The Potential of Tariff Policy for Climate Change Mitigation: Legal and Economic Analysis

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This article addresses a potential role that tariff policy can play in encouraging countries to take part in a multilateral effort to mitigate climate change: it complements discussions on border tax adjustment which in law is limited to domestic taxation. It assesses whether increasing tariffs on products from polluting industries amounts to a violation of World Trade Organization (WTO) rules and whether protectionism in this case can be differentiated from genuine environmental concerns. It argues that while lowering tariffs on environmental goods may serve as a carrot to promote dissemination of cleaner technologies, tariff deconsolidation is a legitimate stick to encourage polluting countries to move towards an international climate agreement. The article further explores this view by undertaking a partial equilibrium analysis to examine the impact of a unilateral 5% tariff increase on the most carbon-intensive imports from countries not committed to climate polices. Our results, however, suggest that plurilateral action would be more effective than countries pursuing tariff policy in isolation, with the former leading to an average 1.4% net reduction in carbon-intensive imports from a 5% increase in their tariffs.

1 INTRODUCTION

Climate change mitigation and adaptation measures are at the heart of the contemporary economic, legal, and political debate. A major effort to reach a common understanding was made in December 2009 in Copenhagen and in Cancun in 2010. The overall goal for the United Nations Climate Change Conference of the Parties (COP 15) in Denmark was to establish a global climate agreement intended to enter into force in 2013 following the end of the Kyoto Agreement's first commitment period. Unfortunately, the conference did not achieve a binding agreement, a 'Copenhagen accord'[1] was merely 'taken note of'

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1 UNFCC, FCCC/CP/2009/L.7, Draft decision -/CP.15, Proposal by the President Copenhagen Accord, 18 Dec. 2009, available at www.unfccc.int/resource/docs/2009/cop15/eng/l07.pdf.

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by the COP as there was no consensus.[2] The subsequent Conference in Cancun (COP 16) formalized some of the political results achieved in Copenhagen. It showed the way for further work on a multilateral system, but again failed to bring about a common and shared approach, let alone agreement on specific tools. The same results characterized the 2013 Conference in Warzaw (COP 17). The prospects of achieving common standards and programmes on abatement are dim. Countries continue to prefer to adopt and develop domestic measures suitable to their political environment and levels of economic and social development.

Against this backdrop, the question arises as to how governments are able to unilaterally create incentives inducing other countries to restructure production towards carbon friendly modes and to seriously consider participation in a multilateral system on climate change mitigation and adaption. Overcoming free-riding and collective action problem calls for new approaches beyond the existing and widely discussed option of carbon taxes and border tax adjustment. The article addresses a potential role that unilateral tariffs, being the most classical tools of trade policy, can play in encouraging countries to take part in a multilateral effort to mitigate climate change. It assesses in particular whether increasing tariffs on products from energy intensive or polluting industries amounts to a violation of World Trade Organization (WTO) rules and whether protectionism in this case can be differentiated from genuine environmental concerns.

The question arises within the broader context to what extent countries can use unilateral measures for environmental purposes. While adjustment of domestic taxes at the border has been widely discussed, tariff policy has not attracted much attention except for failed efforts at lowering tariffs on environmental friendly goods. Tariff increases have not been considered. This may be due to the fact that the global trading system has been engaged in reducing tariffs, and increases in import tariffs are generally considered against the spirit of the global trading system and are generally discouraged. New challenges, however, call for new responses.

We conclude that WTO members can use tariff policy. They may reduce tariffs on specific carbon friendly products. They may equally deconsolidate bound tariffs in the pursuit of CO_2 abatement. The very purpose of such measures is to favour trade in low carbon products and processes and to encourage countries to join the multilateral effort which in return supports recourse to and development of technologically advanced products by restricting carbon intensive production.

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[2] For more on the discussion about the main results of the Accord see '*Is there a silver lining to the failure to strike a global climate deal? Outcome and perspectives of the Copenhagen Conference*', Brown Bag seminar presentation by Dr Joëlle de Sépibus, NCCR Trade Regulation (Work Package 5: Trade and Climate Change), held on 28 Jan. 2010 World Trade Institute, Berne, Switzerland.

Tariff measures will be interpreted by some as disguised protectionism instead of genuine concern about the climate, since the tariffs would permit the competing domestic industries to increase production. Others, however, will consider the possibility to refer to tariff protection against highly polluting products and related processes as a suitable means to encourage others to join an agreed international system of CO_2 abatement In particular, the threat and imposition of tariff increases against outsiders, and abstention from doing so within a treaty-based system of multilateral abatement, may induce countries to overcome free-riding and abstention. Tariff reductions or elimination on carbon friendly processes and tariff increases on polluting products not only have the potential to reduce production of such products, but also to create incentives to join a system of agreed CO_2 reductions.

Since emissions of Member States to an agreed international system are capped, its domestic industries cannot increase environmentally harmful production and will be on par with foreign industries that use clean technology. Hence, existing tariffs do not create advantages for domestic industries and cannot be considered as a protectionist measure if the country is a member of an international climate change mitigation agreement. These tariffs may even be eliminated within that system. The above motivation clearly does not apply to countries that are not a member of a post-Kyoto agreement. Their uncapped products and processes will be exposed to the full effect of tariffs protecting domestic products from carbon intensive and cheaper imports

We therefore argue that while lowering tariffs for environmental goods can serve as a carrot to promote dissemination of cleaner technologies, tariff deconsolidation is an equally legitimate stick to encourage polluting countries to move towards an international climate agreement. We explore this view by conducting a partial equilibrium simulation to examine the impact of a unilateral unit increase in tariffs on the imports of the most carbon-intensive products (as identified in this literature) from countries not committed to climate polices (non-Annex I, Kyoto Protocol). Our results suggest that the committed importing countries would have to raise their tariffs only slightly to bring about a significant decline in the imports of uncapped products from the non-committed countries, thereby suggesting the effectiveness of such a measure in pushing countries towards a global climate policy.

The article sets out with a brief introduction to scientific evidence regarding climate change causes and consequences, and then touches upon economic incentives to take multilateral mitigation measures (II). It then analyses the WTO rules relevant for trade related mitigation measures (III) and examines the WTO-compatibility of tariff deconsolidation (IV). It finally conducts a partial equilibrium analysis to examine the impact of a unilateral unit increase in tariffs

on the imports of the most carbon-intensive products (as identified in this literature) from countries not committed to climate polices (non-Annex I, Kyoto Protocol). The article concludes on a note proposing a coherent approach to climate regime in the WTO (VI).

2 SETTING THE SCENE TO CLIMATE CHANGE MITIGATION

2.1 Climate change: the need for action

2.1[a] *Global Warming Evidence, Consequences, and Causes*

Global warming of the climate system can be detected in temperature observations taken at the surface, in the troposphere and in the oceans. Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases.[3]

According to the Fourth Assessment Report of Intergovernmental Panel on Climate Change (IPCC),[4] 'warming of the climate system is unequivocal' and evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and the rising global average sea level.[5] At continental, regional, and ocean basin scales, numerous long-term changes in climate have been observed, including changes in arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heat waves and the intensity of tropical cyclones. The Fifth Draft Assessment Report published in 2013 essentially corroborates these findings.

Changes in snow, ice and frozen ground have with *high confidence*[6] increased the number and size of glacial lakes, increased ground instability in mountain and other permafrost regions and led to changes in some Arctic and Antarctic ecosystems. There is *high confidence* that some hydrological systems have also been affected through increased runoff and earlier spring peak discharge in many

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3 S. Solomon et al. (eds.), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007), para. 1.2.

4 The IPCC, created back in 1989, is a scientific body established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences.

5 S. Solomon et al. (eds.), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007), paras 3.2, 4.2, 5.5.

6 A level of confidence is used in the Report to characterize uncertainty that is based on expert judgment as to the correctness of a model, an analysis or a statement. The term *high confidence* corresponds to about eight out of ten chances of being correct.

glacier- and snow-fed rivers and through effects on thermal structure and water quality of warming rivers and lakes.[7] Regional-scale changes include increases in the frequency of hot extremes, heat waves, and heavy precipitation and *likely*[8] increases in tropical cyclone intensity.

