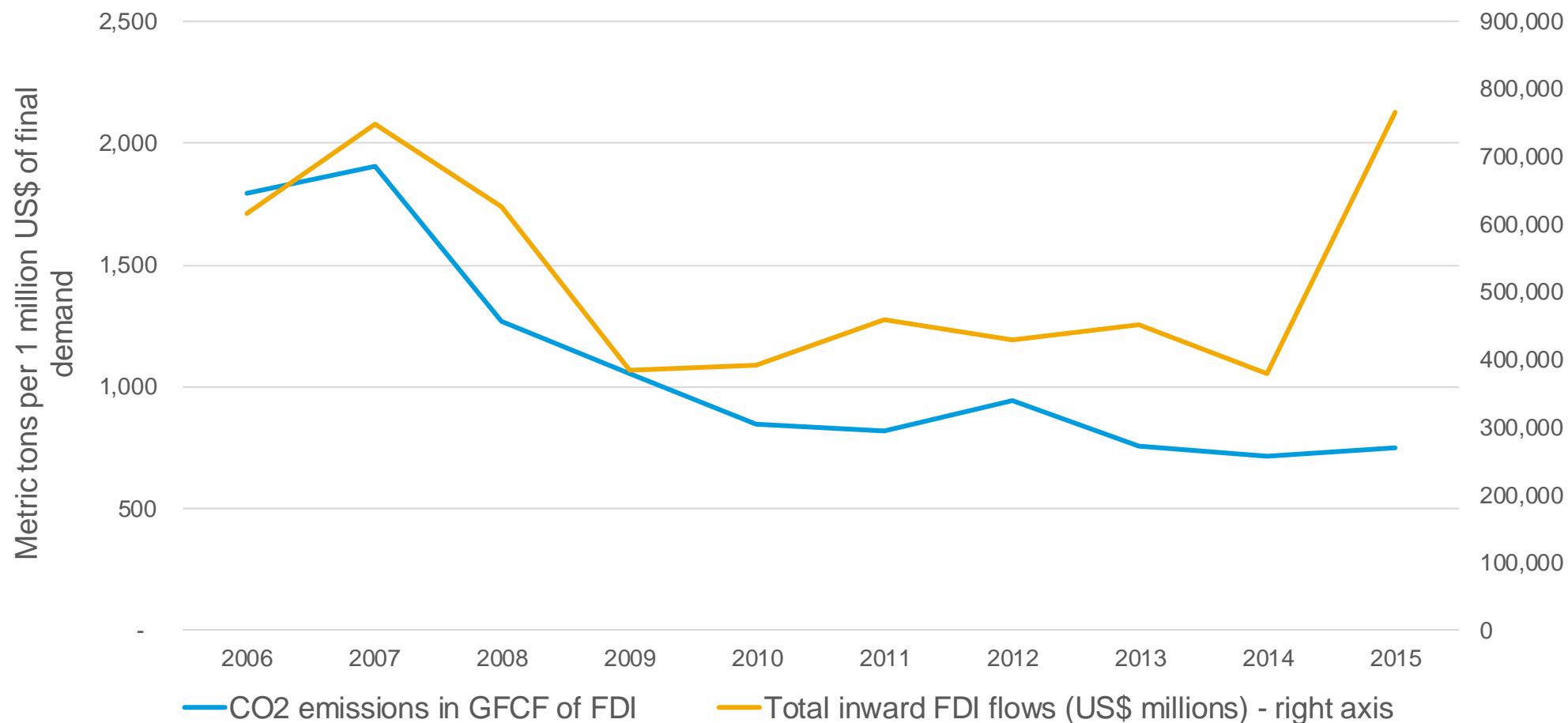
- Unavailability of estimates on FDI by use (i.e., Greenfield FDI);
- Limited geographic coverage;
- Source data used available for only 2005-2015 (no Input Output Tables (IOTs) for other periods);
- Direct emission estimates are not disaggregated between MNEs and Domestic Owned enterprises (DOEs);
- Direct emission estimates are available based on only Tier 1 method.

