Unclassified **SG/SD/RT(2009)3**

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

English - Or. English

GENERAL SECRETARIAT

SG/SD/RT(2009)3
Unclassified

Cancels & replaces the same document of 14 June 2010

Round Table on Sustainable Development

COMPETITIVENESS, LEAKAGE, AND BORDER ADJUSTMENT: CLIMATE POLICY DISTRACTIONS?

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22-23 July 2009

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This paper was prepared under the authority of the Chair of the Round Table on Sustainable Development at the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the OECD or of the governments of Member countries.

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ACKNOWLEDGEMENTS

This paper benefited from collaboration with Peter Wooders and Aaron Cosbey at the International Institute for Sustainable Development. We would also like to thank John Ballingall, Jean-Marc Burniaux, Susanne Dröge, Stéphanie Jamet, Jens Lundsgaard, Helen Mountford, Jennifer Prescott, Vangelis Vitalis, and George York for comments and suggestions. Finally, we would like to thank Amelia Smith for editorial advice.

The Round Table on Sustainable Development gratefully acknowledges financial support provided by The McCall MacBain Foundation, The European Climate Foundation and Shell.

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SUMMARY

Major change is required to prevent dangerous climate change. This means policies that shift commercial activity away from emissions-intensive production and consumption. It means behavioural and technical change that for some will come at a cost.

In the developed world emissions-intensive producers have argued that they will face prohibitive costs unless the world moves in step when implementing climate policies. They point out that their competitiveness will be at risk; that they could lose business to offshore competitors; that they may have to relocate; and that jobs will be lost. Further, they argue, this will create "leakage" where emissions will relocate and could even increase.

Firm- and sector-specific studies yield a range of results; some suggest that adverse competitiveness effects could be large. It is difficult for policy makers to validate these claims. The cost to businesses from climate policies will vary according to a range of factors such as carbon price, geography, trade costs and the ability of firms to pass on cost increases to their customers – all of which are very difficult to measure in practical terms. These uncertainties are compounded by the fact that economy-wide adjustment has the capacity to reduce costs to some sectors of the economy.

Empirical evidence of leakage is limited. This is scarcely surprising given the immaturity of emissions reductions policies in most developed countries. Studies provide little precision on the size of the leakage problem, with estimates ranging from virtually no relocation of emissions to near complete relocation in some industries. It is also clear that leakage will vary depending on the number of countries adopting comparable climate policies.

While leakage is easy to define arithmetically – the ratio of emissions increases outside a country to reductions inside that country as a result of climate policy – it is much more difficult to determine whether such changes would be problematic and need to be prevented. Effective, least-cost global action is likely to mean emissions reductions in some countries and increases in others. Furthermore, unlike competitiveness, leakage is not a firm-specific problem. It may be environmentally advantageous for a firm's production and emissions to migrate. Net changes to global emissions are what really count.

There are various channels through which changes in emissions, or emissions leakage, might come about. Some can be addressed through domestic policies. Others cannot. For instance, if demand for fossil fuels declines in one part of the world as a result of carbon prices, the fall in world prices would lead to leakage through fossil fuel demand increasing elsewhere.

As long as research is unable to confirm the magnitude of competiveness risks and leakage or categorically refute their existence, claims of wide-ranging and sometimes extreme impacts will persist. This poses a political problem which history suggests is a powerful one. Competitiveness concerns have frequently prevented the passage of environmental policies including climate change issues. They were a factor in the US Government's decision not to ratify the Kyoto Protocol and remain a potent political challenge to that nation's ability to sign up to any subsequent agreement. More frequently, they have caused a dilution of political ambition and reduced the effectiveness of climate policies.

Policy makers are thus faced with the need to find solutions to defuse the competitiveness and leakage problem for emissions-intensive sectors of the economy. In this regard there are two broad options which go to the heart of firm competitiveness: free allocation of emissions permits and adjustment through carbon taxes and rebates at the border.

Free allocation of emissions allowances is preferred in the European Union's Emission Trading Scheme (EU ETS) and would be used in the first phase of the United States' Waxman-Markey bill. This does not imply that it is a better solution than border tax adjustment nor vice-versa – neither is ideal and both present problems. The table below compares the kinds of issues raised by the two approaches.

Summary comparison of free allocation and border adjustment*

	Free allocation of emission allowances	**Border adjustment**
Basis for comparison	Distributed periodically on the basis of historical emissions ("grandfathered").	A rebate of emissions costs on exports and a levy on imports, irrespective of destination or origin.
Implementation	Authorities determine the share of allowances each firm receives for free. Errors inevitable when identifying appropriate recipients and appropriate quantity of allowances they receive.	Authorities determine the methodology for calculating the emissions content of goods. Trade-off needed between accuracy and cost.
Emissions reduction incentives	Incentive maintained for domestic producers to reduce emissions short term. Reduced incentive to restructure out of emissions-intensive industries.	Incentive maintained for domestic producers to reduce emissions if selling to the domestic market. Increased incentive for domestic customers to reduce purchase of emissions-intensive products. Exporter incentives diluted.
Preservation of firm competitiveness	Effectiveness unknown. An indirect solution affecting profitability. Profitability is improved but competitiveness may not be. Cannot address all indirect cost increases.	Effectiveness depends on accuracy of implementation. A direct solution affecting product prices. Likely to be more effective than free allowances. Cannot address all indirect cost increases.
Preventing leakage	Cannot address all causes of leakage.	Cannot address all causes of leakage.
Distributional costs	Increases costs faced by producers with insufficient or no free allowances. Fiscal costs potentially high. Reduces scope for complementary fiscal measures, e.g. to reduce costs to households.	Increases mitigation costs faced by domestic customers. Fiscal costs ambiguous; depends on trade balance.
Risks	Over-allocation or inflated payments could become entrenched. Could spark a "subsidy race" or support inefficient firms. Could violate WTO rules – yet to be tested and depends on details.	Used for protectionist purposes. Could reduce trade. Could violate WTO rules – yet to be tested and depends on details.

* *Comparison is general only. It assumes policies are implemented in the context of an absolute cap on an economy's emissions. Impacts and issues raised will vary according to the fine detail of either policy*.

Such interventions could remain in place even if there were widespread adoption of emissions trading schemes because national schemes are likely to differ as to which allowances are allocated and in sectoral coverage.

Border adjustment may be seen by some as a more sustainable solution to the competitiveness problem because it does not risk addicting industries to costly government support. The recent experience of the EU suggests that weaning industry away from free allocations is, politically, no easy task.

Policies that seek to restore firm competitiveness may not fit comfortably with the United Nations Framework Convention on Climate Change (UNFCCC) and Parties' "common but differentiated responsibilities". Different levels of mitigation action implies some loss of competitiveness as industry and firms take on costs that are not equivalent to those faced elsewhere. This is the economic implication of taking different levels of action.

But even if one assumes that the UNFCCC anticipates a shift in commercial competitiveness as a result of action on climate change, the question still remains whether leakage should go unchecked. Leakage undermines the objective of the UNFCCC. As such, competitiveness effects, when accompanied by leakage, are not merely a domestic cost of adjustment but rather a systemic concern for the multilateral system.

Some policies to prevent leakage may be consistent with the UNFCCC depending on how they are implemented. Key issues here are the extent to which leakage policies maintain a level playing field, do not discriminate against developing countries and do not shift developed country mitigation policies onto developing countries who maintain the right to nationally appropriate policies consistent with sustainable development.

Minimising leakage, while at the same time avoiding subsidies and negative trade effects, is the challenge facing policy makers. In facing it, policy makers could decide to borrow from trade policy. Leakage is a process uniquely facilitated by trade, and the trade regime has dealt explicitly with the problem of how to arrange policies to manage the distributional consequences of trade, including environmental aspects, while optimising its objectives.

There has, for example, been a long debate over using border tax adjustment to minimise competitive disadvantage. In this debate discriminatory policies are treated with suspicion and distortions to price signals avoided for their discriminatory effect on trade.

Here there is a message for climate arrangements. The paramount policy objective must be to ensure effective policy signals for emissions mitigation; policies which seek to preserve those signals should be afforded some latitude. Conversely, policies which undermine those signals should be treated with caution. The rationale and reasoning behind world trade rules and norms, if not the rules themselves, could thus provide a sound basis for a shared understanding on what might and might not be acceptable in unilateral leakage reduction policies in the future.

Would existing rules and trade policy norms lead to a productive alignment of climate and trade policy? A dispute over climate policy adjudicated in the WTO could set climate and trade policy on a collision course from which neither emerges unscathed.

UNFCCC signatories could develop their own principles to guide measures addressing competitiveness and leakage, but this may not prevent a collision between climate and trade policies. In any case, attempts to establish a new set of rules or principles, irrespective of their institutional home, is a time-consuming and challenging task.

Whatever the approach chosen by the international community, a common way forward is needed to address leakage. A constructive approach would recognise the value that addressing competitiveness concerns can have for smoothing the implementation of emissions reduction targets in developed countries while remaining alert to the risks of competitiveness problems being over-stated. Any such approach, whether formal or informal, should seek to indicate those measures which may be tolerable and those which are beyond the pale.

1. INTRODUCTION

1. Worries that businesses in developed economies will be placed at a costly, competitive disadvantage have the potential to delay, dilute and even de-rail steps to curb greenhouse gas (GHG) emissions. They were a powerful factor in the US Government's decision not to ratify the Kyoto Protocol and remain a potent political challenge to that nation's ability to sign up to any subsequent agreement. The same concerns threaten proposed emissions trading schemes elsewhere in the world. In Europe, where the most extensive emissions reduction policies have been introduced, including an emissions trading scheme covering close to half of CO_2 emissions, competitiveness concerns have led to the significant dilution of policies.