Moreover, there is *medium confidence*[9] that other effects of regional climate change on natural and human environments are emerging, although many are difficult to discern due to adaptation and non-climatic drivers. These include the effects of temperature increases on agricultural and forestry management, some aspects of human health, such as heat-related mortality in Europe, changes in infectious disease vectors in some areas, and allergenic pollen, some human activities in the Arctic (e.g., hunting and travel over snow and ice) and in lower-elevation alpine areas (such as mountain sports).

2.1[b] *The Impact of Greenhouse Gas Emissions*

Based on an assessment of thousands of peer-reviewed scientific publications, Working Group 1 of the IPCC concluded that most of the observed increase in global average temperatures since the mid-twentieth century is *very likely*[10] due to the observed increase in anthropogenic greenhouse gas[11] (GHGs) concentrations.[12] This is an advance since the IPCC Third Assessment Report concluded that 'most of the observed warming over the last 50 years is *likely*[13] to have been due to the increase in greenhouse gas concentrations'.[14] Evident human influences now extend to other aspects of climate, including ocean warming, continental-average temperatures, temperature extremes, and wind patterns.

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7 S. Solomon et al. (eds.), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007), para. 1.2.

8 Likelihood, as defined in 'IPCC Guidance Notes for Lead Authors of the IPCC Fourth Assessment Report on Addressing Uncertainties', refers to a probabilistic assessment of some well defined outcome having occurred or occurring in the future and may be based on quantitative analysis or an elicitation of expert views. According to the Report's likehood scale, *likely* corresponds to more than 66% probability.

9 The term corresponds to about five out of ten chances of being correct.

10 The term corresponds to more than 90% probability.

11 GHG emissions covered by the United Nations Framework Convention on Climate Change (UNFCCC) include: carbon dioxide (CO_2), methane (CH4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphurhexafluoride (SF6).

12 See paras 9.4 and 9.5 in G.C. Hegerl et al., 'Understanding and Attributing Climate Change' in S. Solomon, et al., (eds.), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press 2007).

13 The term corresponds to more than 66% probability.

14 IPCC, Third Assessment Report.

Changes in atmospheric concentrations of GHGs and aerosols, land cover, and solar radiation alter the energy balance of the climate system. The increase in the concentration of CO_2 during the past fifty years has passed beyond the range of natural fluctuations.[15] Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004.[16]

Carbon dioxide (CO_2) is the most important anthropogenic GHG. Global atmospheric concentrations of CO_2, methane (CH4), and nitrous oxide (N_2O) have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years. Atmospheric concentrations of CO_2 (379ppm) in 2005 exceed by far the natural range over the last 650,000 years.[17] Global increases in CO_2 concentrations are due primarily to fossil fuel use and land-use change.

Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the twenty-first century that would *very likely* be larger than those observed during the twentieth century.[18]

The IPCC Special Report on Emissions Scenarios (SRES) projects an increase of global GHG emissions by 25%–90% (CO_2-eq[19]) between 2000 and 2030, with fossil fuels maintaining their dominant position in the global energy mix to 2030 and beyond. But even if the concentrations of all GHGs and aerosols had been kept constant at year 2000 levels, a further warming would still be expected due to the fact that several GHGs remain in the atmosphere for very long periods. Hence, prompt and strong action in emissions reduction is clearly necessary.

2.1[c] *Economic Incentives for Climate Change Mitigation*

While the IPCC reports gave the scientific analysis of the climate change scourge, the Stern Review on the Economics of Climate Change released in 2006 highlighted the economic costs of inaction or delay in action. The Stern Review

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15 T. Stocker, 'Earth in the Greenhouse – a Challenge for the Twenty-First Century' in T. Cottier et al. (eds.), *International Trade Regulation and the Mitigation of Climate Change: World Trade Forum* (Cambridge University Press 2009).

16 Climate Change 2007: Synthesis Report, Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Core Writing Team, R.K. Pachauri & A. Reisinger (Eds.), IPCC.

17 *Ibid*.

18 See para. 3.2.1 in Hegerl, G.C. et al., 'Understanding and Attributing Climate Change' in S. Solomon, et al. (eds.), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press 2007).

19 CO_2 equivalent.

Report discussed the effect of climate change and global warming on the world economy. Its main conclusion was that the benefits of strong, early action on climate change would considerably outweigh the costs.

Using the results from formal economic models, the Review estimated that if there was no action, the overall costs and risks of climate change would be equivalent to losing at least 5% of global GDP each year. If a wider range of risks and impacts were taken into account, the estimates of damage could rise to 20% of GDP or more.[20] In contrast, the costs of action – reducing greenhouse gas emissions to avoid the worst impacts of climate change – could be limited to around 1% of global GDP each year.

Another study by the UNFCCC[21] concluded that additional global investment and financial flows amounting to USD 200–210 billion would be necessary in 2030 to return global GHG emissions to the current levels.

According to Stern, the risks of the worst impacts of climate change can be substantially reduced if greenhouse gas levels in the atmosphere can be stabilized between 450 and 550ppm CO_2 equivalent (CO_2e). The current level is 430ppm CO_2e today, and it is rising at more than 2ppm each year. Stabilization in this range would require emissions to be at least 25% below current levels by 2050, and perhaps much more.

Knutti et al.[22] have used the climate model of reduced complexity of the University of Bern[23] and their results show that stopping global warming at 2°C requires rapid implementation and efficient reduction of CO_2 emissions. A capping of atmospheric concentrations at twice the pre-industrial concentrations, i.e., at around 560 ppm, would permit a global warming target of about 3°C. It is evident from these calculations that the challenge increases rapidly with increasing CO_2 concentrations and more stringent temperature limits.

2.1[d] *Safe Levels of GHG Emissions and the Precaution Principle*

Although scientists are still unsure about the required pace of GHG emissions reduction and level of 'safe' atmospheric concentrations, it has to be taken into

[20] N. Stern, The economics of climate change: the Stern Review (Cambridge University Press 2007).

[21] UNFCCC, 'Report on the analysis of existing and potential investment and financial flows relevant to the development of an effective and appropriate international response to climate change', 2007, http://unfccc.int/files/cooperation_and_support/financial_mechanism/financial_mechanism_gef/application/pdf/dialogue_working_paper_8.pdf.

[22] R. Knutti et al., 'Probabilistic Climate Change Projections for CO_2 Stabilization Profiles', Geophys. Res. Lett. 32 (2005), L20707.

[23] T.F. Stocker, D.G. Wright & L.A. Mysak, 'A Zonally Averaged, Coupled Ocean-Atmosphere Model for Paleoclimate Studies', J. Climate 5 (1992), 773–797.

account that if efforts to limit net greenhouse gas emissions are not initiated before scientific certainty is achieved, it may be too late to undo the damage.

With a view to limiting the civil liability of governments in prohibiting potentially hazardous activities, environmental law developed the precautionary principle.[24] While the legal nature of this principle is still debated and controversial in general public international law, precaution has obviously been important and is most prominent in the field of climate change. The precautionary principle provides that activities threatening to cause serious or irreversible damage should be restricted or even prohibited even before scientific certainty about their impact is established.

Reduction of GHG emissions is considered a necessary precautionary measure which must be taken in order to avert what both the IPCC reports and the Stern Review Report of 2006 warned would be catastrophic to the future well-being of the eco-system.