■ Methodology:

- Conflict between the hypothesis of matrix calculation and the IOT balancing approach resulted in aggregation of some sectors of MNEs or DOEs affecting reliability of interrelations.
- Central equation system of input-output analysis fails to reflect dynamic interactions between the respective variables
- IOTs pertain to lack of constraints on the factors of production and impose on the supply side, a fixed input structure and fixed ratios for production for each industry

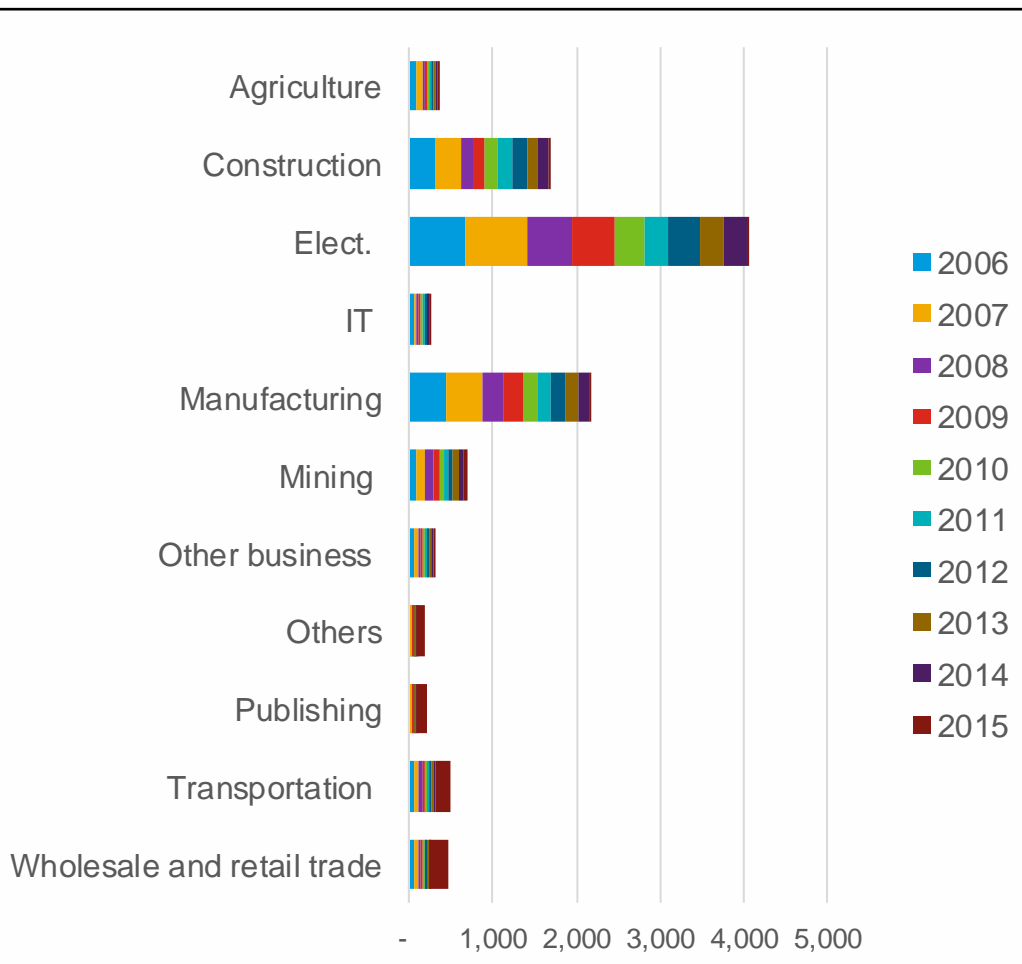
Carbon emissions associated with the investment effect of FDI - Results (1)

...emissions associated with FDI effect on GFCF have continued to fall even as FDI recovers.