2. Any new international agreement to address GHG emissions is likely to provoke fresh concern. Any plausible agreement will require differing levels of stringency depending on the development status of particular countries – flowing from one of the founding principles of international efforts to curb GHG emissions: that member countries carry common but differentiated responsibilities.

3. Recognition of the widely different capacities of the Parties to the UNFCCC and their differing levels of historical responsibility for increased atmospheric concentrations means that domestic policies in developed economies will impose costs that are not imposed elsewhere. Competitiveness pressures flow from the very nature of the global compact that has been entered into. If the concerns they raise have made progress slow over the Framework Convention's early life, more ambitious emissions reduction goals can only exacerbate them – with significant risk for effective on-going implementation.

4. The political rationale to act is strong. If businesses in countries seeking to reduce emissions are exposed to competition from businesses in countries without such constraints they are competitively disadvantaged. Beyond a certain point this can lead to leakage, where commerce and its attendant emissions migrate to countries with less stringent regulation.

5. This paper starts from the premise that whatever the merits of particular industrial cases or sectors, competitiveness concerns are a powerful influence on policy makers and future progress on emissions reductions depends on dealing with them.

6. Section 2 describes the climate policy problem. Section 3 then evaluates the effectiveness and implications of various policy options, principally border measures and free allocation, to offset competitiveness concerns.

7. Section 4 reflects on what the UNFCCC has set in place to deal with leakage reduction policies and poses questions about the consistency of such policies to address competitiveness concerns with the principle of "common but differentiated responsibilities".

8. Section 5 explores the potential for trade and climate policies to come into conflict and what lessons the experience of trade policy and trade rules can provide for the climate competitiveness debate. Concluding remarks in Section 6 consider possible ways forward.

2. THE CLIMATE POLICY PROBLEM

2.1 Competitiveness

9. Firm- and sector-specific studies suggest that risks to competitiveness are concentrated in a handful of emissions-intensive and trade exposed sectors – those where emissions costs constitute a significant portion of the production costs or value added. Though not a large part of many post-industrial economies, these sectors include[1]:

- lime and cement;
- basic iron and steel;
- refined petroleum;
- aluminium;
- inorganic basic chemicals;
- pulp and paper.

10. Typically, studies show that 0.5%-2% of post-industrial countries' national GDP is exposed to significant increases in production costs from the imposition of a carbon cost.[2] This suggests that competitiveness may not be an especially large problem economically. When it comes to industry concerns, however, the analysis quickly becomes complicated and claims of undue loss of competitiveness are hard to dismiss.

11. Emissions costs faced by firms do not necessarily correlate with the extent to which those firms' competitiveness is put at risk. Factors such as geography, market competition, ability to pass on cost increases, and trade costs also need to be factored in (Sijm et al, 2008; Ponssard and Walker, 2008; Demailly and Quirion, 2008b). Assessing all these issues is difficult in practice (Fischer, 2001).

12. The ability to pass cost increases on to customers while maintaining profitability is a key part of establishing risks to a firm's competitiveness. Though most firms will be able to pass on or avoid some of the upfront costs of emissions regulation, this creates a dilemma. If firms are not affected by the full "headline" cost of emissions then compensatory policies need to account for this, but uncovering precise pass-through rates is not possible. This leaves policy makers with a difficult decision about whether to err on the side of under- or over-compensation.

13. Such complications led the European Commission (2008b), when considering which sectors were at "significant risk of leakage", to conclude that an approximation based on simple indicators of cost increase and trade openness seemed "a more practical way forward offering sufficiently robust results".[3]

14. This approach to assessing competitiveness risk is useful, but vulnerable to claims of inadequacy. For example, it is ambiguous as to whether higher levels of trade-intensity lead to stronger competitiveness effects (Reinaud, 2008).[4]

15. A further complication in identifying which firms and sectors should be compensated and by how much is that some degree of reduced profits, particularly for firms that do not take appropriate action to reduce emissions, is anticipated by climate policy. Cost increases are intended to drive a change in resource allocation in the economy (demand for emissions-intensive goods will decline, prices may fall and so will returns on associated existing assets). This is the objective of market instruments in climate policy. The question is to what extent firms are exposed to unintended loss of competitiveness. Answering this

means understanding how the economy as a whole is likely to adjust in response to the introduction of emissions costs.

16. As is the case with trade liberalisation, the perspective of a firm or industry is often quite different to that of the policy maker charged with balancing the interests of society at large. Firms concerned about the impact of an emissions trading scheme will focus on the upfront cost of emissions permits in assessing their competitive position (examples of such impacts are shown in Table 1 below). From the policy maker's perspective this arithmetic is incomplete because it doesn't account for economy-wide adjustments in costs and prices.

17. Some sectors that face cost increases can end up in an improved position as a result of domestic climate policy. Furthermore, the principal economic driver of change in sectors facing cost increases may not always be loss of competitiveness. Of the sectors listed in Table 1, aluminium production is the only one for which loss of competitiveness is a key driver of output losses.

Table 1. Climate policy impact on industry output: example of Australian Policy Analysis

Industry Sector	2020 % change	2050 % change	Key economic drivers
Iron and Steel	-0.4	+1.1	Exchange rate depreciation
Coal-fired electricity	-30	-56	Shift to low-emission technologies
Coal Mining	-3.7	-26	Falling world demand
Rubber and plastic products	+0.4	+2.5	Exchange rate depreciation
Forestry	+29	+166	Emission credits and rising demand
Aluminium	-35	-49	Loss of competitiveness
Trade	-0.8	-1.8	Reflects domestic economy

Source : Commonwealth of Australia, 2008

18. Table 1 also shows that declining incomes affect demand for firms' products, both domestically and internationally. But climate change cannot be tackled without overall (gross) economic costs reducing incomes relative to a world without climate change.[5] Firms cannot be protected from their (carbon-based) share of that cost and these income effects should not be considered part of the competitiveness problem.

19. These effects will be transmitted beyond a country's borders. For example, Manders and Veenendaal (2008) find that when the EU acts unilaterally to reduce emissions, accompanied by minimal effort in other Annex I countries, non-Annex I countries experience a decline in national income of 0.1% as a result of spill-over effects from reduced growth in developed countries.[6] This compares to a 0.7% decline in national income in the EU and a 0.3% decline in Annex I countries. This is important context for policy makers who, when evaluating competitiveness impacts of climate policy, are apt to consider domestic impacts in isolation of impacts abroad. Non-Annex I countries "benefit" from actions taken in Annex I countries only to the extent that their loss in welfare tends to be lower than that in Annex I. The models almost uniformly show welfare loss to both groups.

20. Macroeconomic insights should not be used as evidence that a specific firm will or will not face adverse and unintended competitiveness problems as a result of climate policy. Competitiveness is a firm-level concern (Krugman, 1994). However, the macroeconomic analyses described above emphasise that restructuring is a necessary consequence of reducing emissions, and that the effects of domestic policies cannot be contained within national boundaries. These are important caveats when considering how to deal with competitiveness concerns.

2.2 The political economy of competitiveness

21. The claim that policies will not only result in lost competitiveness and job losses but also displace and potentially increase emissions – so-called "leakage" – is often made in the same breath. This can give rise to significant confusion. In reality the two concerns are quite distinct. The former is a firm-specific issue, while the latter represents a problem for environmental policy.

22. Claims that firms will fail on account of impaired competitiveness are not new and have long been associated with the withdrawal of policies designed to address environmental concerns including climate change issues.[7] More frequently, they have caused a dilution of political ambition and reduced the effectiveness of climate policies (OECD, 2006).

23. Such misgivings continue to feature in contemporary debates. In the US, competitiveness concerns have been debated by the House Subcommittee on Energy and Environment during deliberations on a proposed emissions trading scheme. Energy intensive manufacturers have suggested that:

> *"… if the U.S. enacts tough global warming regulation but other key manufacturing nations do not, production of energy-intensive goods may well shift to the unregulated countries, moving the associated carbon emissions beyond regulation and moving American jobs elsewhere as well".* [8]

24. These concerns are familiar to European policy makers, who have been managing them for some time in the context of the European ETS. Competitiveness concerns were a feature of EU debate over the 20:20:20 by 2020 climate and energy package in 2008.[9] Policy makers faced a concerted and rather successful lobbying effort to reduce perceived impacts of the ETS on firms' competitiveness. The final package included concessions to reduce adverse impacts on energy-intensive and trade exposed industries.

25. Concessions to industries concerned about competitiveness are a feature of many regulatory initiatives despite the fact that empirical evidence to support these concerns is inconclusive (OECD, 2009a).

26. There are many reasons why competitiveness concerns may derail or dilute environmental policies. One is that as long as research cannot confirm the existence or magnitude of competiveness risks, policy debate must admit, and cannot categorically refute, a wide range of claims including extreme impacts. For example:

> *"…cement production in the EU would be wiped out of the EU leading to a loss of approximately 40,000 direct jobs and € 4.2 billion gross value added (GVA) per year. The replacement of domestic production by imports would also result in increased global CO_2 emissions as the European cement industry is demonstrably the best world performer in lowering net CO_2 emissions and as a result of extra CO_2 emissions from transport. All of this is has been demonstrated by experts."*[10]

27. Another reason is that the arithmetic of competitiveness is simple, easily expressed and readily digested by a wide audience of taxpayers and workers concerned about job losses or lower incomes. If a firm faces higher costs in its home country it may struggle to compete, move offshore or lose its business to offshore companies and jobs will be lost. This resonates with many constituents and cannot be refuted in its entirety.