2.2 Multilateral and unilateral l mitigation measures

Given the nature of the public good at hand, climate change clearly demands an international response, based on a shared understanding of long-term goals and agreement on frameworks for action. The 1992 UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol provide a basis for international cooperation, along with a range of partnerships and other approaches. The Framework Convention states in its preamble that 'change in the earth's climate and its adverse effects are a common concern of humankind'[25] While geared at international cooperation, common concern does not legally exclude unilateral action required to bring about more ambitious action now required around the world.[26]

2.2[a] *Policies for Emissions Reduction*

A range of options exists to cut emissions. Emissions can be cut through increased energy efficiency, changes in demand, and through adoption of clean power, heat, and transport technologies. According to Stern, the power sector around the world

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[24] For more on precautinary principle and climate change see T. Cottier and S. Matteotti, 'International environmental law and the evolving concept of common concern of mankind' in T. Cottier et al. (eds), *International Trade Regulation and the Mitigation of Climate Change: World Trade Forum* (Cambridge University Press 2009).

[25] United Nations Framework Convention on Climate Change, 9 May 1992, pmbl., 31 I.L.M. 849, 851.

[26] Thomas Cottier, Philipp Aerni, Baris Karapinar, Sofya Matteotti, Joëlle de Sépibus, Anirudh Shingal, The Principle of Common Concern and Climate Change, (forthcoming).

would need to be at least 60% decarbonized by 2050 for atmospheric concentrations to stabilize at or below 550ppm CO_2e,[27] and deep emissions cuts would also be required in the transport sector.

Even with very strong expansion of the use of renewable energy and other low carbon energy sources, fossil fuels could still make up over half of global energy supply in 2050. Coal would continue to be important in the energy mix around the world, including in fast-growing economies.[28] Extensive carbon capture and storage would be necessary to allow the continued use of fossil fuels without damage to the atmosphere. Cuts in non-energy emissions, such as those resulting from deforestation and from agricultural and industrial processes, are also essential. Diffusion of environmental goods and services (EGS)[29] provides for another opportunity to limit GHG emissions.

Effective policy to reduce emissions has several elements. The first is the optimal pricing of carbon; the second is to support innovation and the deployment of low carbon technologies; and the third is action to remove barriers to energy efficiency. Last but not the least is a climate change communication strategy whose purpose is to inform, educate and persuade individuals on the optimal response to climate change. Most of the economic policies that can be used for climate change mitigation have a trade angle and fall under the auspices of the WTO.[30]

2.2[b] *Addressing Carbon Leakage*

Following the Kyoto Protocol, some countries have introduced (or are planning to introduce) cap-and-trade systems and other measures to curb CO_2 emissions from power generation and large industries. However, as climate change mitigation policies are not implemented worldwide in a coherent manner, there are concerns that emission reduction efforts in one country would be offset by emission increases in non-carbon constrained regions. Reallocation of production from countries with carbon reduction commitments to countries with no emissions restrictions is termed 'carbon leakage'.[31] This can lead to the changes in trade patterns worldwide and increase of market share of the countries without climate

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27 N. Stern, The Economics of Climate Change: The Stern Review (Cambridge University Press 2007).

28 World Energy Outlook 2008, International Energy Agency.

29 T. Cottier & D. Baracol, *WTO Negotiations on Environmental Goods and Services: A Potential Contribution to the Millennium Development Goals*, UNCTAD, UNCTAD/DITC/TED/2008/4, 2009.

30 For further information see T. Cottier et al. (eds), International Trade Regulation and the Mitigation of Climate Change, Cambridge University Press, 2009.

31 Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, B. Metz et al. (eds.), Cambridge University Press, p. 665, WTO-UNEP Report Trade and Climate Change, 2009, p. 99.

policies. So, the total volume of GHG emissions remains the same or even rises. As observed by Krugman, 'China announced that it plans to continue its reliance on coal as its main energy source and that to feed its economic growth it will increase coal production 30% by 2015. That's a decision that, all by itself, will swamp any emission reductions elsewhere'.[32] Such leakage might therefore considerably decrease the effectiveness of global climate change mitigation efforts. Policymakers are therefore looking for specific policy measures to avoid carbon leakage. Some countries have a domestic focus in addressing these issues. Others have also suggested introducing measures such as sectoral approaches[33] or border adjustment schemes, which would have effects beyond their frontiers with the aim of levelling the CO_2 playing field.[34]

However, it is widely recognized that the multilateral track for developing a coherent worldwide climate change mitigation policy is still a preferred option. International trade regulation has the potential to address these challenges and support the effort to bring about a multilateral system in the field. It can serve both as a carrot and as a stick to promote international cooperation in mitigating climate change.

3 INTERNATIONAL TRADE REGULATION AND CLIMATE CHANGE MITIGATION

3.1 Key disciplines of the WTO agreements

3.1[a] *Non-discrimination*

The national treatment principle is a key discipline of the WTO and the GATT. In accordance with GATT Article III, a member shall not discriminate between its own and like foreign products (giving them 'national treatment').[35] The national treatment principle may be particularly relevant in cases where a climate change related regulation is applied differently to domestic and foreign producers.

According to the most-favoured nation clause, a WTO member shall not discriminate between 'like' products from different trading partners (giving them equally 'most favoured-nation' status). GATT Article I.1 provides that 'any

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32 P. Krugman, 'Empire of Carbon', New York Times, 14 May 2009.

33 Iron and steel, aluminium and cement are considered to be key sectors. See J. Stephenson, (2009) – Post-Kyoto Sectoral Agreements: A Constructive or Complicating Way Forward? Round Table on Sustainable Development background paper, OECD, Paris, 13 Mar. 2009.

34 For example, The US Clean Energy and Security Act (Waxman-Markey Bill) includes provisions allowing the government to take action against trading partners that fail to meet US greenhouse gas standards, but not before 2020.

35 T. Cottier, M. Oesch, International Trade Regulation. Law and Policy In the WTO, The European Union and Switzerland, Cases Materials and Comments, Cameron May Ltd. London, 2005, P. 382.

advantage, favour, privilege or immunity' granted by any member to any product originating in or destined for any other member shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other members.[36]

3.1[b] *Exemptions*

If a trade-related climate change measure is found to be inconsistent with one of the core provisions of the GATT, justification could still be sought under Article XX. Article XX GATT lays out a number of specific instances in which WTO members may be exempted from GATT rules. The exception potentially applies to all provisions of the Agreement, including those relating to tariffs in Article II and Article XXVIII GATT, beyond disciplines on tariff deconsolidation discussed below. Two motives are of particular relevance to the protection of the environment, mentioned in paragraphs (b) and (g) of Article XX. According to these two paragraphs, WTO members may adopt policy measures that are inconsistent with GATT disciplines, but necessary to protect human, animal or plant life or health (paragraph (b)), or relating to the conservation of exhaustible natural resources (paragraph (g)).

Some authors have argued that policies aimed at reducing CO_2 emissions could fall under Article XX(b), as they intend to protect human beings from the negative consequences of climate change (such as flooding or sea level rise), or under Article XX(g), as they intend to conserve not only the planet's climate but also certain plant and animal species that may disappear because of global warming.[37]

For a GATT-inconsistent environmental measure to be justified under Article XX, a member must perform a two-tier analysis proving first that its measure falls under at least one of the exceptions (e.g., paragraphs (b) and/or (g), two of the ten exceptions under Article XX) and second that the measure satisfies the requirements of the introductory paragraph (the 'chapeau' of Article XX), i.e., that it is not applied in a manner which would constitute 'a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail,' and is not 'a disguised restriction on international trade'.[38]

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36 T. Cottier, M. Oesch, International Trade Regulation. Law and Policy in the WTO, The European Union and Switzerland, Cases Materials and Comments, Cameron May Ltd. London, 2005, p. 346.

37 J. Pauwelyn, US Federal Climate Policy and competitiveness Concerns: The Limits and Options of International Trade Law, Nicholas Institute for Environmental Policy Solutions, Duke University, Working Paper, 2007.

38 Appellate Body, US – Gasoline, p. 22.

WTO jurisprudence has highlighted that relevant coordination and cooperation activities undertaken by the defendant at the international level in the trade and environment area may help to demonstrate that a measure is applied in accordance with the chapeau.[39] This is particularly relevant should international negotiations on a new binding agreement fail and the concerned WTO member introduces a unilateral trade measure such as tariff deconsolidation for the purpose of climate change mitigation.

