How Vulnerable is India's Trade to Possible Border Carbon Adjustment in the EU?

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Abstract

This paper presents an empirical exercise with the aim of adressing the following research questions: how vulnerable is India's trade to any future border carbon adjustment in the European Union and which sectors/items are most likely to be affected? The empirical exercise is based on the EU List released in December 2009 in which the bloc has identified 164 (sub)sectors as deemed to be exposed to a significant risk of carbon leakage. Given that the HS 6-digit items corresponding to the 'Full EU List' have been found to comprise the lion's share of India's exports to the EU, it is argued that there is a very high probability of any such border measure having a considerable impact on India's exports to the bloc. The study further reveals that even if the EU decides to bring only the 47 (sub)sectors belonging to the 'Truncated EU List' (that leaves out the 117 highly trade-intensive but low carbon-intensive sectors) under the ambit of its border measure, the overall vulnerability of India could still be quite high. Among the four BASIC countries (namely, Brazil, China, India and South Africa), India appears to be the second-most vulnerable, after South Africa.

I. Introduction

Among the various issues in the interface between international trade and climate change, perhaps the most contested one is the proposed use by developed countries like the European Union (EU) and the United States (US) of border carbon adjustments[1] on imports from countries that are not implementing comparable green house gas emissions reduction measures on the grounds of addressing the risk of 'carbon leakage'. Carbon leakage refers to the effect that a part of the carbon dioxide (CO_2) emissions reduction achieved by the countries undertaking abatement measures is offset by an increase in carbon dioxide emissions in the non-abating countries. The developed countries are concerned that in the energy intensive, trade-exposed sectors, the carbon costs imposed by their domestic climate policies (e.g. carbon tax or cap-and-trade scheme) would put their own producers at a competitive disadvantage *vis-à-vis* producers in developing countries that are not imposing comparable carbon constraints. They further argue that carbon leakage could end up undermining the environmental integrity of the carbon constraining domestic policy measures adopted by them and create 'carbon havens' in the non-carbon-constrained countries. Another issue underscored by the developed countries in this context is that production (re)location in favour of non-carbon-constrained regions could have detrimental social consequences with job losses. In keeping with the above arguments, law makers in both the US[2] and the EU have proposed introduction of border carbon adjustments as a measure to obviate the disadvantages that their domestic products may face *vis-à-vis* imports as a result of emission reduction measures adopted by them. The EU, for instance, has included proposals on border carbon adjustment in its post-2012 climate change and energy package finalized in April 2009[3] (henceforth the 2009 Directive). The 2009 Directive includes, among other things, an array of measures towards strengthening and expanding the EU Emissions Trading Scheme (EU ETS)[4] beyond 2012 and improving its functioning. These measures include *inter alia* a much larger share of allowances to be

[1] Different terms have been used in the existing discourse to refer to these proposed border measures in the context of climate change. These include 'carbon equalization system' 'border carbon adjustment', 'carbon tariff', 'carbon border adjustment' and so on. The EU legislation has used the term 'carbon equalization system'. This paper uses the terms 'border carbon adjustment', 'carbon equalization system', and 'border measure' interchangeably.

[2] border carbon adjustment proposals have been included in several US bills as well, which include the American Clean Energy and Security Act of 2009 (also referred to as the Waxman-Markey Bill), as approved by the US House of Representatives in June 2009. However, the senate version could not be passed till date, despite the fact that several bills have been proposed at the Senate. These include, among others, the 'Clean Energy Jobs and American Power Act' (also known as Kerry-Boxer Bill), which was introduced in September 2009. In May 2010, this version was replaced by the 'American Power Act' (also called the Kerry-Lieberman Bill). These bills also included provisions on border measures.

[3] The package was proposed by the European Commission on 23 January 2008 [see EU (2008)]. A revised (watered-down) version of the package was adopted as the final Directive on 23 April 2009 [see EU (2009a)]. The package proposed a 20-20-20 targets for the EU to achieve by 2020: a 20% reduction in green house gas emissions from 1990 levels; increasing the share of renewables in the EU's energy mix to 20% from 8.5% today; and a 20% cut in energy use through improved energy efficiency.