28. This arithmetic becomes especially challenging for climate policy makers, however, due to the global nature of climate change. This has two closely related dimensions. One is "leakage", the environmental counterpart of competitiveness concerns (discussed further below). If a firm loses business to foreign competitors or moves offshore then policy may not reduce emissions and emissions could even

increase. As a result, the effectiveness of climate policy can be called into question. The second dimension is that no country can act alone to prevent dangerous climate change. This gives credence to the concern that competitiveness is being undermined for uncertain gain.

29. Some of the understandings employed in the international arena which bear on competitiveness concerns are not easily translated to the domestic political context. One example is intergovernmental acceptance of the common but differentiated responsibilities of countries in addressing climate change. This understanding implies policy space to expand production and emissions in some countries and not in others. It may be interpreted as justifying reduced competitiveness of some firms in some countries. However, the implication that multinationals can evade emissions regulations is not well received on "Main Street".

2.3 Leakage

30. The IPCC defines leakage as:[11]

> *[an] increase in emissions outside the country as a result of a country's climate policy / decrease in emissions inside the country as a result of a country's climate policy*

31. Depending on the stringency of domestic policies, lost competitiveness can lead to a situation where commerce and its attendant emissions migrate to countries with less stringent regulation. On the domestic front, firms will point to this as a flaw in emissions policies because it can undermine their environmental integrity. The prospect of leakage becomes a powerful justification for policies that will also address firms' concerns about reduced competitiveness.

32. Estimates of the size of the leakage "problem" vary widely. Sector-specific studies show leakage rates ranging from 0.5% to 75% of emissions reductions (Reinaud, 2008). Studies at the economy-wide or international level produce similarly disparate results (Dröge, 2009).[12] They also show that leakage varies significantly depending on the size of country coalitions adopting comparable climate policies. A forthcoming OECD (2009b) study estimates a 11.5% leakage rate under unilateral EU policy which would decline to around 1.7% if all Kyoto Annex I countries adopted comparable policies.

33. The IPCC's accounting definition accommodates a broad interpretation of leakage. This begs the question: is all leakage created equal?

34. Assessing potential leakage is confused, as competitiveness is, by the fact that price or other market-based policy instruments seek to incentivise restructuring in economies away from emissions-intensive production and consumption. If this happened on a global scale one would expect emissions to become like any other scarce resource. Production would occur in those countries able to undertake it in the least emissions-intensive manner, meaning emissions reductions in some countries and increases in others compared to a no-action counterfactual. This could be considered to represent leakage, but some of the change might simply reflect an efficient shift in resources.[13]

35. Analysis requires an understanding of the channels of leakage. Leakage driven by a decrease in international market share is often referred to as the "competitiveness-driven leakage" channel. In the longer term, differences in cost levels could lead to a relocation of energy intensive industries to countries with more favourable climate policies, generally referred to as the "investment channel" for leakage. These two channels are intuitive. Other forms of leakage are less so, including the fossil fuel price channel, where reduced demand for fossil fuels in countries taking action on climate change lowers world prices and increases demand and CO_2 emissions elsewhere (Reinaud, 2008).[14] Studies suggest that the fossil fuel price channel is the most important source of leakage (Burniaux et al. 2008). There is nothing in domestic policy that can offset leakage through this channel.

36. From a firm's perspective it might seem that if the production of a more emissions-intensive competitor expands because of lower emissions costs then any net increase in emissions is 'leakage'. But leakage is not a firm-specific concept. It may be environmentally advantageous for a firm's production and emissions to migrate – i.e. it may lead to lower emissions globally if production is shifting to less emissions-intensive producers. It may also be optimal for some sectors to increase their emissions. The main issue is how overall emissions change. Leakage is the extent to which economy-wide emissions have migrated after sector-specific increases and decreases have been taken into account. In this regard it is not possible to discern precisely which sectors' competitiveness problems might contribute to leakage and which will not. Thus policies to address leakage are entangled, politically and practically, with policies to address competitiveness issues.

37. The UNFCCC accepts that countries will adopt different policies and take on varying responsibilities in the pursuit of its objective of "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".[15]. Thus there will be some shifting in the distribution of emissions globally, and this is in and of itself not an unintended or negative consequence. If the focus is on leakage in the context of undermining the UNFCCC's objective, then it matters considerably.

38. Similarly, under the Kyoto Protocol, a redistribution of emissions amongst Annex I countries may not matter as long as overall reduction targets are met, much as it may not matter if domestic climate policy causes a shift in emissions sources from one industry to another.[16]

39. This assumes, however, that country caps are set at appropriate levels. In practice, setting emissions caps or reduction targets is a tricky business. Caps which are too loose cause "hot air" – emissions reductions on paper that may not reflect a positive contribution to stabilising climate change.

40. Focussing solely on the UNFCCC's climate stabilisation objective also ignores the principle that "policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost".[17] Migration of emissions can increase the global cost of meeting the UNFCCC's objective if it means that industries with relatively low cost abatement options avoid being regulated. Such cost increases may undermine public willingness to tackle climate change.

41. Further, if one's reference point is not international but domestic policy, then emissions which migrate from one Annex I country to another will matter to the extent that they increase the cost of domestic climate policy and undermine domestic policy objectives, especially where a country's domestic policy includes an emissions reduction target or cap which is more stringent than its international commitment.

42. Thus even if one assumes that the UNFCCC anticipates a shift in commercial competitiveness, economic restructuring, and migration of some emissions as a result of action on climate change, the question remains whether leakage should go unchecked. Leakage undermines the objective of the UNFCCC. As such, competitiveness effects, when accompanied by leakage, are not merely a domestic cost of adjustment but rather a systemic concern for the multilateral system.

43. This perspective begs a careful interpretation of emissions leakage, one which goes beyond an accounting framework and considers the extent to which migrating emissions undermines the environmental integrity or objectives of climate policy. One which accepts that different mitigation policies might lead to competitiveness concerns but that they should not cause action on climate change to become unnecessarily or prohibitively expensive.

44. Herein lies the challenge for the international community. While identifying leakage is arithmetically possible for a particular sector (although with uncertainties), identifying systemic leakage that would undermine overall global objectives to stabilise climate change is not. This raises an important question: should the world act to guard against leakage as a kind of insurance against a problem we cannot yet quantify? Such uncertainty also suggests that policies to address leakage should be time-bound and subject to repeated review.

3. COMPETITIVENESS AND LEAKAGE POLICY

45. Historically, the preferred way of dealing with competitiveness concerns arising from environmental policy has been to exempt industries perceived to be at competitive risk from emissions reduction policies (OECD, 2006). This turns out to be one of the most economically and environmentally costly ways of dealing with the problem (Babiker and Rutherford 2005) because more often than not exemptions are applied to the most polluting industries and economic costs are shifted to industries least able to adjust. The challenge for policy makers is to find a method of defusing competitiveness concerns which minimises economic and environmental costs.

46. As discussed above, there are a various factors affecting firm competitiveness and a range of channels through which leakage is caused. Thus policies are likely to vary in their efficacy.[18] A recent study (Dröge, 2009) recommends different policy options for different climate policy impacts:

- Direct compensation when climate policy results in high indirect costs (e.g. of increased electricity prices to aluminium producers);
- Border adjustment when climate policy results in high impact on direct or operating costs and the product is homogenous or is not from a process which is capital-intensive or incapable of running with plant at part load;
- Output-based allocation when the product is not homogenous but all other conditions are the same as above;
- Direct compensation or free allowances with a new entrant reserve when processes are capital-intensive and/or incapable of running at part load.

47. These measures can be lumped into two broad categories: behind the border measures (direct compensation and free allowances) and border measures (border adjustment). [19]

3.1 Behind the border allocation and compensation

48. As increasing numbers of developed countries move towards emissions trading schemes the preferred instrument for dealing with competitiveness issues has been the free allocation of emissions permits or allowances.

49. The free allocation of allowances has been part of the European Union's ETS since its inception in 2005. Provisions are included within proposed ETSs in the US (the Waxman-Markey bill currently under discussion), Australia and other jurisdictions.

50. Free allocation is a useful tool because it can support firm profitability while preserving price signals and incentives to reduce emissions. The value of permits are unaltered by whether or not they are distributed free of charge. As such, firms have an interest in reducing emissions so they can sell a permit rather than use it.

51. Free allocation is thus an improvement on exemptions, but it does create problems of its own and may not adequately defuse competitiveness problems. A firm's market share may decline with free allowances while its profitability improves. "The more that companies profit by raising prices to reflect the opportunity costs of carbon [allowances], the greater the possible erosion of their market share over time" (Grubb and Neuhoff, 2006 p.11).

52. To stop firms from taking their free allowances and relocating, governments need to use closure rules that prevent firms from receiving permits if they shut down operations. This policy and schemes of repeated free allocation can be shown to create subsidies to inefficient producers that should otherwise close their doors (Neuhoff et al, 2006).

53. Presently the EU is the only jurisdiction where free allocation takes place. It has only done so since 2005, so some of the problems with free allocation have yet to present themselves. For example, free allocation can set the scene for a "subsidy race" (Dröge, 2009). As emissions trading schemes become more prevalent around the world countries may be tempted to match the generosity of domestic allocations with those being offered in other countries.

54. Longer-term free allocation can also have a subsidy effect. A firm which has received free allowances will be in a stronger financial position than one which has had to pay for them. As such, it will be better placed to invest in R&D, marketing, energy efficiency, new plants or any other priority that might prop up its market share within the country where it faces a carbon cost. But this is far from the only possibility. The firm could decide to invest in a new plant overseas. Many firms in energy-intensive sectors are multi-nationals and would consider their best opportunities across the world rather than show a particular affinity for any country. A stronger financial position would also tend to result in secondary benefits such as a lower cost of capital.