At the same time, it is also acknowledged that, '"as far as possible", a multilateral approach is strongly preferred' to a unilateral approach.[40]

3.2 Trade measures as carrots and sticks

3.2[a] *Liberalizing Trade in Environmental Goods and Services*

Liberalization of trade in environmental goods and services (EGS) can help achieve climate change mitigation objectives through reducing the cost of access to EGS, promoting environmentally preferable products and services, and creating incentives for technology transfer.[41] Both the Doha ministerial declaration as well as UNCTAD[42] specifically called for the reduction or elimination of tariffs on EGS.[43]

EGS negotiations have witnessed major difficulties. It has been difficult to achieve an overall balance between products of industrialized and developing countries. Moreover, no differentiations were made on the basis of environmentally friendly versus harmful production methods. By organizing negotiations on the basis of specific target areas and goals, these difficulties could

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[39] For instance, in the US – Gasoline decision (p. 26), the Appellate Body considered that the United States had not sufficiently explored the possibility of entering into cooperative arrangements with affected countries in order to mitigate the administrative problems raised by the United States in their justification of the discriminatory treatment. Furthermore, in US – Shrimp (Appellate Body, US – Shrimp (Art. 21.5 – Malaysia), para. 134), the Appellate Body found that, in view of the serious, good faith efforts made by the United States to negotiate an international agreement on the protection of sea turtles, including with the complainant, the measure was applied in a manner that no longer constituted a means of unjustifiable or arbitrary discrimination.

[40] Appellate Body, US – Shrimp (Art. 21.5 – Malaysia), para. 124.

[41] O. Nartova, 'Assessment of GATS' Impact on Climate Change Mitigation' in T. Cottier et al. (eds.), International Trade Regulation and the Mitigation of Climate Change, Cambridge University Press, 2009, p. 259.

[42] T. Cottier & D. Baracol, *WTO Negotiations on Environmental Goods and Services: A Potential Contribution to the Millennium Development Goals*, UNCTAD, UNCTAD/DITC/TED/2008/4, 2009.

[43] Paragraph 31(iii) of the Doha Development Agenda.

be better managed as negotiations would be more focused.[44] The Environmental Area Initiative approach offers a method which reduces negotiations complexity by proceeding in certain steps, from political decisions in identifying relevant climate change areas, to technical implementation. However, it has not been implemented so far.

3.2[b] *Taxation: Limits of Border Tax Adjustment*

WTO regards taxation as a prime instrument of sovereignty and does not limit member's power to tax. However, it renders it subject to the principle of national treatment,[45] providing that imported products must not be subject to less favourable tax than the member's domestic products; the underlying principle here is Article III:2 which stipulates that members must ensure equal taxation of imported and domestic products hence providing for equal conditions of competition.[46]

Recently the practice of border adjustment in international trade has attracted much interest in the context of climate change. It is often said that in the US, border adjustment measures are perceived as a 'price of passage' of any ambitious climate bill establishing a cap-and-trade system at a federal level.[47] The literature[48] uses different terms, such as border tax adjustment, border carbon adjustment, and border tax measures. However, all these measures boil down to the same unilateral measures that a country imposes when a good is imported from a country where climate policy is not 'comparably effective'. What they have in common is that they offset disadvantages for domestic production, re-establishing a level playing field. Offsetting domestic taxation by imposing similar taxes on imports at the border is considered lawful under Article II. The provision limits border tax adjustment to the equivalent of an internal tax. It cannot exceed levels of domestic taxation. In practice, there is no certainty that such taxes would be able to absorb the levels of pollution caused by the production in the country of origin. Hence,

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44 On EGS negotiations see in particular T.Cottier and D.Baracol-Pinhao, 'Environmental goods and services: the Environmental Area Initiative Approach and Climate Change' in T. Cottier et al. (eds.), International Trade Regulation and the Mitigation of Climate Change, Cambridge University Press, 2009, p. 395.

45 T. Cottier & M. Oesch, International Trade Regulation. Law and Policy in the WTO, The European Union and Switzerland, Cases Materials and Comments, Cameron May Ltd. London, 2005, p. 580.

46 *Ibid*., p. 581.

47 K. Holzer, Current Legislative Proposals on Border Adjustment Measures for Climate Policy: Are There Potential Conflicts with WTO Law? NCCR-Climate (subproject CITEL) research paper 2010/01.

48 For instance see K. Holzer, 'Proposals on Carbon-Related Border Adjustments: Prospects for WTO Compliance', Carbon and Climate Law Review 1: 51–64.

the measure may be insufficient to offset the price of carbon emissions. Unlike tax adjustment, however, tariffs do not face this limitation and can be deconsolidated as deemed necessary to capture effective levels of pollution by non-state of the art technology.

3.3 Tariffs as a tool of climate change mitigation: the notion of tariffs

Although the word 'tariff' is used in different contexts, the WTO application of this term exclusively relates to taxes triggered by, and imposed upon, cross-border movement of goods. They do not extend to domestic commerce. Import and export tariffs are normally classified under three major categories based on the principle of application: ad valorem, specific, and mixed or compound tariffs. Tariffs need to be distinguished from customs-controlled, but essentially distinct levies such as quotas, other duties, indirect taxes (e.g., VAT) and service fees.

In the course of economic history, tariffs evolved from being an exclusive source of governmental revenue to a multifaceted international trade tool. Nowadays, the tariff system is used to perform the following commonly recognized functions:[49] an instrument of fiscal revenue; smoothing out the differences among established regional and sectoral economic structures; providing a degree of protection over infant industries; resolving military or security-related issues; maintaining optimal balance of payments at a national level; and as punitive measures in international trade disputes.

Since GATT 1947, the main drive by WTO members has been to achieve an overall general reduction of rates in the national tariff systems. This has been achieved through multiple rounds of negotiations on the basis of the GATT framework of Article II and XXVIII and XXVIII*bis*, and formalized in the schedules of Tariff Concessions of each Member States or customs union. On average, industrialized tariffs were reduced from around 40% in 1947 to around 4% in 1995 upon completion of the Uruguay Round. The application of tariffs to a great extent relies nowadays on the generally adopted customs product specification called the Harmonized Commodity Description and Coding System (HS) developed by the World Customs Organization (WCO) and fully adopted by WTO members and used by the organization in its work.

With the schedule of Tariff Concessions indicating a member's level of maximum tariff protection on each and every item of the HS, Article II propounds and implements the overriding principle of MFN treatment in the field of tariffs

[49] Thomas Cottier, Matthias Oesch, International Trade Regulation: Law and Policy in the WTO, the European Union and Switzerland, Bern/London: Steaempfli and Cameron May, 2005, pp. 577–659. For a detailed and recent account of WTO, Swiss and EU tariff law see Remo Arpgagaus, Zollrecht, 2nd ed. Basel: Helbing Lichtehahn 2007.

and other duties. The article also lays down the crucial principle of Bound and Unbound tariffs. The bound products inscribed in Part I of the schedule must not be taxed in excess of stipulated levels, while unbound products do not carry such a tariff ceiling. Most tariffs today are Bound tariffs and must not be exceeded. However, it should be noted that such limitations are not without exceptions.[50]

The main and unresolved problem is whether tariff deconsolidation can be undertaken on the basis of process and production methods. The issue is controversially debated in the context of GATT Article III analysis. While some argue that like product differentiation can be undertaken on the basis of PPMs here and in the context of the TBT Agreement, other exclude such differentiation. However, it is established in case law that distinctions based upon PPMs, in the final analysis, can be operated under the exceptions of Article XX(g) discussed above.[51] The Appellate Body essentially agreed to distinctions based upon production methods in the landmark case of Shrimps Turtle.[52] These exceptions, in our view, also apply to tariff reductions and, vice versa, to deconsolidation. It will inform tariff policies taking into account levels of pollution caused by production technology relating to the item taxed.