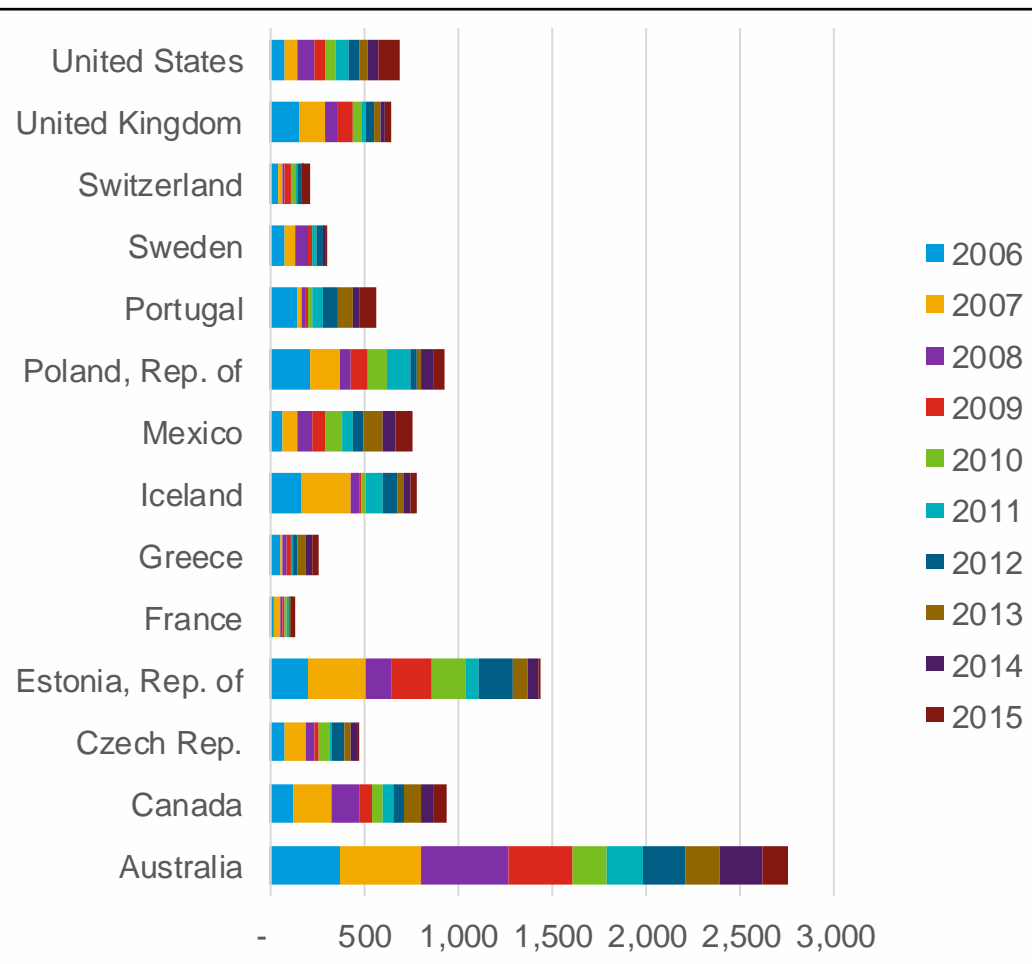


Carbon emissions associated with the investment effect of FDI - Results (2)

...sector emission estimates are highest in electricity, manufacturing, and construction