55. The auctioning of allowances is seen by most economists to be the most efficient option. The European Commission has stressed before and throughout the development of the EU ETS that it considers auctioning to be the preferred allocation option.[20, 21]

56. Free allocation also represents a major fiscal opportunity cost for governments, which could present a problem if it became entrenched. If emissions allowances are auctioned, not only do firms have an incentive to reduce emissions but governments possess a revenue stream that could, for example, be used to reduce tax rates elsewhere in the economy. Free allocation prevents this by distributing the value of permits to firms rather than to governments.

57. There is also a range of practical distributional and legal issues at stake when a country engages in allocating emissions. The most challenging is on what basis to allocate permits.

58. One option is to distribute permits on the basis of past emissions. But past emissions are not an accurate indicator of future ones. To establish the appropriate level of "compensation" regulators also need to assess whether firms can pass permit costs on to their customers. In other words, such allocations are likely to result in under- or over-allocation. Under-allocation would undermine attempts to control leakage while over-allocation would constitute a net subsidy. The political economy of permit allocation and the practical reality that firms know more about their production, emissions and investment intentions than regulators suggests that over-allocation is more likely than under-allocation.

59. Another approach is to rebate some of the cost of permits on the basis of a firm's actual output. The US Waxman-Markey Bill (May 15 2009) features absolute caps with rebates of actual permit costs for "vulnerable" sectors, known as 'output-based rebates' because they link to the level of production. Such allocation is understood to be less economically efficient than grandfathering, as it precludes the option of

reducing emissions by reducing production, thus requiring higher overall levels of abatement (Demailly and Quirion, 2008a). Output-based rebates reduce leakage, but at the cost of diluting incentives to reduce of GHG emissions. Of course they are attractive to major emitting industries in that they do not place any limit on output, but in the presence of a national emissions cap this kind of scheme shifts costs to other sectors.

60. Demailly and Quirion (2008a) find that output-based allocation is the least efficient policy in economic terms although it can be an effective tool in reducing leakage. Similarly, Monjon and Quirion (2009) find that "the performance of different output-based free allocation models reduces leakage compared to auctioning, but it does so only to a limited extent if compared to border adjustments". In terms of welfare, these studies conclude that auctioning with border adjustment is the most efficient policy.

61. The free allocation approach may be beneficial, however, because it limits the extent to which climate policy directly interferes with trade, therefore limiting opportunities for trade-related disputes.

62. But trade disputes are not impossible. Under the WTO Agreement on Subsidies and Countervailing Measures (SCM Agreement), free allocation would be an actionable subsidy – i.e. a subsidy that could be challenged in WTO Dispute Settlement – if it 1) were a "financial contribution" by the government; 2) conferred a "benefit"; and 3) was "specific" to certain industries or sectors.

63. Free allowances, if they are found to be subsidies, are allowable under WTO rules only if they do not impose adverse effects on other WTO members. They may meet this criterion because whether allowances are given for free or auctioned does not alter a firm's short-term decisions on how much it will produce and thus is unlikely to adversely alter market conditions for foreign producers (Bordoff, 2008). Longer term, free allowances would be likely to boost a firm's profitability, enhance its ability to invest and expand production, and could keep uneconomic firms from closing. In concept this could boost domestic production, displacing imports and having an adverse effect on other WTO members, though this is not certain. Furthermore, demonstrating that imports are being displaced and linking such effects to free allocation would be difficult and would need to be judged on a case-by-case basis.

64. Some commentators, invoking the concept of property rights, argue that there is no case to answer and that free allowances do not constitute subsidies because they are compensating producers for the effects of new regulations. Either way, there is no established case law and free allocation may have trade implications.[22]

65. Subject to certain exceptions, allocating free allowances within a country while requiring importers to pay for their allowances could raise questions under WTO rules.

66. Naturally, the free allocation of permits has only been considered in respect of sectors that fall within the scope of an emissions trading scheme. For trade exposed sectors whose emissions are regulated outside an ETS there may be demands for other forms of support to minimise risks to competitiveness. An example might be agricultural producers in the EU for whom any mitigation requirements will be imposed outside of the ETS. The kinds of policies that might be called for include border adjustment mechanisms.

3.2 Border adjustment

67. The idea of adjustment at the border has frequently caused a stir in the international community when it has been framed in public debates as a tax which could be applied selectively to sanction free-riders as much as to neutralise leakage and unintended trade distortions.

68. There are, however, two categories of border adjustment: origin-specific adjustment and adjustment which does not depend on the origin of products. Examples of the difference from existing

trade policies are countervailing tariffs and excise tax adjustment, respectively. In both cases a cost is imposed on imported products to reflect emissions costs and costs may be rebated to exporters.

69. Border adjustment can also be applied differently according to whether domestic policy includes emissions taxes or an emissions trading scheme. The principal difference is in the way the rates of levies (on imports) and rebates (on exports) are calculated. In the presence of an emissions trading scheme, costs imposed or rebated would be linked to prevailing market permit prices, which will fluctuate. In tax schemes the rate would be fixed by government. Other than this, not much distinguishes these different kinds of adjustment.

70. Origin-specific border adjustment or countervailing carbon tariffs which seek to differentiate trade measures according to where products originate raise the possibility of retaliatory trade measures, especially as they would be very difficult to implement due to problems in determining which countries were free-riders and the appropriate size of any tariff.

71. Emissions mitigation policies can take many forms and most imply a cost to producers. These costs are hard to measure but are material even if they are not as visible as carbon price or emissions trading schemes. Thus it is difficult to identify a free-rider.

72. By way of example, consider the impact of a border adjustment on cement produced in Latin America (Wooders et al, 2009). A carbon cost of \$20/tCO_2 would add approximately \$12 to the average operating costs of \$24/t cement produced. But Latin American countries could reduce their carbon emissions using other policies and measures, for example a renewable electricity portfolio standard, mandatory electricity efficiency measures in plants or the refurbishment of older plants. Indicative calculations show that these would result in cost increases to cement manufacturers in the range of \$0.20-4/t cement. This example shows firstly how policies with equivalent national impacts could result in significantly different cost burdens to industrial sectors, and secondly that any countervailing tariff that attempted to equalise emissions costs between Latin America and other countries must take account of the range of climate change policies and measures already enacted.

73. Similarly, over the past two decades Chinese policy has progressively removed incentives to energy-intensive highly polluting exporters and replaced them with export tariffs. It is possible to calculate the equivalent value of these tariffs in terms of carbon. For 2006-08 these were (Voituriéz and Wang, 2009):

- Steel: €30-43/tCO_2;
- Aluminium: €18-26/tCO_2;
- Cement: €2.5-3.5/tCO_2

74. One of the least discussed, practical problems of BTA as a sanction would be determining the origin of emissions embodied in a product. Existing rules for conferring origin on a product are not well suited to tariffs based on emissions. Calculating the origin of emissions would also involve another complicated layer to trade administration and the cost could be quite high. Existing documentary costs for proving origin are estimated to be to 2-3% of the value of trade. Moreover, existing evidence on the take up of trade preferences suggests that large numbers of traders would choose to face increased costs irrespective of the origin of their products rather than the cost of proving origin (Brenton and Imagawa, 2005). Thus the costs of a tariff are likely to spread to otherwise exempt products and producers who would then face double taxation.

75. Selective origin-specific tariffs are likely to be a messy and costly policy option. As remarked by a past EU Trade Commissioner: "It would also be bad politics. A punitive approach to pursuing

international cooperation on climate change would be politically and strategically clumsy, igniting a carbon war" (Mandelson, 2006).

76. Alternatively, non-origin-specific border adjustments might seek to neutralise the effects of domestic climate policy on trade in much the way excise taxes are adjusted for at the border. Imports are subject to the same rate of excise as domestic products and exports are left to face whatever cost awaits them in their destination market. In this way it might be possible to keep the direct costs of emissions reductions measures within national borders. There is no punitive element and non-discriminatory adjustment of this kind is used universally by countries employing domestic fuel excise taxes (OECD, 2006). However, if a country introduced this kind of measure in the present context, without global adoption, it would most likely create double taxation with goods facing an emissions cost domestically and when they arrive at destination of export. It would be in the interests of countries to adopt equivalent adjustment but this would take time.

77. Implementation of non-origin-specific border adjustment is not straightforward and would be even less so in respect of an emissions-based excise. It would be necessary to ascertain the emissions embodied in imported products. This is a complicated task, the cost of which can be minimised in emissions trading schemes by placing obligations on upstream sources of emissions such as energy producers or large-scale industrial processors.[23] A BTA scheme, on the other hand, has to target goods and services further down the production chain, which magnifies measurement problems.

78. Tools, techniques and protocols to measure the carbon content of products exist but complete data sets do not. Collecting such data is not simple (see Box 1.).

Box 1. Measuring emissions: lessons from the cement sector

The experience of the Cement Sustainability Initiative (CSI) in setting up their emissions database provides useful lessons about what it takes to measure the carbon content of an industrial product.

The CSI scheme has been successful but was not straightforward, though cement is perhaps the most homogenous manufactured product and therefore one of the easiest for which to measure and compare emissions.

