UNILATERAL CLIMATE POLICY – INCIDENCE ON AFRICAN COUNTRIES

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Overview

In the absence of an effective global agreement as a first-best solution to mitigate climate change, industrialized countries lead the way with unilateral carbon emission reductions. The most prominent example is the European Union (EU), which adopted emission reduction targets until 2020 to be achieved through an EU-wide emissions trading system (ETS). In 2014, EU leaders agreed on a reduction target of at least 40% by 2030 compared to 1990 levels, with the EU ETS remaining the centre piece of EU's climate policy (European Council, 2014). Before and during the UNFCCC conference in Paris in December 2015 (COP 21), most countries of the world communicated their intended nationally determined contributions (INDCs) to reduce greenhouse gas (GHG) emissions (UNFCCC, 2015). The USA stated the intention to reduce greenhouse gas emissions by 26–28% below 2005 levels by 2025, and has launched a clean power plan to reduce CO2 emissions in the power sector (EPA 2015).

In the applied literature, a common finding is that countries that unilaterally put a price on emissions are able to shift larger parts of the economic burden of emission reductions to trading partners through price changes on international markets (Branger and Quirion 2014). However, in the Rio Declaration and subsequent agreements, governments have committed themselves to principles that acknowledge the 'common but differentiated responsibilities' of countries and particularly that the 'special situation and needs of developing countries […] shall be given special priority' (UNCED 1992).

In this paper, we investigate the economic implications for African countries of emission constraints in countries that have implemented carbon pricing or are intending to in the near future, and are important trading partners for African countries: Europe, China, and the USA. We find that African countries bear substantial costs from carbon pricing by their trading partners. Different regions in Africa are affected rather differently depending on whether Europe, China, or the USA introduces emission constraints, according to their import dependency on the respective region.

Methods

To derive business-as-usual statistics we use multi-region input-output analysis. For our policy analysis we use a canonical static computable general equilibrium (CGE) model of global trade and energy use. Parameterization of the model is based on the version 8.1 of the Global Trade Analysis Project (GTAP) dataset (B. Narayanan, Aguiar, and McDougall 2012) with the base-year 2007. The analysis will be updated to the most recent version 9 of GTAP (Narayanan, Aguiar, and McDougall 2015) with the base-year 2011.

Results

Table 1 shows the cost shares of imports in private final consumption and in production as well as shares of imports from Europe, China, and the United States of total imported embodied carbon. The cost share of imports in private consumption ranges between 11% and 21% while that of production ranges from 8% to 15%. The results thus reaffirm the significance of Europe, China and the USA as major trading partners for the various sub-regions in Africa. In terms of the share of embodied carbon associated with total imports, these three major economies account for more than half of carbon embodied in imports to Africa as whole with China and Europe being the dominant source. While Europe serves as a major origin of embodied carbon in imports to Northern, Central and Sourthern Africa, China's share of total imported embodied carbon ranks higher than Europe in all sub-regions except Western Africa. Among the three major economies, the USA has the least share of total imported embodied carbon across all sub-regions in Africa.

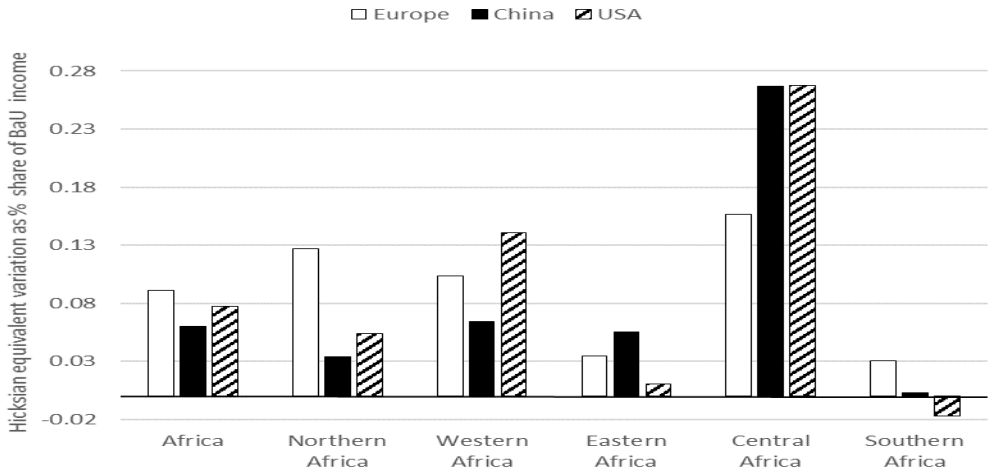
Figure 1 also illustrates the cost incidence in African regions in the event of the implementation of emission reduction policy i.e., a CO2 tax of USD 30 in Europe, China or the USA. In general, a carbon tax in Europe results in a higher cost incidence in Africa, followed by a carbon tax in USA and China, respectively. The cost incidence in Northern Africa follows the continent-wide trend but the cost incidence in Western Africa as a result of a carbon tax in the USA is higher than a similar tax in Europe and China. There is also a more

pronounced cost effect of a carbon tax in China in Eastern Africa than a similar carbon tax in Europe or the USA. The cost incidences in Central Africa are significantly higher compared to all other regions. The degree of the cost incidence in a sub-region could be attributed to the substitutability options available to the sub-region. Regions that have a higher capacity to substitute goods from the emission constraints country will be less affected by the introduction of a carbon tax than a region with less capacity to substitute goods from an abating country. The degree of cost incidence may also be determined by the type of goods and the carbon content of the goods that are imported from the abating country (a detailed analysis in this respect has just begun).

Table 1: Cost shares of imports in private final consumption and in production as well as shares of imports from Europe, China, and the United States of total imported embodied carbon (EC)

	Cost shares of imports (%)		Regional shares of total imported EC (%)		
	Private final consumption	Production	Europe	China	USA
Africa	15.6	11.5	21.1	24.0	8.3
Northern Africa	21.4	10.2	30.2	17.3	9.8
Western Africa	18.0	12.8	17.2	32.4	11.0
Eastern Africa	11.7	14.7	9.5	21.3	3.4
Central Africa	10.5	9.5	25.0	25.8	6.8
Southern Africa	20.0	8.7	20.5	25.6	7.2

Figure 1: Cost incidence in African regions of a CO2 tax of USD 30 in Europe, China, or the United States



Conclusions

African countries face substantial economic costs as a result of the implementation of a unilateral climate policy (e.g., a carbon tax) that increases the costs of both inputs/intermediates and final goods that are imported from their major trading parteners. There are also substantial differences with respect to the degree of cost incidence across the sub-regions. As such, industrialized countries in particular should take these implications into account to respect for the Rio principles.

NOTE: **These results are very preliminary – a more detailed analysis (country and sector level; different variants of climate policy) would be completed before the conference is due.**

References

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