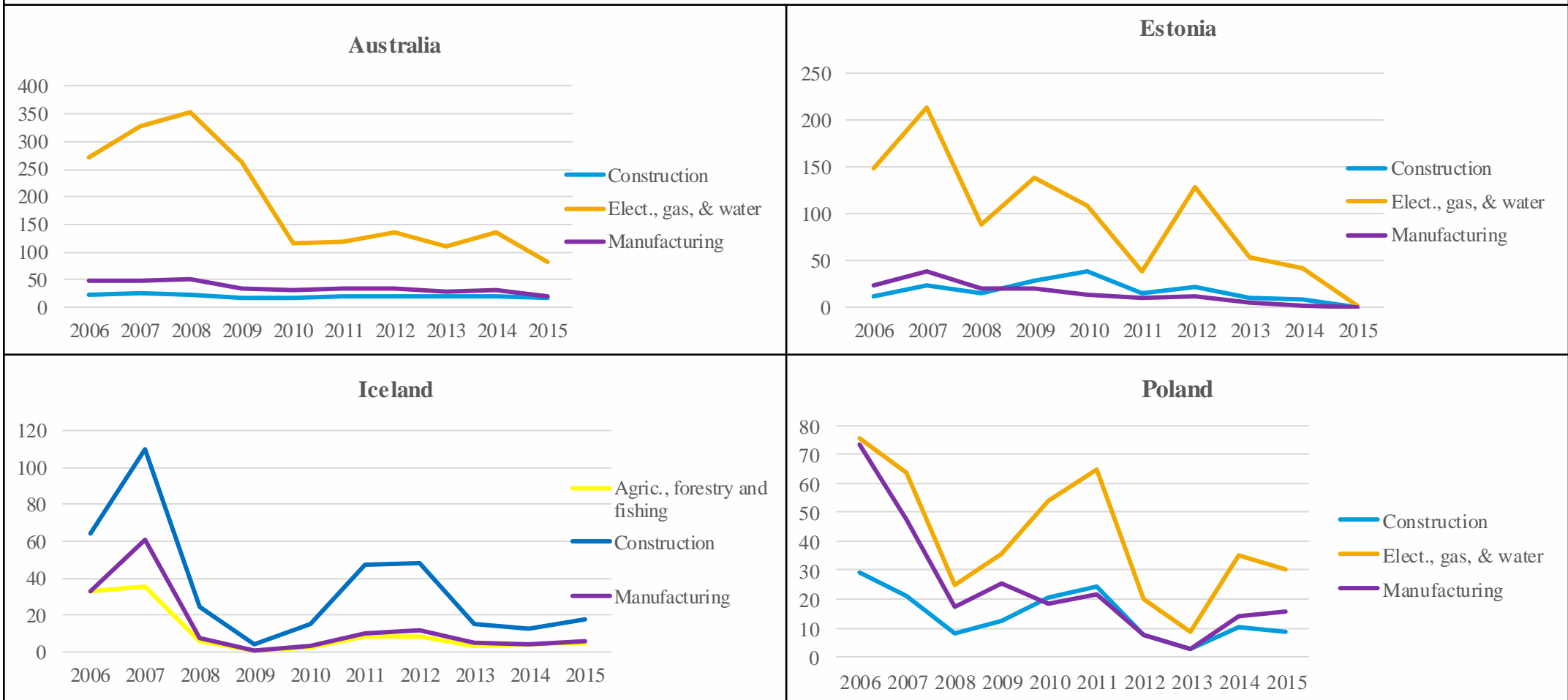


...Country estimates are highest in Australia and Estonia and lowest in France and Switzerland



Carbon emissions associated with the investment effect of FDI - Results (3)

... electricity, construction and manufacturing sectors account for most emissions (in metric tons per million US\$ of output) at country level as well

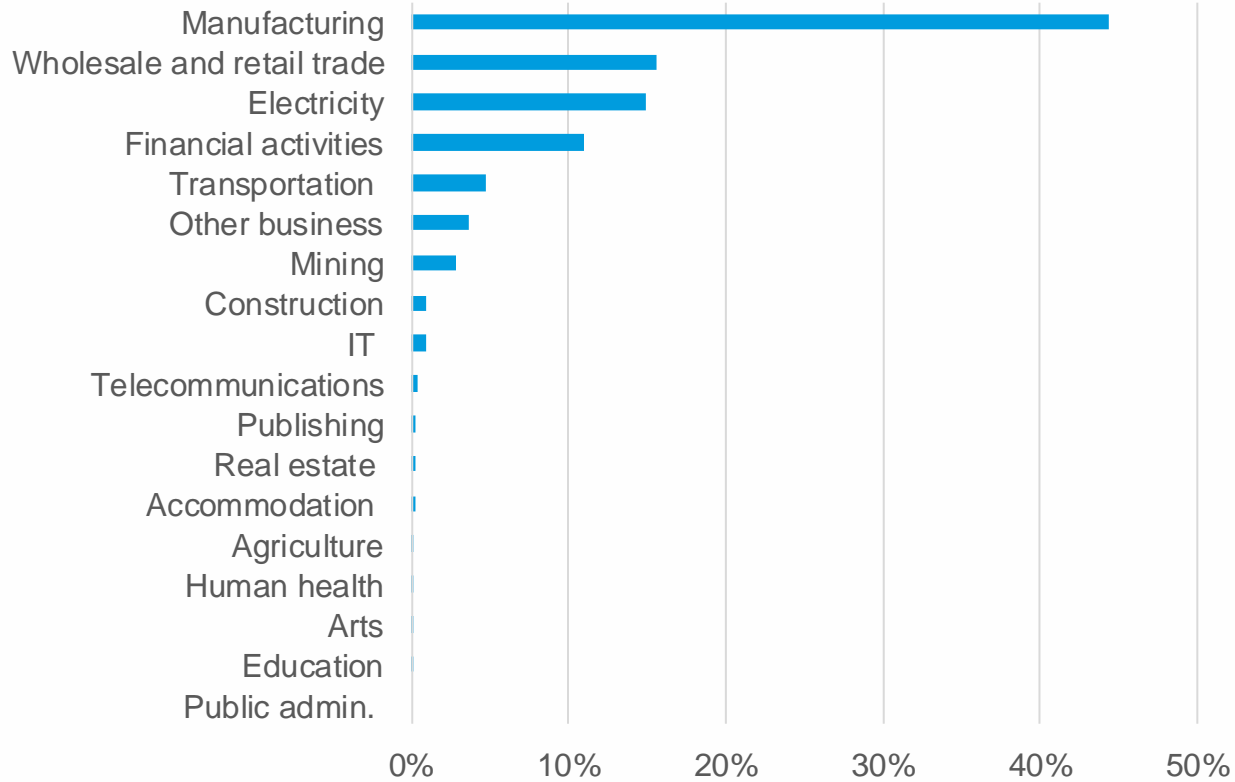


Carbon emissions from ongoing operations of MNEs – Results : distribution of output emissions, 2005-2015