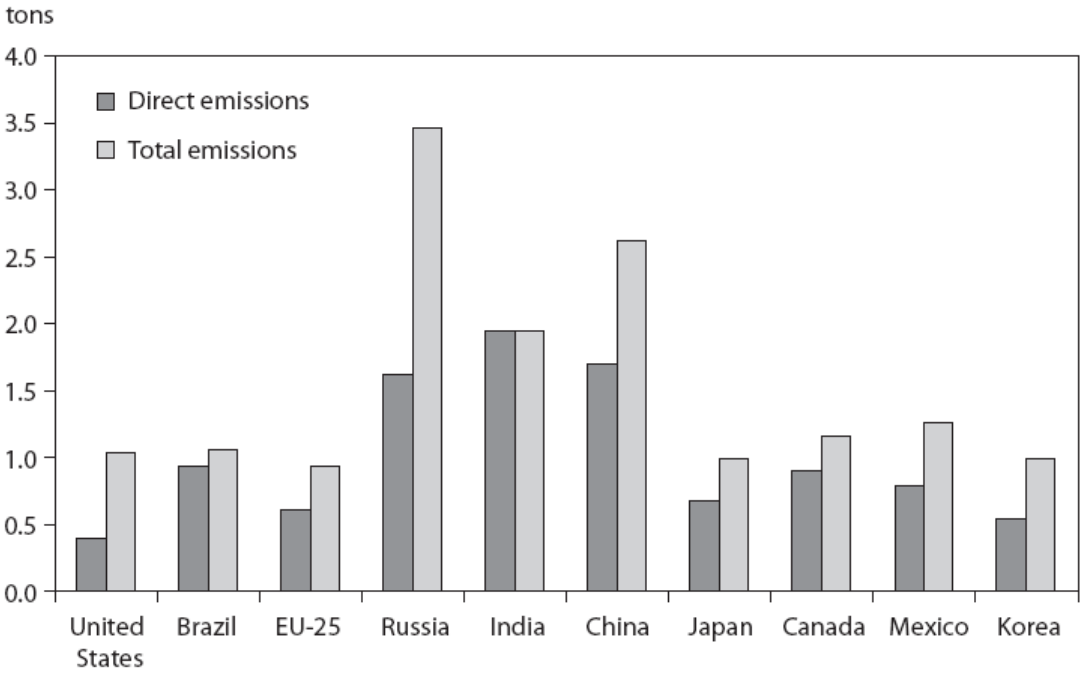
The scheme uses a variant of the WBCSD/WRI GHG Protocol, the accepted protocol for measuring GHG emissions under ISO standards. The CSI found that plant-level data was essential. They collected only physical, current data for these plants, excluding financial data or any future projections. The administrative management of the database was contracted out to a professional services company.

The development of the CSI's GNR database took several years and included agreeing protocols and taking decisions around 'grey areas' (e.g. emissions factors for fuels derived from wastes and whether on-site electricity generation should be included within the system boundary). The development was within a self-selected group of volunteers (development could have been slowed if it were less co-operative).

79. The margin for measurement error is also potentially large given variable production methods even amongst similar products. Steel products, for example, can have widely varying emissions content depending on how they are produced. Figure 1 below (Houser et al, 2008) shows that total emissions from US steel production are, on average, 40% of those from Chinese steel production. A major part of the difference is due to the much higher share that plants which recycle steel play in the US compared to China. These plants require electricity to melt the recycled scrap, a far less energy- and GHG-intensive process than steel production starting from iron ore in a blast furnace.

Figure 1. Carbon intensity of Steel, 2005

(Tons of CO_2 emissions per ton of Steel)



Source : Houser et al (2008)

80. The challenge of measuring emissions becomes more complicated the more complex a manufactured product is. Carbon footprinting and life cycle assessment (LCA) are techniques being developed for evaluating emissions along production chains.

81. Experience to date has focused on specific products (e.g. carbon labels for retailers such as Tesco in the UK) and on producing inventories of total emissions for companies who wish to set themselves GHG emissions targets and/or make claims around them.[24] While it is difficult to give an exact cost for the carbon footprinting of a GHG-intensive process, Tesco's experience in producing carbon labels for around two hundred of their products has required a contract with environmental consultancy, ERM, over a two-year period.[25]

Box 2. Effectiveness of Border Tax Adjustment: what can modelling tell us?

Firm-level studies (Demailly and Quirion, 2008; Monjon and Quirion 2009), suggest that border adjustment might be an efficient policy for controlling leakage, but economy-wide and international analyses are less convincing. Almost all general equilibrium studies of the effects of border tax adjustment show a global welfare decline with uncertain net benefit from reduced competitiveness problems or reductions in leakage [Burniaux et al (2008), EPA (2008), Alexeeva-Talebi (2008a), Manders and Veenendaal (2008)].

A number of studies find that output from energy-intensive industries could decline if countervailing tariffs are used to offset domestic costs of action to reduce emissions (Burniaux et al, 2008; McKibbin and Wilcoxen, 2009; and EPA 2008).

In the case of environmental effectiveness, the range of estimates of the effectiveness of BTAs in reducing leakage runs from almost zero (the EPA's 2008 analysis of the Lieberman-Warner Bill) to nearly 100% avoidance of leakage (McKibbin Wilcoxen, 2009).

Burniaux et al. and forthcoming analysis from the OECD (2009b) find that countervailing tariffs could be effective in reducing leakage in the case of unilateral action by a small number of countries, such as the EU, but that the benefit of BTAs in reducing leakage declines rapidly relative to costs as the number of countries taking action increases:

For instance, in a scenario where Annex I countries cut their emissions unilaterally by 50% by 2050, imposing a countervailing duty achieves a small additional world emissions reduction of about 0.4 Gt (or about 0.6% of projected 2050 world emissions) at a cost of about 0.7% of world GDP (1.2% instead of 0.5%).[26]

Thus the additional benefit of reduced leakage may not be worth the costs imposed by BTAs [Babiker and Rutherford, McKibbin and Wilcoxen, Mander and Veenendaal, Peterson and Schleich (2007), Burniaux et al].

BTAs will also shift costs to other countries. OECD (2009b) analysis shows non-Annex I country GDP declines by 0.34% in 2050 due to countervailing tariffs in Annex I countries (where GDP declines 0.1% as a result of countervailing tariffs).

It has also been shown that the modelled effects of BTAs are sensitive to the basis on which adjustment rates are measured, so measurement error may have wide-ranging impacts on policy effectiveness (McKibbin and Wilcoxen; Alexeeva-Talebi, 2008a) .

82. Thus for border adjustment there is a trade-off between accuracy and administrative cost. An exercise which established GHGs emitted from the 'best available technology' (BAT) and applied this to all producers would eliminate the need for estimating GHG emissions from individual plants. Ismer and Neuhoff (2007) advocate such an approach, claiming also that it would be likely to be WTO-compliant. It would clearly be an under-estimate of GHG emissions for almost all plants, and would eliminate any incentive on firms already at BAT to further improve their emissions reduction technologies. Given the wide ranges that exist in emissions intensity of the production of most products, a 'best available technology' factor would most likely have to be set at a very low rate, which would render it largely ineffective in controlling leakage and reducing competitiveness concerns.

83. Whether countervailing duties or "excise-style" adjustments are used, economy-wide modelling analysis casts doubt over the effectiveness of border adjustments for offsetting competitiveness and leakage. A review of studies to date suggests that while border tax adjustment may be a useful way to manage the domestic distributional effects of climate policy, it is likely to be less useful as a means of minimising the costs of climate policy or reducing leakage from the economy as a whole (see Box 2).

84. There is also a risk that once it is introduced border tax adjustment could become a focal point for vested interests and a means of protectionism. To limit this risk such measures could, if introduced, be time-bound and subject to repeated review.

4. LEAKAGE AND THE UN FRAMEWORK CONVENTION

85. The United Nations Framework Convention on Climate Change does not explicitly deal with competitiveness and leakage, although it does touch on related issues.

86. Article 3.5 of the UNFCCC requires that "Measures 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". This echoes language found in international trade rules and suggests that, at a minimum, leakage minimisation policies must be well-founded. It also suggests that policies focused on industrial competitiveness are not appropriate (Werksman and Houser, 2008). Equally, the language of Article 3.5 does not exclude measures that are non-discriminatory and whose transparent and

explicit focus is the avoidance of leakage that might undermine the global environmental goal that lies at the heart of the Convention.

87. Equally important is the Convention's recognition in Article 3.1 of the Parties' "common but differentiated responsibilities" and the idea that countries should take on "nationally appropriate mitigation actions".

88. The principle of common but differentiated responsibilities has important implications for leakage policy. It is accepted that different countries will act to reduce their emissions in different ways, with any combination of policies and measures. The UNFCCC has never attempted to prescribe policies or their stringencies, only to facilitate agreements on the scale of national commitments and on the common mechanisms which can be used (i.e. the so-called flexible mechanisms such as the Clean Development Mechanism or CDM).

89. With this in mind, border taxes might give rise to objections on the basis that they seek to impose equivalent emissions costs on imported products from countries employing alternative methods of emissions regulation. This objection could be raised as easily by developed as by developing economies.

90. More generally, it could be argued that express provision for common but differentiated responsibilities under the Convention necessarily implies differential competitive positions. While there may not have been an explicit intention to tilt the commercial playing field, there was an intention to cause changes in behaviour. One may ask: is it reasonable to incite change in one of the key factors of production and then insulate economic agents from the effects of that change through an instrument like a border tax adjustment?

91. The dilemma can be stated very precisely: if an importing Annex I country applies an adjustment that levels the playing field compared to the situation prior to the regulation of emissions regulation then the competitiveness of producers in an exporting country is unchanged relative to their immediate competitors. The only cost to the exporter will be in terms of reduced consumption of their products. That cost can be viewed in two ways. Either it is a cost of mitigation shifted to producers in exporting countries or it is a cost to consumers in the importing country. On balance it is likely to be both, with a simple rule of thumb being that such taxes are shared equally between producers and consumers (Tokarick, 2006).