3.4 Differential reduction of tariffs

Article XXVIII*bis* of the GATT 1994 encourages members to increasingly lower and bind maximum tariff ceilings, a process which has been largely completed for industrialized and developing countries alike. Unbound tariffs, by definition, are open to increases and thus do not offer legal security. They undermine the very purpose of tariff disciplines in the WTO and are detrimental to attracting foreign direct investment. Since the Uruguay Round, bound or consolidated tariffs are the rule, and unbound tariffs the exception.

A first option consists of lowering tariffs for products conducive to carbon reduction, learning the lessons from failed EGS negotiations discussed above. Products supporting low carbon emissions, and products made with low carbon technologies can be defined in HS digits 6 to 8 of a tariff position of the Harmonized Systems. For these digits, tariffs could be reduced or even eliminated. The approach builds upon the idea pursued in negotiations on EGS during the Doha Development Agenda. Given the difficulties encountered, it is more

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50 See e.g., Art. II:2(b) of the GATT 1994, which explicitly exempts anti-dumping and countervailing duties applied consistently with Art. VI.

51 See R. Christiane Conrad, Processes and Production Methods (PPMs) in WTO Law: Interfacing Trade and Social Goals, Cambridge: Cambridge University Press 2011.

52 US – Import Prohibition of Certain Shrimps and Shrimp Products, Report of the Appellate Body, 12 Oct. 1998, WT/DS58/AB/R.

promising to work on the basis of an Environmental Area Approach, including all related products conducing for a low carbon economy. But foremost, it differentiates tariffs among like products on the basis of carbon-intensity of the product and related processes. These items may be negotiated multilaterally under the umbrella of Article XXVIIIbis GATT. Or, they may be introduced unilaterally by individual members on the basis of newly defined HS digits 6 to 8 of the respective tariff position.

3.5 Deconsolidation of bound tariffs

Alternatively, tariffs may also be increased in carbon sensitive areas. Instead of, or complementary to, the reduction of tariffs for green technology and products, highly polluting products may be identified and defined in HS digits 6 to 8 of a tariff position unilaterally increased. This can readily be done for unbound tariffs. Yet, it can also be effected for bound tariffs. WTO law provides particular rules and procedures to this effect.

Bound or consolidated tariffs are not irreversible in WTO law. Members can deconsolidate bound tariffs by offering compensation on different tariff lines to the members primarily affected by such deconsolidation. In case compensation fails, members affected may eventually suspend market access rights upon authorization by dispute settlement. WTO tariff law thus offers ample flexibility in accommodating the changing needs of Member States.

Deconsolidation is addressed in Article XXVIII of the GATT 1994 and by corresponding notes, the Understanding on the Interpretation of Article XXVIII of the GATT 1994[53] and the Procedures for Negotiations under Article XXVIII adopted on 10 November 1980.[54] The principles and procedures of deconsolidation are based on the idea of preserving reciprocal and mutually advantageous trade relations. In practice, tariff deconsolidations are not frequent, as governments tend to negotiate tariff bindings beyond the tariff levels actually in existence.[55] This leaves them with the option to increase applied tariffs up to the bound level. The difference between bound and applied levels offers particular problems in negotiations as offered reductions may be ineffective and remain what is called 'water in the pipe'.

A WTO member can increase its bound protection on a given item provided that the multilateral process included in Article XXVIII has been followed.

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53 http://www.wto.org/english/docs_e/legal_e/12-28_e.htm.

54 GATT, Basic Instruments and Documents BISD 27S at 26 (1981).

55 T. Cottier & M. Oesch, International Trade Regulation. Law and Policy in the WTO, The European Union and Switzerland, Cases Materials and Comments, Cameron May Ltd. London, 2005, p. 606.

Typically, a member wishing to raise its duties will negotiate and agree compensation with a subset of the WTO membership. Negotiation will involve the WTO member holding initial negotiating rights (INR), the WTO member that qualifies as the Principal Supplying Interest (PSI) member and the WTO member having a substantial interest (SI).[56] The latter is consulted but does not have a legal right to participate in the negotiations. The agreed compensation will be applied on an MFN basis.

In case no agreement is reached, the requesting WTO member is free to increase its tariff protection and the main affected members would then have the right to withdraw substantially equivalent tariff concessions. The procedures to reduce tariff commitments are set out in Article XXVIII GATT. These provisions provide for three different avenues. In two of them there is no need to secure approval of WTO membership before negotiations.

Article XXVIII.1 provides that the requesting WTO member must initiate negotiations during a specified period from July to October in any three year period starting on 1 January 1958 (or during any other period defined by consensus or two-thirds of the membership). The requesting member notifies the Council for Trade in Goods (CTG) of its interest to initiate negotiations. The CTG then identifies the primarily concerned members in accordance with the 1994 Understanding. In case agreement with them is not reached, the WTO member can go ahead and unilaterally modify its concessions, running a risk of retaliation. Article XXVIII.3 explicitly acknowledges that the WTO member has the right to modify unilaterally its schedule of concessions, even in the absence of agreed compensation. Both the primary concerned members and SIs can withdraw substantially equivalent concessions on goods initially negotiated with the requesting member.

The second category of procedures with no prior approval is described in Article XXVIII.5. WTO members can reserve their right to renegotiate at a later date. These procedures have one important downside – the right can be exercised only within a particular time period.

WTO members that have not reserved their right to renegotiate or who wish to negotiate outside the period prescribed in Article XXVIII.1, can do so only if they have first secured the authorization from the WTO membership under Article XXVIII.4. The WTO member concerned will submit its request to the CTG and the latter will decide. A short period for renegotiations (sixty days) is granted. If no agreement can be reached, the CTG will determine whether adequate compensation in terms of tariff reductions on appropriate items has been offered in order to restore the overall balance and levels of market access. If it does,

[56] These terms are defined by the 1994 Understanding, *supra* n. 56.

the modified concession will be allowed to stand. Yet, in the alternative, a unilateral modification is still allowed, in which case a primary concerned members as well as SIs have the right to retaliate by suspending equivalent tariff concessions. In conclusion, members retain a right to unilaterally increase tariffs subject to compensation to, and retaliation by, other affected members. In all three types of negotiations, the requesting state identifies a commodity the tariff of which it wishes to modify, and the primary concerned members will identify the commodity where compensation will be paid. Compensation for increased tariffs can be in the form of lowering tariffs for certain environmental goods.

3.6 Conclusion

Members of the WTO are in a position to differentiate tariffs on the basis of product quality and on the basis of production and process methods. WTO law does not prevent members from jointly negotiating tariff differentiation in tariff negotiations. They may jointly agree to alter the tariff classification of the Harmonized System within the World Customs Organization. They may unilaterally amend tariff schedules on sensitive position either by introducing low or zero tariffs for low carbon products and processes in HS digits 6 to 8. Alternatively, they may deconsolidate carbon intensive products and processes and increase tariffs in order to deter importation and create incentives to adopt technologies suitable for low tariff treatment.

While tariff reductions are preferable, as they do not trigger compensation or retaliation, the option of tariff deconsolidation on polluting products and processes is equally available, in particular where low carbon technology and like products simply are not available. Deconsolidation is either accompanied by compensation, or by the right of those affected mostly to withdraw equivalent tariff concessions. Members, therefore, may contemplate to increase import tariffs on specific highly polluting products detrimental to carbon reduction goals and to render market access for such products more costly and less competitive. Deconsolidation can focus on specific products which will be defined in digit 6 to 8 of the HS tariff position.