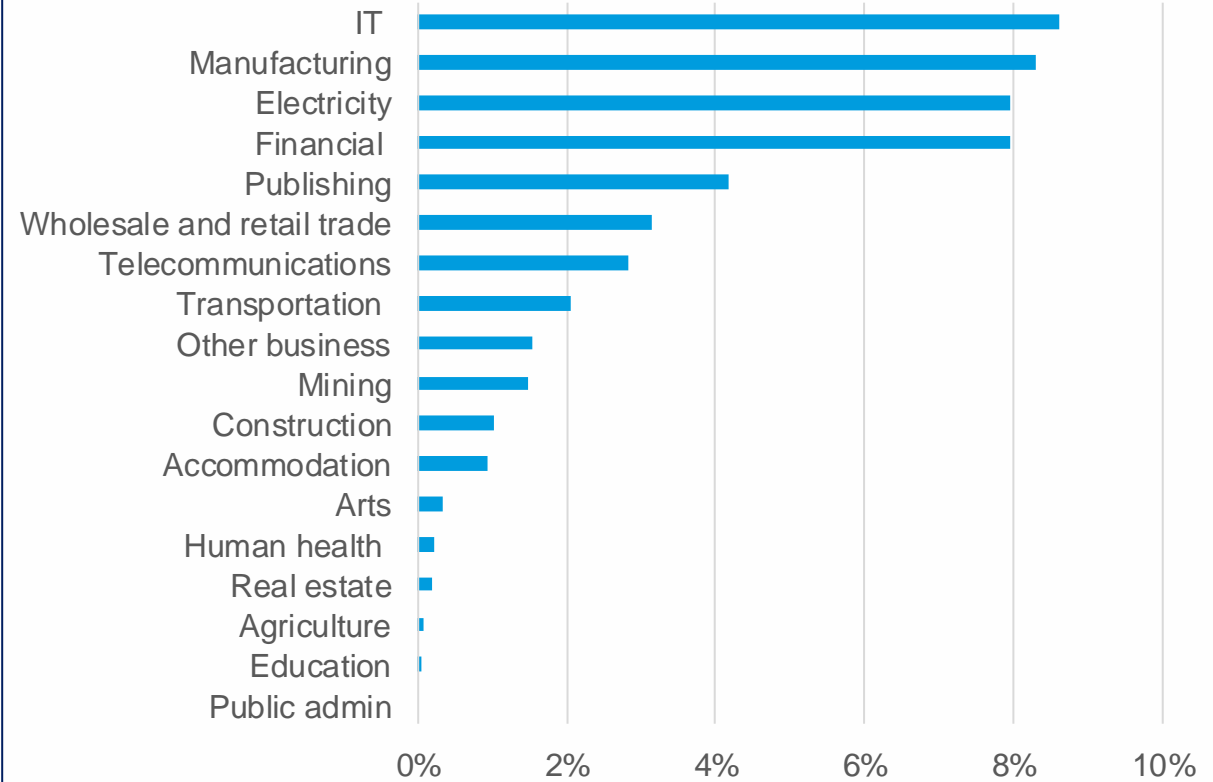
..... manufacturing, trade, and electricity had the highest contributions to MNE emissions

....shares of MNEs emissions were generally low with IT, manufacturing, electricity, financial and insurance activities having the highest shares.