92. Even if one assumes that the UNFCCC anticipates a shift in commercial competitiveness as a result of action on climate change, the question still remains whether leakage properly defined should go unchecked. Leakage undermines the objective of the UNFCCC. As such, competitiveness effects, when accompanied by leakage, are not merely a domestic cost of adjustment but rather a systemic concern for the multilateral system.

93. Are measures that seek to minimise leakage likely to contravene the principle of common but differentiated responsibilities? One cannot be sure if a measure would be interpreted as respecting common but differentiated responsibilities, but it is easy to see which measures would not.

94. Intent is important. If the intent is to restore industry competitiveness then policies will be on very shaky ground. Different levels of mitigation action imply some loss of competitiveness as industry and firms take on costs that are not equivalent to those faced elsewhere. This is the economic implication of taking different levels of action.

95. If the intent of a measure is to reduce leakage then it may be easier to justify, but the principle of common but differentiated responsibilities may still be threatened. As discussed earlier (Section 2.3), an arithmetic account of leakage says nothing about how problematic leakage is, if at all, given the anticipated redistribution of global emissions implied by common but differentiated responsibilities. Key issues here

are the extent to which leakage policies maintain a level playing field, do not discriminate against developing countries and do not shift developed country mitigation policies onto developing countries who maintain the right to nationally appropriate policies consistent with sustainable development.

96. In this context, border adjustment priced according to "best available technology" (i.e. the lowest carbon tax base possible) could be considered compatible with common but differentiated responsibilities. It would not alter price relativities between like products, irrespective of origin. Developing country industries would not face any loss of competitiveness. And there would be no incentive for those industries to adopt less emissions-intensive production methods – the only cost to developing country industry would be from reduced demand for emissions-intensive products.

97. When considering this it is important to recall that the actions of countries to reduce emissions at home will almost certainly have indirect costs for other countries, at least through income effects – i.e. lower demand for foreign goods and increased returns (in domestic currency) for some exports. Policies that shift costs onto other parties cannot be avoided. It is hard to accede, therefore, that policies can contravene the principle of common but differentiated responsibilities simply because they imply a cost spill-over. There must be more to it.

98. Non-discriminatory action intended to minimise leakage may be viewed as within the responsibility of governments to ensure that their own policies are effective and to ensure that citizens do not use trade as a loop-hole to avoid domestic regulations. This loop-hole has implications for international burden sharing. Countries with emissions reduction obligations would find that meeting their targets would become easier if emissions migrate. While it would be of little consolation to workers in industries moving offshore, it nonetheless would mean a lower cost of emissions across the entire economy even if global emissions would have increased.

99. It may also be argued that policies to reduce leakage are consistent with the responsibility of developed country consumers for much of the world's emissions. This means acting on the consumption of goods associated with GHG emissions rather than the direct point of production of those emissions. This is out of step with the current UNFCCC approach, however it is of increasing importance as a number of developing countries produce substantial emissions making goods for developed country customers. More than 20% of China's emissions are associated with exports (Dröge, 2009). For this reason, policies to reduce leakage and, perhaps by extension, policies to reduce competitiveness concerns, could become of increasing importance as the definition of differentiated responsibilities begins to shift increasingly towards the responsibility of developed country consumers as much as developed country producers.

5. CLIMATE AND TRADE TREATIES – SYMMETRIES AND DIFFERENCES

100. Minimising leakage, while avoiding subsidies and negative trade effects, is the challenge facing policy makers. The tensions that have arisen around competitiveness under the UNFCCC are not new and in this respect the UNFCCC is not so different from the GATT (1994) and other WTO agreements. In the WTO, special and differential treatment (SDT) yields increased flexibility and policy space to those members that need it. Under the UNFCCC, the principle of common but differentiated responsibilities reflects the fact that some countries are more capable and more culpable than others in the task of reducing greenhouse gas emissions (GHGs). As such, international trade and climate policy have counterpart concepts for dealing with the distributional consequences of advancing policy but acknowledge the very different capacities of the parties.

101. Where the two regimes differ is that the trade regime has dealt explicitly with the problem of how to arrange policies to manage the distributional consequences of trade, including environmental aspects,

while optimising its objectives. The climate regime has yet to deal with this issue with similar precision. The case for doing so demands careful attention if the two regimes are to be productively aligned.

102. The trade policy community has signalled the risks that measures for controlling competiveness problems and leakage pose for the integrity – and liberalisation – of global trade rules. Concerns are most acute in the case of border tax adjustment. Given this, these kinds of policies need to be considered in the context of trade policy. Insights from trade policy may be helpful in navigating the climate policy competitiveness and leakage debate.

103. Trade and climate policy have much in common. Both deal with issues of global welfare and the way in which the regulatory powers of nation states can be developed to enhance that welfare. Both have the potential to significantly alter the competitive environment in which businesses exist.

104. But there are important differences. Enhancing gains from trade is encouraged by governments to promote *domestic* welfare, with spin-off benefits for global welfare. In promoting gains from trade, governments must navigate the transitional costs that liberalisation imposes on specific domestic enterprises whose market power has been constructed in the absence of exposure to competitors with more advantageous factors of production. The case for reducing GHG emissions, by contrast, is driven to secure a *global* benefit. While similar transitional costs for particular economic interests must be addressed, only a portion of the benefits of emissions reduction will accrue domestically, and it is impossible to say *a priori* how these measure up against the costs of action.

105. If trade liberalisation is deferred, nations forgo gains to welfare but it is not a zero sum gain. Unilateral trade liberalisation can, notwithstanding the transitional costs, yield overall welfare gains at the level of the domestic economy. But if GHG emissions reductions are deferred, nations face potentially considerable destruction of welfare and significantly higher costs of action. Unilateral measures to cut emissions can also be negated by the migration of emitting industries to countries with less stringent or no regulation.[27]

106. It is important to keep these similarities and differences in mind when examining the institutions that have evolved at the global level to deal with trade and climate concerns. The WTO and UNFCCC regimes have grown up separately over the past two decades to deal with different problems, but neither was established in a vacuum and interactions between them were clearly envisaged by their architects. Both trade and climate policy exist in a second-best world where the distributional impacts of policies, across countries and people, are not even and need to be taken into account.

107. In the WTO and its predecessor the GATT there is a long history of debate over border tax adjustment to minimise competitive disadvantage (Lockwood and Whalley, 2008). The GATT (1994) allows WTO members to impose charges on imports equivalent to internal taxes on like domestic products, but stops short of allowing countries to use border adjustment to protect domestic industry. The distinction is a fine one at the margin, but lessons can be learned from the trade arena and applied to climate policy in the context of the UNFCCC.

108. In the trade debate the difference between acceptable and unacceptable policies hinges on whether a policy is discriminatory in either application or effect. Excise taxes, for example, may be extended to imports provided the tax is applied evenly irrespective of where the goods come from. This avoids distorting price signals and trade.

109. In this there is a message for climate arrangements. The paramount policy objective must be to ensure effective policy signals for emissions mitigation and policies which seek to preserve those signals

should be afforded some latitude. Conversely, policies which undermine those signals should be treated with caution.

110. The so-called destination principle of taxation, where goods are taxed at the point of consumption rather than the point of production, achieves what one GATT body described as "fiscal justice."[28] WTO members have recognised that such policies may be legitimate and are acceptable under certain conditions.

111. On the specifics, however, there is little clarity on whether border tax adjustment is permissible for climate change purposes. The GATT's 1970 Working Party on Border Tax Adjustment was able to agree that BTA of indirect taxes was permissible.[29] These are taxes levied on the good in question, such as excise tax, value-added tax, sales tax and so on. There was also consensus on the notion that direct taxes were not an appropriate subject of adjustment. Such taxes are not levied on the good itself, e.g. income taxes, payroll taxes, social security charges on employers and employees. But on a third category of taxes – so-called *taxes occultes*, which lie somewhere in between – there was no agreement. The Working Party offered an illustrative list of such taxes that included taxes on advertising, transport and, significantly, energy used in the production of a good. It is these taxes which most closely relate to emissions taxes and permit costs.

112. Differentiating between direct and indirect taxes for the purposes of border adjustment has a very practical dimension. Direct taxes are generally more opaque in their effects than indirect taxes. Thus it is harder to assess the amount of adjustment required and border tax could more easily be used as a disguised restriction on trade (OECD, 1994).

113. Borrowing from world trade rules and norms also seems appropriate in considering the issue of common but differentiated responsibilities. In the WTO, developing countries have access to special and differential treatment which admits different levels of trade liberalisation in trade negotiations, assistance in implementing new rules, and time to come to grips with these rules. This differentiation does not extend to the underlying reciprocity that sits at the core of the WTO rules: what one member extends to another it extends to all. There is no differentiation in this common responsibility.[30]

114. In this way, WTO rules have grappled with allowing differentiation while avoiding discrimination. This is codified in the GATT (1994) and bears on border adjustment. While it is not possible to establish in advance whether a border adjustment would be legal, legislation and experience do point to which characteristics would make legality more, or less, likely.[31]

115. The legal treatment would differ depending on whether the measure came in the form of a tax, designed to make importers pay in the same way that domestic producers pay in a domestic carbon tax regime (border tax adjustment), or in the form of a requirement to buy allowances at the border in a way that parallels a domestic requirement for producers to participate in a cap and trade scheme where allowances are assigned or auctioned.