Based upon MFN, import tariffs in WTO law need to be imposed erga omnes, and cannot distinguish among countries unless the conditions of the exemption of Article XXIV GATT are met. A global system on emission targets and control, however, does not amount to a free trade agreement or a customs union. Members within the system and those outside need to be treated alike. How then is it possible to create inccentives to join the multilateral system of carbon reduction in the first place? It is submitted that differentiation among countries will take place on the basis of commitments to transfer of technology

and knowhow enabling producers within the system to produce products in line with low tariff digits of the HS position concerned. Members outside the system will face greater difficulties to meet these standards. As a consequence, they will be subject to relatively higher tariff position for polluting products, either by tariff reductions for carbon friendly products, or by increased tariffs on carbon-intensive products and processes. Based upon these options legally available in WTO law, we turn to assessing the impact of such policies. The model applied is based upon deconsolidation and tariff increases for selected highly carbon intensive products and processes the use and trade of which should be strongly discouraged from the point of view of mitigating climate change. We do not consider in this study the economic impact of tariff reductions on low carbon products and processes.

4 TRADE EFFECTS OF DECONSOLIDATED CARBON TARIFFS

To further study the potential role of tariffs in climate policy, we explore the option of a unilateral increase in tariffs on the imports of the most carbon-intensive products (as identified in this literature) from countries not committed to climate polices (non-Annex I, Kyoto Protocol) through a partial equilibrium simulation exercise. The importing countries considered in this analysis include Australia, Canada, the EC, Iceland, Japan, New Zealand, Norway, Switzerland, and USA.[57] The list of exporters include Argentina, Brazil, Chile, China, India, Indonesia, Israel, Mexico, the Philippines, Russia,[58] South Africa, South Korea, Thailand, Turkey, and the US. Significantly, these countries account for 70%–80% of global CO_2 emissions over 1996–2008. Products for this analysis include the most carbon-intensive products identified in this literature[59] – paper, rubber, glass, plastics, iron & steel, cement, and basic chemicals.[60]

To begin with, we conduct preliminary statistical analyses to study the importance of these products in the trade flows of both importing and exporting countries. Table 1 looks at the import share of these products in the importing countries' (reported in columns) total imports from the exporting countries (reported in rows) for the year 2005[61] and documents the importance of carbon-intensive trade in the import profiles of several of these countries (shares in

[57] Although the US has not ratified the Kyoto Protocol, given its position as the largest polluter in the world in terms of per capita emissions, it was decided to include it amongst the importers as well as the exporters.

[58] Both Russia and Turkey are Annex I countries, but they are net carbon-exporters and hence were included in the list of exporting countries.

[59] For instance see Reinaud (2008).

[60] The nomenclature used was ISIC Rev.3.

[61] This is the latest year for which import and tariff data is the most complete for our sample of countries and products.

excess of 15% have been highlighted in the table). For instance, in the year 2005, these products accounted for more than 40% of Australia's total imports from Chile and Russia; more than a third of Canada's total imports from Argentina; close to 70% of New Zealand's total imports from Russia; and more than 40% of Swiss total imports from Mexico.

Table 1 Share of Carbon-Intensive Products in Importing Countries' Total Imports from Exporters (Year 2005)

Exporter/ Importer	*Australia*	*Canada*	*EU*	*Iceland*	*Japan*	*NZ*	*Norway*	*Switzerland*	*USA*
World	11.3	12.9	8.8	10.1	7.8	13.1	13.7	14.1	10.0
Argentina	9.5	**35.9**	7.9	0.1	3.5	12.0	**20.6**	3.4	11.7
Brazil	**19.0**	**18.3**	14.6	1.6	8.8	4.5	1.2	12.4	**20.0**
Chile	**42.6**	1.8	13.4	3.5	4.3	3.7	**17.2**	**21.9**	6.9
China	9.9	8.0	6.1	5.5	7.5	9.4	5.0	14.1	6.7
India	**14.9**	14.4	13.5	**31.5**	8.4	13.0	6.4	**23.6**	10.1
Indonesia	9.1	10.3	8.0	**15.8**	6.4	**22.0**	**20.9**	10.1	6.1
Israel	**25.0**	12.2	**16.9**	11.9	9.4	**18.4**	10.2	8.1	4.6
South Korea	**17.1**	13.7	6.8	5.8	**20.3**	**26.4**	7.1	12.1	11.0
Mexico	3.5	4.3	10.3	6.6	1.9	9.3	9.2	**42.3**	5.5
Philippines	8.7	1.3	1.9	0.5	3.9	7.8	2.7	2.0	2.2
Russia	**44.6**	13.1	8.0	**18.6**	4.5	**69.3**	9.5	10.5	14.6
South Africa	**15.6**	**22.1**	**15.2**	1.8	13.1	**25.1**	6.8	1.6	**18.8**
Thailand	9.2	9.3	7.4	3.6	8.6	14.3	5.1	3.1	8.4
Turkey	12.7	**27.6**	9.8	4.5	5.5	7.4	4.3	4.0	**15.9**
USA	12.2	**16.0**	11.6	6.1	9.7	10.7	9.2	8.5	N/A

Source: WTO's IDB through World Bank WITS; author's calculations.

Analogously, Table 2 looks at the export shares of these products in the exporting countries' (reported in rows) total exports to the importing countries (reported in columns) for 2005[62] and once again, documents the importance of carbon-intensive trade in the export profiles of many of these countries (shares in excess of 15% have been highlighted in the table). For instance, in 2005, these products accounted for 40% of Chilean and more than 60% of Russian exports to

[62] In the case of the Philippines, the data pertain to 2007.

Australia; more than a third of Argentinean and Turkish exports to Canada; nearly half of Russian exports to Iceland; nearly 80% of Mexican exports to Norway and Russian exports to New Zealand; and more than a third of Russian exports to the US.

Table 2 Share of Carbon-Intensive Products in Exporters' Total Exports to the Importing Countries (Year 2005)

Exporter/ Importer	*Australia*	*Canada*	*EU*	*Iceland*	*Japan*	*NZ*	*Norway*	*Switzerland*	*USA*
World	11.3	14.1	14.4	9.3	7.9	12.9	13.4	12.6	9.9
Argentina	11.2	**36.1**	7.7		3.1	12.5	**37.8**	1.4	11.7
Brazil	**15.2**	**17.2**	13.1	1.8	11	6.3	1.3	**24.7**	**20.8**
Chile	**40.5**	1.7	15.1	13	2.6	4.8	0.4	0.2	6.9
China	12.3	10.4	7.1	6.8	8.1	12.4	6.6	6.7	7.7
India	**16.1**	**17.8**	12.7		9.9	13.4	5.8	**21.8**	10.3
Israel	**28.8**	**15.8**	18.4	13.3	12.7	**29.7**	**15.9**	2.3	5.3
South Korea	**21.2**	**16.8**	5.9	3.9	**20.4**	**25.2**	6.1	6.1	11.5
Mexico	4.5	5	11.9	8.1	2.3	**18.7**	**78.6**	**18.9**	5.5
Philippines	7.6	1.4	2.6		6.2	3.6	**16.3**	4.2	2.1
Russia	**63.3**	**32.1**	8.9	**47.0**	4.0	**77.8**	**15.5**	3.2	**36.6**
South Africa	12.7	**23.7**	17.4	1.2	13.2	**24.9**	7.2	3.7	**25.8**
Thailand	11.7	9	7.5	2.3	8.2	**15.3**	5.4	5.9	9.8
Turkey	11.4	**34.7**	9.3	4.1	4.4	11.4	4.6	4.5	**17.7**
USA	9.9	16	12.0	4.8	11.4	9.6	7.7	5.2	N/A

Source: UN Comtrade through World Bank WITS; authors' calculations.

The tariff picture is reported in Table 3 and shows that the average simple applied tariffs across these products are low in all the importing countries (reported in columns) in our sample; in several cases (highlighted in the table), the average applied tariffs are less than 1%, even zero. In fact, the applied tariffs in Norway and Switzerland on the import of all these products from the exporting countries in our sample are zero. This said, the tariffs are relatively higher in Australia, EU, Iceland, and New Zealand.