MNE emissions by industry/total MNE emissions

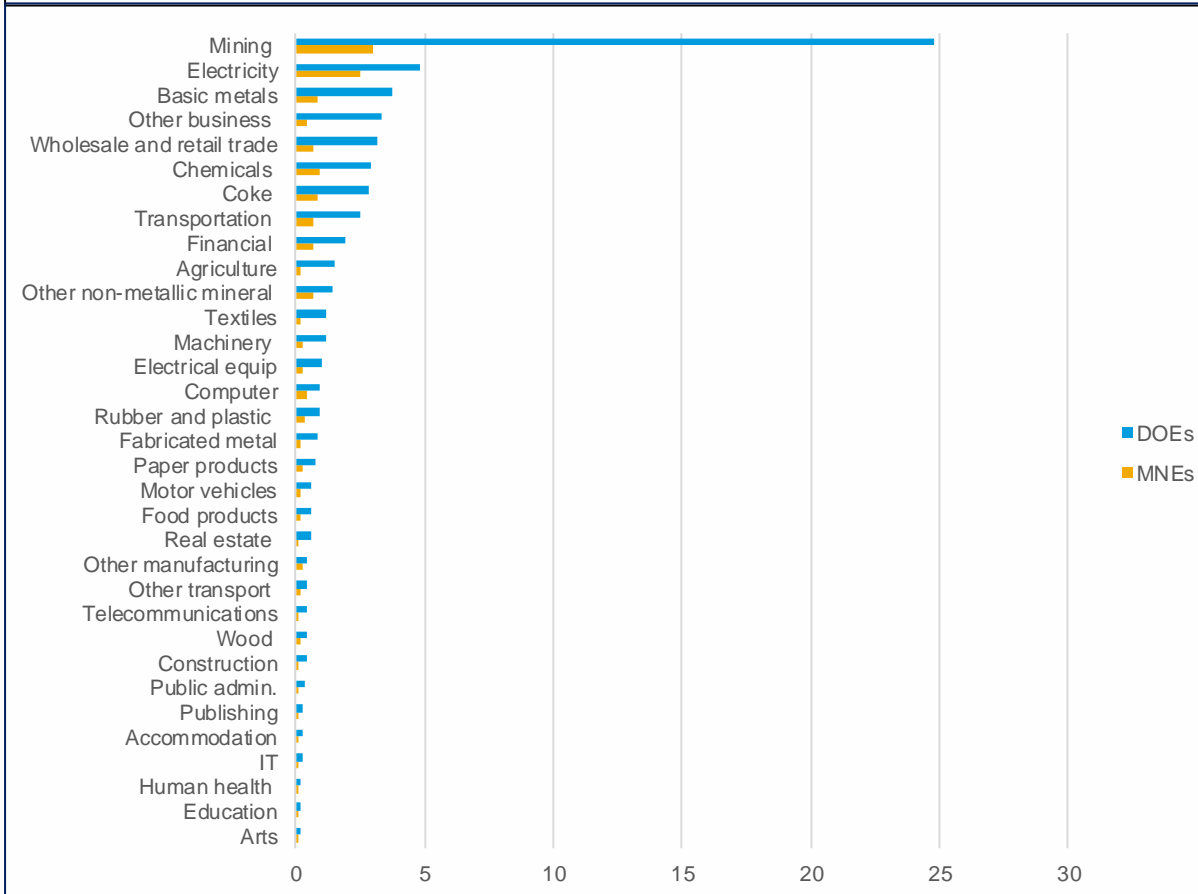


MNE emissions by industry/total emissions by industry

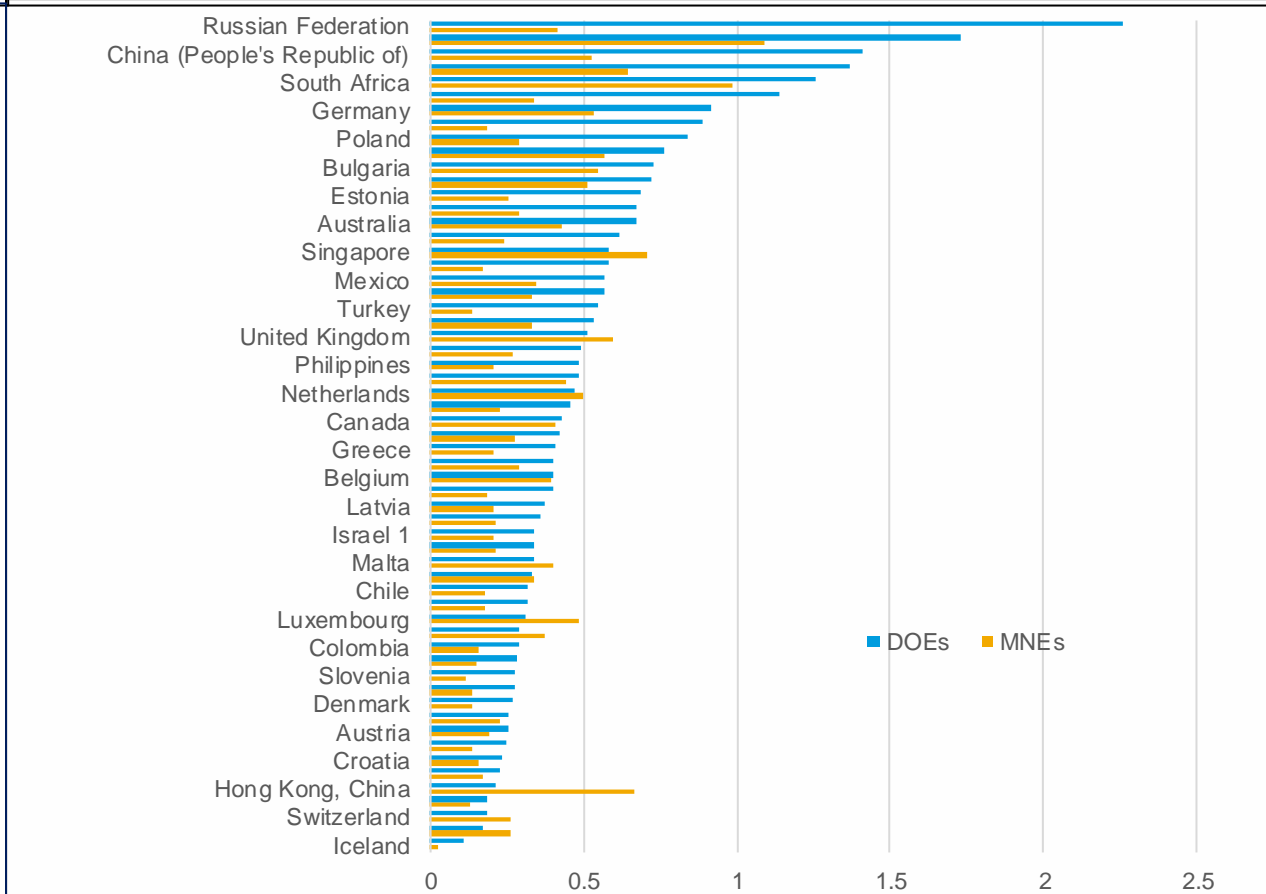


Carbon emissions from ongoing operations of MNEs - Results - output emission intensities, 2005-2015