116. In general terms, adjustments likely to contravene trade law include ones where imported products are held to a higher standard than like domestic products (including higher charges) or charges are levied differently depending on where products originate (see Box 3 which extends these general definitions but is not intended to provide a legal opinion or conclusions).

117. WTO rules admit exceptions in cases where policies seek to protect human health or the environment, but these exceptions cannot be used unreservedly. WTO dispute proceedings have, for example, indicated that adjustment policies which appeal to such exceptions ought to:[32]

- Be transparent and allow for appeal or review.[33]

- Accept that other countries can take comparable action without taking the same actions.[34]
- Follow consideration of appropriate international arrangements (if the policies are unilateral).[35]
- Show that any discrimination is related to the pursuit of the policy's objective.[36]

118. The rationale and reasoning behind these rules, if not the rules themselves, could provide a sound basis for a shared understanding on what might and might not be acceptable in unilateral leakage reduction policies in the future.

Box 3. Overview of trade law and border adjustment issues

A tax adjustment would contravene GATT's Article III:2 if it did not ensure that taxes and internal charges on imports would not be applied in excess of those applied to like domestic goods.

A requirement to purchase offsets at the border would, on the other hand, be covered by GATT Article III:4, which requires that imports be accorded regulatory treatment "no less favourable" than that accorded to like domestic products.

In both cases it is critical to define "like goods." Is a tonne of low-carbon production steel "like" a tonne of high-emission steel? WTO jurisprudence on this question is not straightforward, but probably they would not be considered like and discriminating between them on the basis of carbon emitted during production would therefore breach Article III obligations.

However, for both taxes and requirements to purchase allowances, GATT Article I would need to be respected. This article demands "most-favoured nation" treatment: that any favourable treatment granted to goods from one country must be granted in the same measure to like goods from all other WTO member countries. The key here is that any border tax adjustment would need to be equally applied to all exporting countries and not just to those that were deemed to be lagging behind in the fight against climate change.

For both taxes and purchase requirements the Article I and Article III obligations, if breached, would not be the final word on GATT legality.

GATT's Article XX sets out general exceptions for policies "*necessary to protect human, animal or plant life or health;*" [XX (b)] and "*relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption*." [XX (g)].

While XX(b) might be invoked, climate change measures are more likely to be considered under XX(g). This has been interpreted as containing two tests. First, does the measure in question "relate" to the conservation of natural resources? Second, is it made effective in conjunction with domestic restrictions? Both a border tax and a request to purchase allowances would likely pass the first test. If treatment of the imports and domestic goods were generally even-handed, the second test would likely also be passed.

The final question to be considered if Article XX(b) or (g) were cleared would be Article XX's chapeau obligations, which are designed to weed out protectionist measures. The chapeau requires that:

> *"... measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade ..."*

In practice, these issues are a matter of some complexity and would need to be evaluated in light of the specifics of any particular border adjustment.

6. SHARED UNDERSTANDING AND A COMMON OUTLOOK

119. Competitiveness problems, while hard to evaluate in practice, are a political barrier to action. Leakage, though often overplayed by vested interest, remains a potential threat to global efforts to control climate change.

120. The tools for addressing these problems have been assessed and the results are not very appealing. Most methods of border adjustment would be very difficult to implement and are likely to impose costs for questionable economic benefit. They may fail to protect their intended beneficiaries and still permit leakage. They may also cut across established international rules and norms in both trade and climate policy. The one border adjustment option that gets around these problems – a non-preferential adjustment based on best available technology – may be so weak as to not adequately defuse competitiveness concerns or resolve the leakage problem.

121. Alternatives to border adjustment exist. But the main contender, free allocation in the context of emissions trading schemes, also faces practical problems. Not least is the fact that identifying firms which need such support is very difficult. Free allocation may not adequately address leakage and weaning industry away from initial free allocation will inevitably re-ignite competitiveness concerns. Free allocation has yet to be properly tested with the EU and Norway being the only adopters and only home of systematic emissions pricing in the world.

122. While the politics of competitiveness and leakage are problematic they should not be overstated. It is unlikely that firms will be as adversely affected by climate policies as they make out. Leakage may be of conceptual concern, but no one knows how big an environmental problem it actually is and policy makers will struggle to identify the problem when they see it. This may suggest that these problems should not be addressed at all.

123. It is all too common for researchers, policy analysts and decision makers to think about costs of controlling leakage and reducing competitiveness costs as additional to action on climate change. But what if they are a necessary part of mitigation policy, not an add-on? The history of trade negotiations suggests that whatever the merits of liberalisation, domestic politics has required a slower and more costly road than theory would recommend (Baldwin, 1989). It is unlikely that climate control will prove any different, particularly in the face of far more ambitious emissions reductions than have been discussed to date. Attempts to control leakage and stave off hard to separate competitiveness concerns will create costs which need to be minimised if avoiding them is not a realistic option.

124. If the international community chooses to recognise these issues there are ways to deal with them. Deferring to trade rules is one option. This has the upside that the relevant rules are already established. The downside is that not all parties to the UNFCCC are members of the WTO. It also keeps alive the possibility that a WTO dispute panel would strike down a country's domestic mitigation policies, thereby bringing the world trading system into conflict with the UNFCCC.

125. The result of WTO dispute settlement would require one of two outcomes:

- a finding that a national measure or measures are inconsistent with WTO rules. This would be welcomed in trade quarters but could lend force to the claim that the UNFCCC's legitimacy as the global policy-making forum for climate depends on the trade regime for its legitimacy;

- a finding that a national measure or measures are not inconsistent with WTO rules, thereby exposing the trade regime to criticism from the environmental community for sitting in

judgment on climate policies. Global trade rules have never been able to take for granted a popular constituency and a serious collision between trade and environmental codes could have far-reaching consequences.

126. There remains the possibility of flexibility: WTO members could amend WTO rules, reach specialised agreements or grant waivers for the use of certain BCAs.[37] Such changes would require agreement amongst a majority or all WTO members. For this to be secured there would need to be agreement that the issue is of sufficient importance and the proposed solutions sufficiently fair and effective to warrant their attention. Given the need for a consensus that would include countries with very different emissions reduction burdens, this would be a difficult process.

127. Policy makers are rightly wary of exceptions and perhaps nowhere more so than in trade policy. But perhaps climate change is the truly exceptional case? The Intergovernmental Panel on Climate Change's fourth assessment report said that keeping global average temperature increases between 2.3 to 2.8 degrees Celsius means cutting GHG emissions by 30 to 60 percent in 2050 compared to 2000 levels (Barker et al, 2007). While even this level of ambition represents an exceptional challenge, the IPCC's assessment of what needs to be achieved already appears to be on the optimistic side. In light of this, it seems prudent to adopt whatever approach best smoothes the way for effective climate policy or at a minimum avoids distracting disputes.

128. Countries could engage in bilateral arrangements to address competitiveness concerns on a case by case basis, such as voluntary export restraint if a domestic industry is threatened by a surge of imports from a trading partner. From an institutional perspective this has the drawback of creating a complicated patchwork of agreements, potentially with a range of different terms and conditions and which would not be conducive to trade.

129. Another option is for UNFCCC signatories to develop their own principles that could help guide the elaboration of measures to address competitiveness and leakage. If they were to do this, borrowing from world trade rules would seem appropriate. Werksman and Houser (2008) suggest the following principles:

- Secure the express acknowledgment of all Parties to the Copenhagen agreement that the commitments or actions that are contained in that agreement reflect the international standard for what is an appropriate and "comparable" level of effort expected of Parties during the time frame of those commitments.
- Reaffirm that neither the UNFCCC nor the WTO supports the use of trade measures as a means of protecting domestic industry from competition and that any trade measures used to advance the implementation of the UNFCCC must be narrowly tailored to achieve a legitimate environmental objective.
- Clarify whether the use of trade measures to prevent emissions leakage between Parties is a legitimate environmental objective as part of domestic efforts to meet commitments under a Copenhagen agreement.
- Guide the use of trade measures against non-Parties or Parties not in compliance with their commitments under a Copenhagen agreement.
- Promote the exercise of diplomacy before any unilateral trade measures are resorted to.
- Require transparency, predictability and consistency in the design and application of any trade measures.

- Ensure respect for the special and differential treatment of developing country Parties based on their level of development.

130. This is a worthy list. But given the huge areas of climate policy that remain unresolved it is questionable whether negotiating time will be found for such a tidy and proactive approach. A more likely outcome is the attempted unilateral imposition of measures designed to limit 'leakage'. The acceptability of any such initiative is likely to depend heavily on the transparency with which it is formulated, the scrupulousness with which it can be demonstrated to be non-discriminatory and the extent to which recourse to multilaterally-inspired alternatives have been exhaustively canvassed.

131. Informal arrangements could also be effective in guiding climate and leakage policies towards least cost options and a common approach. Guidelines could be as simple as whether border measures or behind the border measures should be preferred. They might go as far as prescribing how to calculate the emissions content of products or to suggest a set of products to which border tax adjustments might be limited (Climate Strategies, 2008).

132. No approach is likely to be perfect, but a common way forward could smooth the path to action on climate change and prevent costly misunderstanding or the widespread introduction of imprudent policies.

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ENDNOTES

[1] This list is not definitive. Sector-specific studies have tended to focus on heavy industry, reflecting the scope of the EU ETS. There are, however, other emissions-intensive sectors that may face significant cost increases depending on the scope of climate policies, e.g. agriculture.

[2] See Hourcade et al. (2007) and Carbon Trust (2008). For Germany Graichen et al, (2008); Netherlands, Bruyn et al, (2008); Australia, CISA (2008); the United States, Morgenstern et al (2007) and Aldy and Pizer (2009).