Table 3 Average Simple Applied Tariffs (%) on Exporters' Carbon-Intensive Products in Destination Markets (Year 2005)

Exporter/ Importer	*Australia*	*Canada*	*EU*	*Iceland*	*Japan*	*NZ*	*USA*
World	3.1	1.5	2.9	1.0	**0.9**	2.7	1.4
Argentina	4.0	1.1	2.8	6.3	**0.1**	4.5	**0.6**
Brazil	4.0	**0.9**	2.8	3.1	**0.1**	2.6	**0.5**
Chile	3.4	**0.0**	3.2	2.1	**0.5**	2.4	**0.2**
China	3.1	**0.9**	2.8	3.6	**0.0**	2.7	2.0
India	3.3	1.0	2.8	4.0	**0.0**	3.2	**0.8**
Indonesia	3.3	1.3	2.7	3.6	**0.0**	2.8	**0.6**
Israel	3.8	**0.0**	2.8	4.1	1.1	2.8	**0.0**
South Korea	3.8	1.0	2.8	2.3	1.4	2.9	2.0
Mexico	4.3	**0.0**	2.9	3.3	**0.1**	3.3	**0.1**
Philippines	3.3	1.4	2.9	7.6	**0.0**	2.9	**0.6**
Russia	4.0	1.0	2.8	4.7	1.4	2.7	**0.8**
South Africa	4.2	**0.9**	2.9	4.7	**0.1**	3.1	**0.0**
Thailand	**0.5**	1.0	2.8	3.7	**0.0**	2.8	**0.5**
Turkey	3.9	**0.9**	2.9	3.3	**0.0**	2.8	**0.6**
USA	**0.0**	**0.0**	2.8	2.5	1.3	2.6	N/A

Source: WTO's IDB through World Bank WITS; authors' calculations.

In view of the lack of variation in these tariffs to enable more sophisticated empirical analysis, we employ partial equilibrium analysis using import demand elasticities from Kee et. al. (2008)[63] to simulate the impact of an increase in tariffs, which we assume to be 5%. Assuming no other intervention, a tariff imposition or a change in tariffs has a direct impact on import prices[64] and the import demand elasticity measures the responsiveness of imports to a change in these import

[63] H.L. Kee, A. Nicita & M. Olarreaga, 'Import Demand Elasticities and Trade Distortions', The Review of Economics & Statistics, November 2008, Vol. 90, No. 4, Pp 666–682.

[64] If a specific per unit tariff 't' is imposed on a product with a pre-tariff price 'p' then its post-tariff price is p(1+t).

prices, calculated as the ratio of the percentage change in imports to the percentage change in import prices.[65]

Following Viner (1950), any change in tariffs is likely to result in both trade creation (TC) and trade diversion (TD) effects. Thus, using the World Bank WITS SMART model, we estimate both these effects from a 5% increase in tariffs of the most carbon-intensive traded products.

More specifically, $TC = \varepsilon_{k,i} \star M_{k,i} \star \{dt_{k,i}/(1+t_{k,i})\}$ and

$TD = \{(M_{k,i} \star M_{k,\neq i})/(M_{k,i}+M_{k,\neq i})\} \star (dt_{k,i}/(1+t_{k,i})) \star \sigma_{k,i\neq i}$

Where

$\varepsilon_{k,i}$ = import demand elasticity of product k imported from country i

$M_{k,i}$ = value of imports of product k imported from country i

$dt_{k,i}$ = change in tariff on product k imported from country i

$t_{k,i}$ = simple applied tariff on product k imported from country i

$M_{k,\neq i}$ = value of imports of product k imported from all other countries except i ($\neq$i)

$\sigma_{k,i\neq i}$ = elasticity of substitution across imports of product k from country i and all other countries ($\neq$i)

Unfortunately, the import demand elasticities in Kee et.al. (2008) have been calculated with respect to global imports and not bilaterally for each trading pair in our sample. We thus have to use the same elasticities for each trading pair in our sample which is a limitation of this analysis. To that extent, the results from the simulation are more indicative than exact. However, given the importance of these products in the trade flows of our sample countries, the elastic import demand for five of these six products and the low applied tariffs on their imports, the impact of a 5% tariff increase on trade in these carbon-intensive products and by extension on the countries' overall trade would be non-trivial. The elasticities from Kee et al. (2008) are reported in Table 4.[66]

[65] Demand for a product is said to be elastic (inelastic) if the absolute value of the computed elasticity is greater than (less than) unity.

[66] The authors have calculated these elasticities at the ISIC Rev. 2 classification, which is what we use in the analysis. These elasticities were not available separately for cement and cement products, which are therefore excluded from the partial simulation analysis. The results in Table 5 therefore pertain to the remaining six carbon-intensive products only.

Table 4 Import Demand Elasticities for Carbon-Intensive Products

Importer/ Product	*Paper*	*Basic chemicals*	*Rubber*	*Plastic*	*Glass*	*Basic iron and steel*
Australia	-1.28	-1.01	-1.04	-0.95	-1.01	-1.00
Canada	-1.20	-1.02	-1.03	-0.97	-1.01	-1.01
EU	-1.13	-1.03	-1.03	-0.98	-1.00	-1.01
Iceland	-1.13	-1.02	-1.03	-0.99	-1.01	-1.01
Israel	-1.19	-1.02	-1.05	-0.97	-1.01	-1.01
Japan	-2.27	-1.02	-1.37	-0.81	-1.04	-1.00
NZ	-1.16	-1.02	-1.04	-0.97	-1.01	-1.01
Norway	-1.16	-1.02	-1.04	-0.98	-1.01	-1.01
Switzerland	-1.14	-1.03	-1.04	-0.98	-1.01	-1.01
USA	-1.70	-1.02	-1.11	-0.92	-1.02	-1.00

Source: Kee et al. (2008).

Interestingly, our simulation results suggested a net increase in imports of these carbon-intensive products from a 5% increase in tariffs if we considered each importing country in isolation, as the (positive) trade diversion effects exceeded the (negative) trade creation effects in almost all cases.[67] The simulation results from unilateral tariff policy are reported in Table 5. Across importing and exporting countries, these results suggest an average 5% reduction in imports from only trade creation effects but an average 2% increase in imports with the inclusion of trade diversion effects in the analyses. The only exceptions are Japanese imports from China and Canadian imports from USA; in each case, the magnitude of trade creation exceeds that of trade diversion so that the overall effect is a net reduction in imports (-0.4% for Japan-China and 3% for Canada-USA).

[67] Note that, traditionally, the signs of trade creation and trade diversion effects are positive and negative, respectively, as we usually consider a reduction in tariffs. However, the signs are reversed in our results as we are simuating the effect of a rise in tariffs.

Table 5 Trade Creation and Trade Diversion Effects (as a Share of Imports) from a Unilateral 5% Increase in the Average Simple Applied Tariff (Year 2005)

Exporter/Importer	*Effects*	*Australia*	*Canada*	*EU*	*Iceland*	*Israel*	*Japan*	*New Zealand*	*Norway*	*Switzerland*	*USA*	*Average*
Argentina	TC/M %	-5.0	-5.1	-5.0	-5.0	-4.9	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.1	2.3	2.2	2.1	2.2	1.2	2.2	2.3	2.3	1.8	2.1
Brazil	TC/M %	-5.0	-5.1	-5.0	-5.0	-5.0	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.1	2.2	2.0	2.3	2.2	1.1	2.2	2.3	2.3	1.6	2.0
Chile	TC/M %	-5.1	-5.1	-5.0	-5.1	-4.9	-6.4	-5.1	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.1	2.3	2.2	2.3	2.2	0.9	2.3	2.3	2.3	1.8	2.1
China	TC/M %	-5.1	-5.1	-5.0	-5.0	-5.0	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	1.1	1.8	1.2	2.0	1.7	**-0.4**	1.6	2.1	2.2	0.8	1.4
India	TC/M %	-5.0	-5.1	-5.0	-5.0	-5.0	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.1	2.2	2.1	2.2	2.1	1.2	2.2	2.3	2.3	1.7	2.0
Indonesia	TC/M %	-5.0	-5.1	-5.0	-5.0	-5.0	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.0	2.2	2.2	2.3	2.2	0.8	2.0	2.3	2.3	1.7	2.0
Israel	TC/M %	-5.0	-5.1	-5.0	-5.0		-6.2	-5.1	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.1	2.2	2.2	2.2		1.2	2.3	2.3	2.3	1.8	2.1
South Korea	TC/M %	-5.0	-5.1	-5.0	-5.0	-4.9	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	1.8	2.2	2.0	2.2	2.0	0.4	1.9	2.2	2.3	1.6	1.9
Mexico	TC/M %	-5.0	-5.1	-5.0	-5.0	-4.9	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.1	2.1	2.2	2.3	2.2	1.2	2.2	2.3	2.3	1.2	2.0
Philippines	TC/M %	-5.0	-5.1	-5.0	-4.9	-4.9	-6.2	-5.1	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.1	2.3	2.2	2.1	2.1	1.1	2.3	2.3	2.3	1.8	2.0
Russia	TC/M %	-5.1	-5.1	-5.0	-5.0	-5.0	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.2	2.3	1.9	2.1	2.0	1.2	2.2	2.2	2.3	1.7	2.0