..... Industry level intensities show lower emission intensities for MNEs compared to domestic enterprises

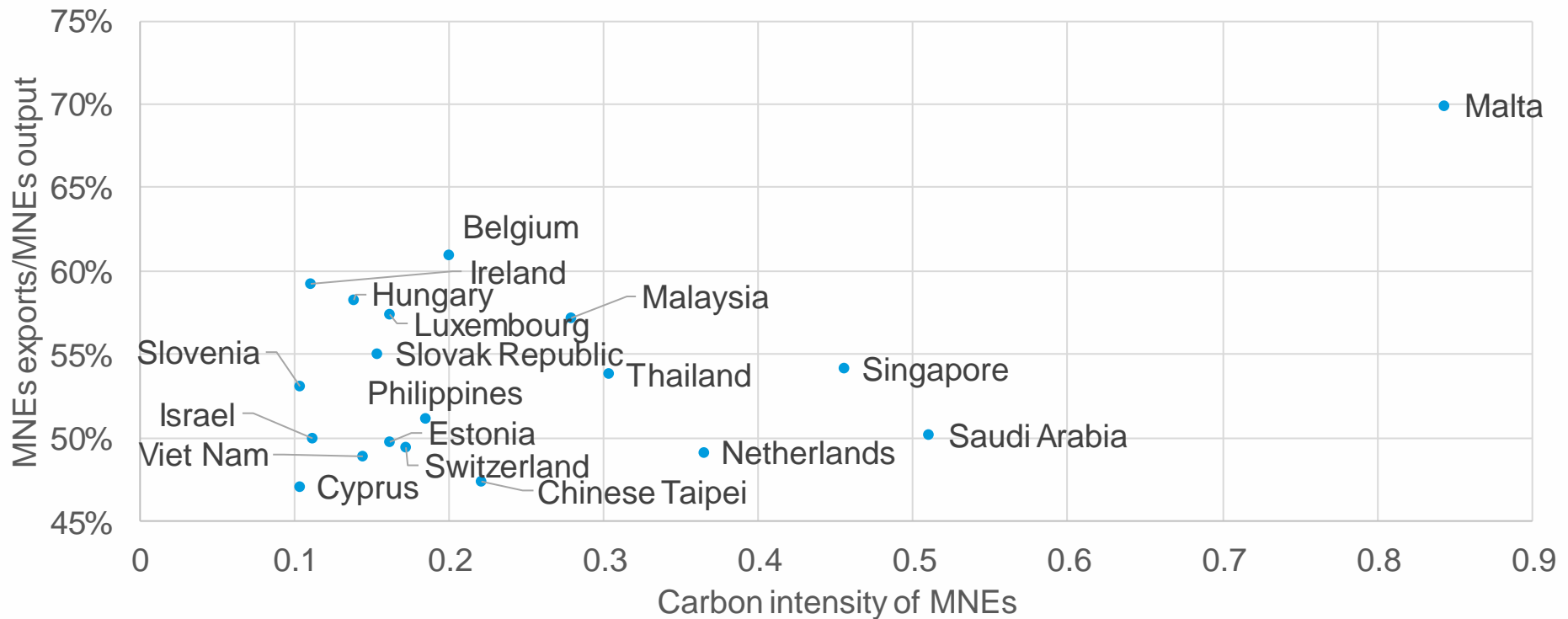


....Country estimates show cases of higher emission intensities in MNEs compared to domestic enterprises (Malta, Luxemburg, Norway, Hong Kong, Switzerland, and Ireland)