[4] The EU ETS is a 'cap and trade' system that was launched on 1 January 2005 as the key tool for the bloc to achieve, in a cost-effective manner, its emissions reduction commitments under the Kyoto Protocol. While the first phase of the EU ETS, 2005-07, was seen as an experimental phase, the second phase, 2008-12, coincides with the first commitment period of the Kyoto Protocol.

auctioned in the third phase of the EU ETS (2013-20) instead of being allocated for free, which is the predominant practice under the first two phases. The implications of increased auctioning of emission allowances in the third phase of the EU ETS, particularly for competitiveness of the EU industries and the concomitant problem of carbon leakage, dominated much of the domestic policy debates in the EU on the post-2012 climate change and energy package ever since the proposals were unveiled by the European Commission in January 2008. The 2009 Directive includes two alternative strategies towards addressing the problem of carbon leakage, namely free allocation and border measures.[5] On the proposed carbon equalization system (or border carbon adjustment), the package envisages that '(s)uch a system could apply requirements to importers that would be no less favourable than those applicable to installations within the Community, for example by requiring the surrender of allowances'. It needs to be underscored at this juncture that as of now, the EU is planning to use free allocation as the key instrument to deal with the problem of carbon leakage.[6] However, the possibility of using border measures in the future has not been ruled out by the EU entirely. It must also be noted that some of the EU members like France and Italy have continuously been pushing for use of border measures on imports. Hence, border carbon adjustment continues to remain an option that the EU may choose to use in the future, depending on how the post-2012 global climate regime shapes up. As observed by Carbon Trust (2010), "(t)he debate in Europe about how to tackle carbon leakage … … is far from over… …it is only just beginning."[7]

It is widely argued by developing countries that such border measures on imports, if adopted by developed countries, would be akin to protectionism in the garb of combating climate change. Serious concerns have been raised by the so-called 'emerging economies' (such as, China and India), which apparently are the key targets of such border measures, that these measures could act as a discriminatory market access barrier affecting their exports to the developed countries concerned in energy intensive sectors that may come under the ambit of such border measures.

This paper presents a detailed empirical exercise undertaken with the aim of adressing the following research questions: how vulnerable is India's trade to any future carbon equalization system in the European Union and which sectors/items are most likely to be affected? The empirical exercise is based on the EU List released in December 2009 in which the bloc has identified 164 (sub)sectors (activities) as deemed to be exposed to a significant risk of carbon leakage. In order to determine the product items as per the HS (6 digit) classification corresponding to the EU List, a concordance table has been prepared

[5] The 2009 Directive states that: 'Energy-intensive industries which are determined to be exposed to a significant risk of carbon leakage could receive a higher amount of free allocation or an effective carbon equalization system could be introduced with a view to putting installations from the Community which are at significant risk of carbon leakage and those from third countries on a comparable footing' [EU (2009a)].
[6] EU (2010a).
[7] Carbon Trust (2010), p.27.

for the present study. The first part of the empirical exercise is based on the 'Full EU List' comprising 164 (sub)sectors, whereas the second part undertakes a deeper assessment of the items corresponding to the 'Truncated EU List', which comprises only those 47 (sub)sectors from the 'Full EU List' that are more likely to come under the ambit of any future carbon equalization system in the EU. The study also explores India's exposure to the EU markets *vis-à-vis* other three BASIC[8] countries (namely, Brazil, China and South Africa) in respect of the items corresponding to the 'Truncated EU List'.

The paper is organized as follows. Section II provides a brief overview of the EU List of 164 (sub)sectors deemed to be exposed to a significant risk of carbon leakage, while Section III undertakes a critical assessment of the methodology followed by the EU in arriving at the aforesaid list. Section IV presents the findings from the empirical exercise, while Section V discusses some caveats underlying the study. Finally, Section VI concludes the paper.

II. A Brief Overview of the EU List of Sectors at Risk of Carbon Leakage

As noted before, the post-2012 climate change and energy package was finally adopted in April 2009.[9] The Directive provides for free allocation of emission allowances at 100% of a benchmark to (sub)sectors determined to be exposed to a significant risk of carbon leakage and includes detailed guidelines for determination of sectors at risk. The first list of such sectors, released in December 2009 (referred to here as the 'EU List' or the 'Full EU List'), has been determined as per these guidelines.

The main criteria for the identification of sectors for this purpose are defined in the Directive, particularly in its Articles 10a(15) and 10a(16). According to Article 10a(15), a (sub)sector shall be deemed to be exposed to a significant risk of carbon leakage if the sum of direct and indirect additional costs induced by the implementation of this Directive would lead to a cost increase of at least 5% of its gross value added *and* the sector concerned has a trade intensity with third countries[10] exceeding 10%.

