

## **POLICY OPTIONS FOR DESIGNING A CARBON BORDER TAX**

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Within the framework of emission control instruments, there is currently an important debate regarding carbon-motivated border tax adjustment (CBTA). CBTAs are tariffs applied by countries that decide to price carbon emissions, and they are aimed at preventing the main drawbacks of unilateral emission control mechanisms. If implemented, these tariffs would be imposed on products imported from all the countries that are not applying the carbon control policy in order to “level the carbon playing field” (Houser et al., 2008), compensating for the loss of competitiveness that a carbon tax may imply for domestic producers, and avoiding possible emission leakage involved in unilateral emission reduction policies (Lockwood and Whalley 2010, Horn and Sapir 2013).

One of the critical issues related to the implementation of CBTAs is its policy design, since tariffs can be computed through different methods. In particular, there are two main approaches to calculate a CBTA. One way is to compute the tariffs considering the emissions embodied in each imported product. Alternatively, the tariff could be computed on the emissions avoided through imports: in this case the tariff applied to any imported product would be based on the emissions embodied in the same good produced domestically.

Focusing on the different methods of designing a CBTA system, we simulate what tariffs system should be applied to the products imported in Europe in order to compensate an equivalent taxation on CO<sub>2</sub> emissions implemented within the EU. We focus in particular on Europe due to its position about carbon policies. Indeed, on the one hand the debate on pricing carbon emissions in EU has a long history from the early 1990s and there are some initiatives in this sense; on the other hand the main policies implemented so far are still very timid (the European Energy Tax Directive in force fixes very low taxes for the most part of fuel uses and does not explicitly tax energy according to the carbon emissions) or are in crisis (the carbon prices in the ETS system has been very low during the last years). Despite the enormous political difficulties in advancing in carbon taxation in the EU, we think it is important to revive the debate on implementing a harmonised EU carbon tax as an important climate change tool to reduce emissions. Consequently, it is also important to debate on CBTA and to compare different policy designs.

More in detail, the aim of our work is to analyze what differences would exist between CBAs calculated on embodied emissions and CBAs calculated on avoided emissions, by using a multi-region and multi-sector analysis that permits to show to what extent the two policy designs would affect differently the countries or sectors that have trade relationships with the EU. To know for which countries and sectors the method used is critical can help to understand and to add information to the political debate on it.

Furthermore, our analysis explores an additional methodological issue about how to calculate the avoided emissions. Indeed, the estimation of avoided emissions is equivalent to compute the emissions of imported products applying the so called “domestic technology assumption” (DTA). As we have analysed in a previous article, the usual way of estimating emissions according the DTA has a problem that could significantly bias the outcomes (Arto et al., 2014), because the implicit assumption is that prices of imported goods are equal to prices of

the same products produced at home. For this reason in this paper we estimate emissions correcting for the differences in prices of imported and domestically produced goods using trade data in physical units as it is explained in Arto et al. (2014).

There are many papers that analyze BTAs, but only few of them compare different CBTA designs using input-output data to compute emissions embodied and emissions avoided (Mattoo et al., 2009, 2013, Böhringer et al., 2012; Elliott et al., 2012). Our work follows this research line focusing the analysis on the case of an EU carbon border tax applied on all the imports and using the WIOD database. Our question is what taxation should be applied to the different goods imported from different countries according to embedded emissions or according to avoided emissions. An important novelty of our analysis is that we estimate avoided emissions not only using the traditional DTA but also using an alternative approach that we consider more appropriate considering the physical quantities of imported goods.

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