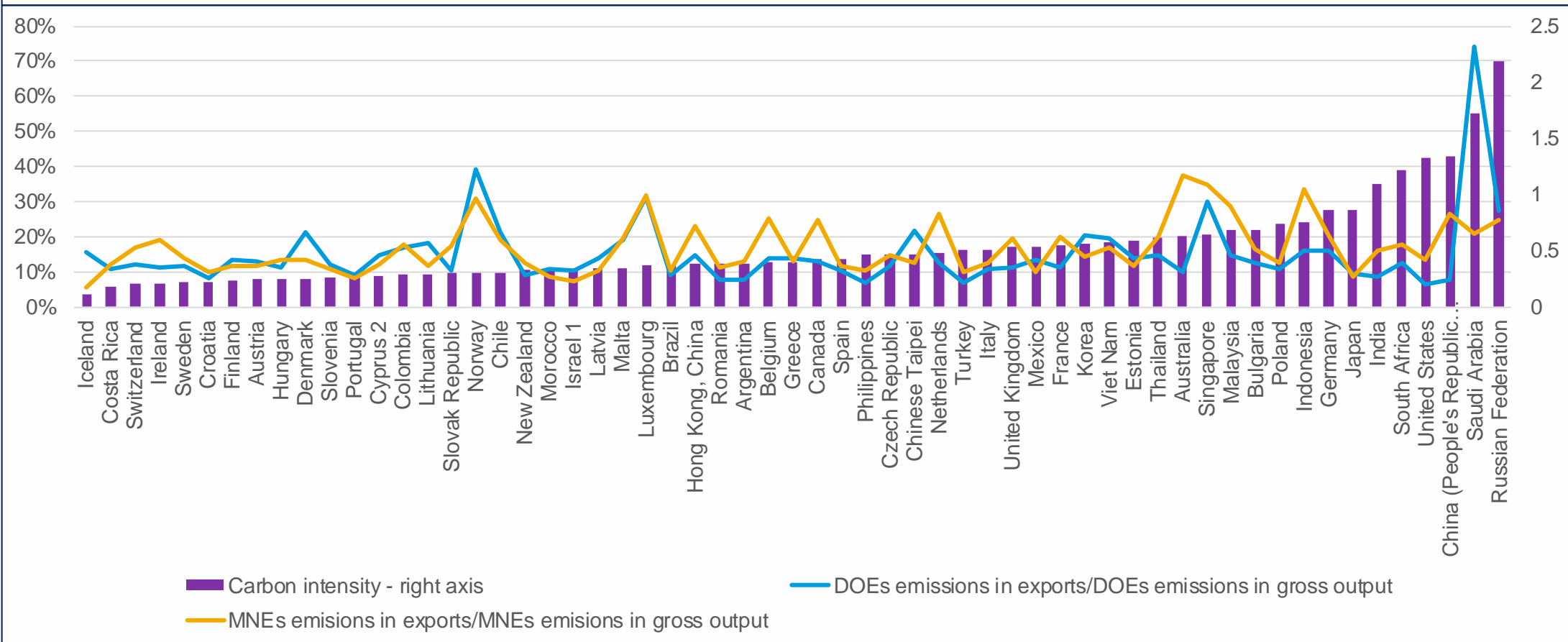
Carbon emissions from ongoing operations of MNEs - Results - emissions in exports, 2005-2015

....sizeable share of the emissions in the low carbon intensity countries is driven by foreign demand - MNEs in Belgium, Hungary, Luxemburg, Malaysia, Slovak, Slovenia, Switzerland and Philippines have relatively low emission intensities, but more than half of their output is exported



Carbon emissions from ongoing operations of MNEs - Results - emissions in exports, 2005-2015

.... export related emissions shares are higher for MNEs compared to domestic enterprises in most countries



Policy implications

- Home economies:
 - Incentivizing domestic investors to meet high environmental standards at home and abroad could be important to reducing global emissions
 - Could reduce emissions directly by inducing firms to use lower carbon production functions and technology and also by inducing them to demand lower carbon infrastructure and transportation in the host economies
 - If firms were also encouraged to reduce emissions along their supply chains, could induce them to demand their suppliers reduce emissions

- Host economies:
 - Remove barriers to investment in environmental goods and services sectors as well as in low carbon technologies to promote positive spillovers and knowledge and technology transfer to the domestic economy
 - Include an analysis of the impact on carbon emissions as part of their FDI attraction strategies;

- Developing a standard for companies to disclose their carbon emissions will provide valuable information that can help us better understand the role of all enterprises, both MNEs and DOEs, in carbon emissions