On the other hand, according to Article 10a(16), a sector or subsector is deemed to be exposed to a significant risk of carbon leakage if the sum of direct and indirect additional costs induced by the implementation of the directive would lead to a *particularly high cost increase* of at least 30% of its gross value added; *or* the sector concerned has a *particularly high trade intensity* with third countries exceeding 30%.

[8] The BASIC is a grouping of four large developing countries – Brazil, South Africa, India and China – formed by an agreement on 28 November 2009. The four committed to act jointly at the Copenhagen climate summit.
[9] See the 2009 Directive [EU (2009a)].
[10] A 'third country' refers to a country outside the EU 27 bloc. The third-country trade intensity is defined as total value of third-country exports and third-country imports divided by the total value of the sector's turnover and third-country imports.

Notably, the cost component has two parts: the direct cost of the required allowances and the indirect costs from higher electricity prices resulting from the implementation of the Directive. This is because, the installations covered by the EU ETS have to face cost increases both directly as well as indirectly. First, the covered installations are required to either reduce their emissions themselves or to cover their emission gaps by acquiring the required amount of permits from the relevant markets. The direct costs emanating from either of these two options are proportional to the CO_2 price as well as to the installations' direct emissions.[11] The installations' emission intensity (i.e. CO_2 emissions per unit of production) is a good proxy for the direct emissions from the industrial production process. Second, the covered installations (particularly the energy intensive ones) have to pay a higher price for the electricity, which is increased by the market value of the allowances passed through by the energy generators. These indirect costs are proportional to the marginal increase of the electricity price and to the industrial process' indirect emissions.[12] The installations' electricity intensity (MWh per tonne of production) is a good proxy for the indirect emissions[13] from electricity consumption.[14]

A sector's direct cost increase has been estimated assuming that all the emissions would have been covered by acquiring permits at a price of €30/tonne.[15] Indirect costs have been estimated multiplying the amount of electricity consumed by the marginal increase of electricity price under the assumption that the €30/tonne price is fully passed through into electricity prices.[16]

As for the estimation of direct additional cost induced by the implementation of the Directive, since the 'benchmarks' for allocation of free allowances were yet to be decided, it was not possible for the European Commission to know at the time of determination of the list of sectors the precise quantity of allowances which would be given out for free. Hence, it was based on the 'best estimates for 2013 and 2014' according to which around 75% of allowances for non-exposed sectors will be purchased in 2013-14.[17]

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[11] An installation's direct emissions mainly depend on the fuel mix, technology efficiency, the amount of self-produced electricity and the industrial process emissions.

[12] An installation's indirect emissions mainly depend on the consumption of electricity and on the fuel mix used to generate the purchased electricity.

[13] It is worth noticing that indirect emissions are not related only to electricity consumption, but to all the phases composing the product life-cycle: from the raw material extraction and transportation to the product distribution and final disposal. In principle, it would be more appropriate to count for the product life-cycle direct and indirect emissions. The 2009 Directive, however, takes into account only the indirect emissions from the consumption of electricity in the production process. This, according to Cló (2010:2424), is because the European climate policy is mainly production based (rather than consumption-based), regulating only the emissions from production (which can be easily monitored), while not taking into account the whole product life-cycle and the whole product emissions linked to consumption.

[14] Cló (2010), p.2424.

[15] Article 10a (14) of the 2009 Directive states that the assessment should be based on an average carbon price determined by the Commission's impact assessment accompanying the climate change and energy package. This price was €30 per tonne of CO_2, and has been used in all calculations related to this issue [EU (2009c)].

[16] Cló (2010), pp. 2425-26.

[17] The Commission services initially based their assessment on a simplified assumption of 100% auctioning and the preliminary results from this exercise were presented to the Member States and stakeholders at the ad-hoc meetings of

Regarding the data sources, the data on greenhouse gas emissions have primarily been collected from the Community Independent Transaction Log[18] for the calculation of direct cost. For the process emissions of new activities and greenhouse gases added in the Annex I of the 2009 Directive, data has been collected from Member States and their national greenhouse gas inventories. The data on electricity consumption for the calculation of indirect cost from higher electricity prices have been obtained from the Member States. For the estimation of gross value added, data from the Eurostat Structural Business Statistics[19] have been used. The trade data as well as the data on the total annual turnover in the Union have been taken from the Comext database[20] of the Eurostat. Depending on availability, the data from the three most recent years for each sector have been used. As a general rule, the trade data has been taken for 2005-07 and the CO_2 cost for 2005-06.