[3] The European Commission's considerations of how to assess which sectors are "at significant risk" recognised that, in principle, an "assessment of the possibility of passing through higher costs into prices" was required and that "a refined analysis, including the estimation of price elasticities, would be desirable". It was accepted, however, that this was not necessarily a feasible way forward.

[4] The cement industry has also argued that while large quantities of cement are not currently traded internationally (compared to industrial commodities such as steel or aluminium), the sector is still very exposed to changes in the relative competitiveness of international firms. This is because the embodied emissions in cement are high relative to the value of the product. A carbon price of US$30/t of CO_2 would add 15-30% to the price of a tonne of cement if that cost could be passed through to consumers. Such a large cost increase would substantially increase the competitiveness of internationally-traded cement (currently constrained by the weight of the material and costs of freight relative to product prices) but would not show up in trade exposure statistics. A new paradigm with significantly altered trade flows could potentially result, but this would depend on how carbon costs and all other costs (e.g. transport) altered relative to each other and to their current values.

[5] There are, however, reasons to believe that "first movers" in climate policy can benefit in the longer term. The argument is that imposing constraints on GHG emissions will encourage a country's sector to become more efficient and to develop and introduce new technology more quickly (Houser et al, 2008; Reinaud, 2008). While there is little specific modelling evidence to support the contention, the maximum limit the EU ETS has placed on offsets from the CDM is a manifestation. Part of the rationale behind this limit is the desire for EU industry to innovate and to therefore improve their chances in a future clean energy market, gaining a "first mover advantage". A related point in terms of understating benefits from climate policy is that not accounting for the global diffusion of induced technological change will overstate net leakage, i.e. a spillover of technologies developed within GHG-constrained countries would occur to unconstrained countries (Grubb et al, 2002a; 2002b).

[6] This is based on Manders' and Veenendaal's IMPASSE scenario for future climate policy.

[7] "International competitiveness concerns have been responsible for the scrapping of proposals to introduce the 1993 BTU Tax legislation in the US, the "Greenhouse Levy" in Australia in 1994 and the EU Council's Directive to establish a common EU framework on energy taxation in 2003." OECD (2006) p.91. See also Hoerner and Muller (1996).

[8] Testimony of John J. McMackin before the House Committee on Energy and Commerce Subcommittee on Energy and Environment Hearing on Competitiveness and Climate Policy: Avoiding Leakage of Jobs and Emissions, March 18 2009, on behalf of The Energy-Intensive Manufacturers' Working Group on Greenhouse Gas Regulation.

[9] '20-20-20 by 2020' sets targets of a 20% reduction in GHG emissions in 2020 (relative to 1990), an increase in renewable energy to 20% of the energy mix in 2020 and a 20% reduction in projected energy demand in 2020 (European Commission, 2008a).

[10] Cembureau (2008) 'The European Cement Industry is highly vulnerable to Carbon Leakage' Press release, Brussels, 8 December 2008, http://www.cembureau.eu/.

[11] Barker, Terry, et al. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Technical Summary. Pp 80-81.

[12] Dröge (2009) has summarised these, noting some of the features of the models and showing that estimates vary widely, the main finding being that leakage is of unknown practical importance but that it could significantly undermine mitigation efforts. The typical leakage estimate is in the order of 20%.

[13] Accordingly support to industries to stop this shift could stop advantageous restructuring. This dynamic also means that leakage is not a bilateral concept but a global concept. Much as bilateral trade balances are of little economic consequence despite getting a lot of political attention.

[14] Reinaud (2008) also identifies "increases in prices of low emitting feedstocks (e.g. recycled scrap metal), lowering its consumption in non-carbon constrained countries; [and] lower unitary emissions in new vintages outside the region, as the constrained producers' process innovations may spill-over to other regions".

[15] United Nations Framework Convention on Climate Change Article 2.

[16] This assumes that countries with emissions caps keep to their obligations.

[17] United Nations Framework Convention on Climate Change Article 3.3.

[18] Dröge (2009) states that, "tool needs to be chosen taking into account the characteristics of an industry, including costs structures, international competition, technological status quo and potentially market structures – all determine the leakage potential".

[19] A third variant, sectoral approaches, has been raised which includes measures applied across borders, but these approaches either lack critical mass (binding sectoral emission agreements) or focus on encouraging mitigation action rather than addressing competitiveness and leakage problems (as in sectoral crediting mechanisms). For discussion see Stephenson (2009). Other policies can be used to ease competitiveness concerns but are unlikely to defuse them. These include enhanced access to emission credits (e.g. through CDM) or expanding and linking emissions trading schemes. Both are important policy options which lower the cost of reducing emissions (OECD, 2009b). However, access to credits does not, per se, "level the playing field". Firms are primarily concerned about competitors facing lower costs. The size of the differential is of secondary concern. Increased use of emissions trading schemes and linking them could be an important step towards and would ultimately lead to a world price for emissions which would defuse competitiveness concerns, but this is self evident and the focus here is on the issues that emerge during this transition.

[20] The Green Paper which led to the EU ETS (European Commission, 2000) stated in Article 7.2.2 that, "periodic auctioning is technically preferable [to allocation free of charge]", in that it "would give an equal and fair chance to all companies to acquire the allowances they want in a transparent manner", would apply the 'polluter pays' principle, would avoid "the need to take the difficult and politically delicate decisions about how much to give each company" and that "the complex issues raised ... about state aid and competition would largely disappear".

[21] Explaining its proposed directive amending the EU ETS for Phase 3 (European Commission, 2008), the EC stated that it, "believes that auctioning should be the basic principle for allocation from the third phase onwards" as it "best ensures the efficiency, transparency and simplicity of the system and creates the greatest incentive for investments in a low-carbon economy. It best complies with the 'polluter pays' principle and avoids giving

windfall profits to certain sectors that have passed on the notional cost of allowances to their customers despite receiving them for free".

[22] See also Howse (2009).

[23] This reduces the number of points of compliance that need to be monitored and minimises information requirements by targeting relatively homogeneous products and processes. The idea is that costs imposed upstream flow into the production chain and are reflected in prices of end-use goods and services.

[24] See for example Eurostar, a European train operator, whose "Tread Lighly" campaign includes the claim that all of their train journeys have been carbon neutral since 14 November 2007 (Eurostar, 2009).

[25] ERM's work is referenced as a case study on their web-site (http://www.erm.com/Analysis-and-Insight/Case-Studies/Case-Study-Tesco/, accessed 24 June 2009. Tesco's carbon labelling initiative is described in their "Carbon Labelling and Tesco" document, downloadable from their web pages on Greener Living (http://www.tesco.com/greenerliving/cutting_carbon_footprints/carbon_labelling.page?, accessed 24 June 2009). ERM's work was based on measuring a set of inputs and outputs (e.g. electricity consumption in particular countries, transport miles driven by vehicle type, quantities of steel and concrete used in construction) and then looking up the life cycle emissions associated with these within a specialised database. The database is populated with data from academic and research studies. The emissions factors it contains have uncertainty ranges and, depending on the source, differentiate by different technologies and production processes. Certain assumptions must be made, for example, about the electricity generating mix in a particular country. For electricity-intensive processes, the choice made at this point can fundamentally alter the emissions factor of the particular product. The majority of ERM's work used the Ecoinvent database, a product of Swiss institutes and departments (see http://www.ecoinvent.ch for more details).

[26] This quote appears in Burniaux et al (2008) but the numbers have been updated with slight changes using analytical results that will be available in a forthcoming OECD (2009b) book on the economics of climate change. Hence the dual reference for this single quote.

[27] There is an analogue for this in trade policy, which is the idea of "optimal tariffs" and strategic retaliation. However the comparison is not perfect and only applies for large economies.

[28] GATT (1970). "Border Tax Adjustments: Report of the Working Party adopted on 2 December 1970," (L/3464), paragraph 9.

[29] Ibid., paragraphs 14-15.

[30] The exception to this rule is the special case of the so-called Enabling Clause, which allows for special tariff preferences granted to developing countries on development grounds.

[31] Only a WTO Dispute Panel ruling can give a definitive answer on whether a border adjustment is legal. A ruling can only be made about a specific policy, and then only when it has been implemented and when a challenge against it has been raised.

[32] Interpretation of the conditions for Article XX exceptions is still in the process of evolution, so how it would apply to any particular measure is hard to predict. Based on what jurisprudence exists, however, it is possible to derive this indicative summary for non-technical readers.

[33] United States – Import Prohibitions of Certain Shrimp and Shrimp Products, Report of the Appellate Body, WT/DS58/AB/R, October 12, 1998, (hereinafter, Shrimp-Turtle AB Report), paragraphs 164, 180, 181.

[34] United States – Import Prohibitions of Certain Shrimp and Shrimp Products, Recourse to Article 21.5 by Malaysia, Report of the Panel, WT/DS58/RW, June 15, 2001, paragraph 144.

[35] This is not clear cut. The Shrimp-Turtle AB report is often credited for this principle, but in fact the finding was that treatment was arbitrary as the US pursued international negotiations with some members but not with others. US—Gasoline might also be read as requiring attempts at international agreement (paragraphs 27-28).

[36] Brazil – Measures Affecting Imports of Retreated Tyres, Report of the Appellate Body, WT/DS332/AB/R, December 3, 2007-Tyres, paragraphs 224-228.

[37] Hufbauer et al (2009) and Cosbey, Aaron. Border Carbon Adjustment. Trade and Climate Change Seminar, June 18-20, 2008, Copenhagen Denmark. International Institute for Sustainable Development.