Exporter/Importer	*Effects*	*Australia*	*Canada*	*EU*	*Iceland*	*Israel*	*Japan*	*New Zealand*	*Norway*	*Switzerland*	*USA*	*Average*
South Africa	TC/M %	-5.0	-5.1	-5.0	-4.9	-5.0	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.1	2.2	2.1	2.2	2.2	1.1	2.2	2.3	2.3	1.8	2.0
Thailand	TC/M %	-5.0	-5.1	-5.0	-5.0	-4.9	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	1.9	2.2	2.1	2.3	2.1	0.7	2.0	2.3	2.3	1.7	2.0
Turkey	TC/M %	-5.0	-5.1	-5.0	-5.0	-5.0	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
	(TC+TD)/M %	2.1	2.2	1.9	2.2	1.5	1.2	2.2	2.3	2.3	1.7	2.0
USA	TC/M %	-5.1	-5.1	-5.0	-5.0	-5.0	-6.2	-5.0	-5.2	-5.2		-5.2
	(TC+TD)/M %	1.2	**-3.0**	1.2	1.8	1.4	0.0	1.7	2.1	2.2		0.9
	TC/M %	-5.0	-5.1	-5.0	-5.0	-5.0	-6.2	-5.0	-5.2	-5.2	-5.5	-5.2
Average	(TC+TD)/M %	2.0	1.9	2.0	2.2	2.0	0.9	2.1	2.3	2.3	1.6	1.9

Source: WTO's IDB through World Bank WITS; authors' calculations.

In view of these results, it may be possible that tariff policy would succeed in reducing overall trade in carbon-intensive products if all importing countries were to consider raising tariffs on carbon-intensive products as a 'group' and not in isolation. Results from such 'plurilateral' action are reported in Table 6 and suggest that the former would be more effective, leading to an average 1.4% net reduction in imports of carbon-intensive products from our sample countries.

Table 6 Trade Creation and Trade Diversion Effects (as a Share of Imports) from a Plurilateral 5% Increase in the Average Simple Applied Tariff (Year 2005)

Product	*TC ($ mn)*	*TD ($ mn)*	*(TC/M)%*	*TC+TD ($ mn)*	*(TC+TD)/M%*
Paper	-1211.0	843.2	-6.6	-367.8	-2.0
Chemicals	-2976.2	2828.8	-5.0	-147.4	-0.2
Rubber	-770.4	549.0	-5.2	-221.5	-1.5
Plastics	-1371.6	961.6	-4.6	-410.0	-1.4
Glass	-392.3	255.5	-4.9	-136.9	-1.7
Iron & steel	-2115.8	1517.0	-5.0	-598.8	-1.4
Average	**-1472.9**	**1159.2**	**-5.2**	**-313.7**	**-1.4**

Source: WTO's IDB through World Bank WITS; authors' calculations.

Understandably, there could be significant displacement effects from such a policy change, which are conveniently assumed away in a partial equilibrium model such as this. For instance, would domestic production meet the excess demand which was earlier met by these imports? Would there be sufficient domestic capacity to do so? Would more trade be diverted to climate-friendly or climate-unfriendly partners? Will climate friendly exports be able to displace climate unfriendly products, or will these simply be sold elsewhere? These are all credible questions that will have to be addressed in a general equilibrium framework. This said, our partial equilibrium results suggest tariff policy as suggested in this article is more likely to achieve its objectives if a critical mass of climate-friendly importing countries was to plurilaterally raise tariffs on carbon-intensive imports. This would also ensure that the trade diversion effects and the possibility of trade in carbon-intensive products being diverted to climate-unfriendly countries are minimized. As for Border Tax Adjustment in carbon tariffs, market size plays a significant role. While large markets may lead off unilaterally, small and medium size countries are unlikely to achieve appropriate effects without a coalition of

like-minded countries. Such a collation could therefore be found within a future multilateral system on climate change following the Kyoto Protocol.

5 CONCLUSIONS

Combining legal and economic analysis in this article, we conclude that members of the WTO are in a position to considerably influence trade of highly carbon-intensive products by marginally adjusting and increasing tariffs levels. WTO members could engage in enhanced product differenation based upon carbon friendly and carbon unfriendly like products within existing tariffs positions. They can multilaterally agree on this by revising the Harmonized System adjusting tariff schedules. They can also do so unilaterally by taking recourse to shaping HS digits 6 to 8 of respective tariff positions. They can lower or eliminate tariffs on carbon friendly products and processes. *Vice versa*, they can deconsolidate tariffs on carbon-unfriendly products, focusing on a limited number of highly polluting products. They can employ a combination of both.

The study submits that trade of such products can be reduced considerably by reverting to agreed mechanisms of tariff deconsolidation in WTO law, either multilaterally agreed or unilaterally. These increases are subject to compensation on other tariff lines, which could be offered for clean products in terms of climate change mitigation policies. Deconsolidation, in our view, can be based upon PPM related criteria, and distinctions of tariff lines based upon production methods of the same products can, in principle be justified by Article XX(g) of the GATT 1994. At the same time, we note that such measures are subject to compensation, are likely to have significant displacement effects and are also likely to attract retaliatory measures. While tariff deconsolidation is a legitimate instrument of trade policy, it must be noted that in the absence of an agreement on compensation, unilateral measures would likely elicit comparable retaliation by affected countries, especially emerging economies, and therefore can easily trigger trade wars.[68]

Recourse to tariff policies in climate change mitigation therefore requires a careful analysis of trade flows and interests at stake. It is evident that they always will be second best. Hence, we do not suggest that tariff deconsolidation be widely used as a mechanism of emissions reduction but rather that it serve as a tool to express the state's concerns and priorities and provide an incentive to its trade partners to join a post-Kyoto international climate agreement. Article 3.5 of the UNFCCC, which borrows language from GATT Article XX, states that the

[68] According to Hufbauer, a state first needs to 'make an exceptional effort to negotiate agreed international rules before blocking imports or penalizing foreign GHG control measures'.

'Means taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade …'. However, when political reasons prevent certain polluting countries from participating in the multilateral effort to curb greenhouse gas emissions, punitive trade measures can be the only effective resort.

Deconsolidation is at its best if not used, but taken into account as a risk and thus as an incentive to join a future international system on climate change mitigation. In light of tariff measures – exceeding the limits of border tax adjustment – powerful and effective incentives exist to convince major producing countries to join a multilateral system with a view to avoiding the imposition of deconsolidation and the potential need to engage in retaliation and a cycle of potentially harmful and welfare reducing tariff increases among members of the WTO. A firm commitment to exclude deconsolidation of tariffs within a multilateral system of climate change, refraining from the exercise of WTO rights in return for committing to multilateral disciplines of capping, offers the potential to convince governments and industries to seek participation and to abandon the road of unilateral climate change policies and related risks attached to it in trade policy.

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