In line with the directions provided in the Directive,[21] comprehensive quantitative analyses for all the 258 sectors in Mining and Manufacturing has been carried out at NACE-4[22] level, as in principle any of them could comprise an installation, which is already covered under the ETS or is supposed to be covered with effect from 2013. Out of the 258 sectors, 146 have been found to meet the criteria specified for carbon leakage risk determination. Among these, 27 sectors have both CO_2 cost above 5% and trade intensity above 10%; two sectors have CO_2 cost above 30% of the gross value added with trade intensity below 10%; and 117 sectors have a trade intensity above 30%.

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the European Climate Change Programme in April and July of 2009. However, based on the comments received at these meetings and following a detailed legal assessment and taking into account the list's period of application, the Commission felt that the term 'additional costs induced by the implementation of this Directive' in Articles 10a (15) and 10a (16), required it to base the calculations of direct costs on its best estimate of the additional cost of the allowances in 2013 and 2014. Hence, in the final determination, costs were based on best estimates for 2013 and 2014, taking into account: (i) the declining share of free allowances; (ii) the required stringency of the benchmarks; and (iii) the linear factor of the cap. The best estimates resulted in the figure that around 75% of allowances would be auctioned out. However, no sector was removed from the list due to the change in assumption on auctioning from 100% to 75%.

[18] The EU Community Independent Transaction Log handles responsibilities for verifying transactions conducted by registries located in Europe. It maintains an electronic accounting system that assists in tracking emission allowances and carbon credits of entities participating in carbon markets.

[19] Structural business statistics (SBS) cover industry, trade and services. The statistics describe the behaviour (structure, conduct and performance) of businesses across the EU – data are available for the EU-27 and for the Member States. The statistics can be broken down to a very detailed sectoral level (several hundred economic activities).

[20] Eurostat's Comtext database contains the official European Foreign Trade Statistics. It includes detailed statistics on the intra- and extra-trading in goods of all EU member states. Aggregated data for the EU12, EU15, EU25, EU27, EU10 (NMS) and EU12 (NMS+Romania+Bulgaria) is available. Trade goods are classified by the 8-digit European Harmonized System (CN8, Combined Nomenclature) as well as NACE (up to 4 digits) and SITC Rev. 3 (up to 5 digits).

[21] As set in recital 24 of the Directive, in order to establish the list of sectors and sub-sectors, which are deemed to be exposed to a significant risk of carbon leakage, the assessment should be undertaken as a starting point, at a 3-digit level (NACE-3 level) or, where appropriate and where the data is available, at a 4-digit level (NACE-4 level) [EU (2009a)].

[22] NACE is the acronym for 'Nomenclature statistique des activités économiques dans la Communauté européenne'. NACE is used to designate the various statistical classifications of economic activities developed since 1970 in the European Union. NACE provides the framework for collecting and presenting a large range of statistical data according to economic activity in the fields of economic statistics (e.g. production, employment, national accounts) and in other statistical domains. Statistics produced on the basis of NACE are comparable at European and, in general, at world level. The use of NACE is mandatory within the European Statistical System.

For some particularly heterogeneous sectors that were not found to be exposed to a significant risk of carbon leakage at the NACE-4 level, more detailed analyses have been carried out at Prodcom-6 or -8 levels.[23] As a result of this analysis, another set of 13 sub-sectors/products have been added to the list of sectors at risk.

In addition, a qualitative assessment[24] has been carried out for seven out of the 112 sectors that were not found to be at risk at the NACE-4 level.[25] From this analysis, another five sectors have been found to be at risk.

To sum up, the list of sectors/sub-sectors deemed to be exposed to a significant risk of carbon leakage contains 151 sectors at NACE-4 level and another 13 sub-sectors/product groups at Prodcom-6 or -8 levels.

It is indeed striking that out of the 258 NACE 4-digit level sectors, as many as 151 (59%) have been found to be at a significant risk of carbon leakage. It may be noted that such a wide coverage is largely attributable to the dominating influence of the high trade intensity criteria. As mentioned above, among the 151 NACE 4-digit sectors included in the EU List, as many as 117 (77%) have been included only on grounds of their particularly high trade intensity with third countries (> 30%), despite not having any significant cost impact from the implementation of the Directive. The methodology followed by the European Commission in determining the list of sectors at a significant risk of carbon leakage, particularly the use of the single threshold of >30% trade intensity may be criticized on several counts, as elaborated in the next section.

III: A Critical Look at the EU's Methodology for Carbon Leakage Risk Determination

The European Commission has classified 164 (sub)sectors – representing over three-quarters of manufacturing emissions under the EU ETS – as deemed to be exposed to a significant risk of

[23] The term Prodcom comes from the French "PRODuction COMmunautaire" (Community Production). Prodcom is the EU's standard classification of production statistics. Prodcom provides statistics on the production of manufactured goods. Prodcom uses the product codes specified on the Prodcom List, which contains about 4500 different types of manufactured products. Products are identified by an 8-digit code: the first four digits are the classification of the producing enterprise given by the Statistical Classification of Economic Activities in the European Community (NACE); the first six correspond to the Classification of Products by Activity (CPA); and the remaining digits specify the product in more detail.

[24] According to Article 10a(17) of the Directive, the list of (sub)sectors that are determined to be exposed to a significant risk of carbon leakage as per Articles 10a(15) and 10a(16) may be supplemented after completion of a qualitative assessment, taking into account both the sectors' technological potential to reduce either emissions or electricity consumption and on the sectors' current and projected market characteristics.The relevant criteria are: (a) the extent to which it is possible for individual installations in the sector or sub-sector concerned to reduce emission levels or electricity consumption, including the increase in production costs that the related investment may entail, for instance on the basis of the most efficient techniques; (b) current and projected market characteristics, including when trade exposure or direct and indirect cost increase rates are close to one of the thresholds mentioned in paragraph 16 of Article 10(a); (c) profit margins as a potential indicator of long-run investment or relocation decisions.

[25] The triggers for such additional investigations included absence of data for one of the indicators, doubts about accuracy or coverage of quantitative data (e.g. discrepancy in gross value added vs. emissions), or integrated production processes [Dröge and Cooper (2010), p.24].

carbon leakage. It has been argued that if all of these sectors were granted free allowances to compensate them for this "risk", the economic incentives to invest in low carbon manufacturing would be greatly weakened.[26] Importantly, as per the findings of Carbon Trust (2010:2), the EU's list of 164 (sub)sectors includes many sectors that are unlikely to suffer significant leakage. This not only underscores the need to pay a careful attention to the proposed counter measures, but also raises serious questions about the methodology adopted by the European Commission for determining the list of sectors at the risk of leakage.

As discussed before, the *quantitative* methodology adopted by the European Commission to assess the risk of carbon leakage faced by a sector is based on two different approaches. According to one approach, a sector is deemed to be exposed to a significant risk of carbon leakage if the sum of direct and indirect additional costs induced by the ETS is found to result in a particularly high cost increase of at least 30% of its gross value added (henceforth referred to as the 'high cost increase criterion'); *or* if the value of its exports (to third countries) and imports (from third countries) divided by the total value of its turnover and imports (from third countries) is found to exceed 30% (henceforth referred to as the 'high trade intensity criterion'). Thus, according to this approach, an ETS sector is considered to be at risk if it satisfies only one among the two criteria: high cost increase or trade intensity. This approach may be called the 'either-or approach'.[27] Under the other approach followed by the European Commission, a sector is deemed to be exposed to a significant risk of carbon leakage if the sum of direct and indirect additional costs induced by the implementation of the Directive would lead to a cost increase of at least 5% of its gross value added, *and* the sector's trade intensity with third countries exceeds 10%. This approach may be called the 'integrated approach', since under this approach, a sector is taken to be exposed to the risk of carbon leakage only if *both* the aforesaid criteria are satisfied simultaneously.[28]

To sum up, the two alternative *quantitative* approaches adopted by the European Commission differ substantially. The 'integrated approach' takes into account both the cost increase criterion and the trade intensity criterion simultaneously. On the contrary, according to the 'either-or approach', carbon leakage is assessed *either* on a cost increase basis *or* on a trade intensity basis. Above the 30% cost increase threshold, a sector automatically qualifies for inclusion in the list