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Greenhouse Gas Reduction Policies and Agriculture:

Implications for Production Incentives and International Trade Disciplines

Issue Brief No. 1



By David Blandford and Tim Josling
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ICTSD-IPC Platform on Climate Change, Agriculture and Trade



International Centre for Trade
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International
Food & Agricultural Trade
Policy Council



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ABBREVIATIONS AND ACRONYMS

AMS	aggregate measurement of support
AoA	Agreement on Agriculture
BTA	border tax adjustment
CAP	Common Agricultural Policy
CARB	California Air Resources Board
CODEX	Codex Alimentarius Commission
CT	cap and trade
EPA	Environmental Protection Agency
ETS	Emissions Trading Scheme
EU	European Union
EurepGAP	common European standard for farm management practice
GATT	General Agreement on Tariffs and Trade
GHG	greenhouse gas
GlobalGAP	Global Partnership for Good Agricultural Practice
GMO	genetically modified organism
IPPC	International Plant Protection Convention
ISO	International Organization for Standardization
MEA	Multilateral Environmental Agreement
MPS	market price support
MRV	monitoring, reporting and verifying
OIE	International Office for Epizootics
PPM	production and processing method
PS	product standard
SCM	Subsidies and Countervailing Measures Agreement
SPS	Sanitary and Phytosanitary Measures Agreement
TBT	Technical Barriers to Trade Agreement
USA	United States of America
WTO	World Trade Organization

FOREWORD

For countries seeking to design effective domestic or international climate change abating policy and incite mitigation, a solid understanding of the implications of greenhouse gas reduction policies for production incentives in agriculture and for international trade disciplines is imperative.

From nearly twenty years of analysis and inquiry into the impact of human activity on climate and the effects of climate change on specific regions and economic sectors, we now know - albeit not at the level of detail and depth we need – that significant changes to agricultural production and trade are to be expected. The questions of how policies adopted to address climate change may affect agricultural production and how they relate to international trade rules are equally important and are also in need of further research.

This paper addresses these issues and makes the case for international trade rules that enable - rather than serve as obstacles to - sound policies to reduce agricultural greenhouse gas emissions. It also calls for climate change policies that do not lead to further distortions of the international agricultural trade system.

The ICTSD–IPC Platform on Climate Change, Agriculture and Trade is pleased to release this paper, trusting that it will contribute to a better understanding of these complex linkages and their treatment in the current negotiations in the international climate change and trade fora.



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EXECUTIVE SUMMARY

Climate change and the instruments of policy that are emerging as a response to that phenomenon pose a multitude of challenges to the multilateral trade system. Both are likely to have an impact on agricultural production. There is also a potential for conflict with World Trade Organization (WTO) trade rules, both through the choice of policy instruments to address climate change and through the way in which governments react to pressures to avoid or deflect the costs of climate change mitigation and adaptation.

We assess the implications of domestic policies designed to reduce greenhouse gas (GHG) emissions from agriculture and to enhance the role of agriculture in GHG mitigation in the context of existing and future WTO disciplines. The following types of policies are examined: (1) performance standards, (2) best-practice requirements, (3) subsidies, (4) carbon taxes, (5) cap and trade (CT) schemes and (6) public expenditure for research and extension.

The impact of these policies on the competitive position of agriculture, and hence upon agricultural production and trade, is complex, particularly if combinations of policies are used. The effects depend on such factors as whether agriculture is the target of the policies or is affected by policies applied to other sectors; whether the policies generate private incentives to change production methods or the volume of output or whether this is generated solely by a publicly funded incentive; and whether the net effect is to create an incentive to increase agricultural output in the aggregate or to change its composition. In general, policies that restrict current activities (e.g. take land out of production) will have a depressing effect on production. Policies that subsidize particular practices will tend to encourage output.

In terms of the current policy debate, three key questions arise: (1) Should subsidies be used to promote the reduction of GHG emissions in agriculture or an expansion of its mitigation activities? (2) Should agriculture be included in CT schemes? And (3) should one continue to promote biofuels?

Rewarding beneficial climate change mitigation by agriculture is both possible and likely. The approach will probably combine best-practice promotion with the tailoring of existing subsidy systems to encourage change. Subsidies could be given for such practices as minimum tillage or the co-generation of on-farm bioenergy. Conservation payments could incorporate incentives for carbon sequestration. Although these could be challenged by foreign competitors, they would appear to be consistent with trade rules if they are part of a comprehensive environmental programme.

The main constraint from the viewpoint of trade rules is that, in order to qualify for the environmental component of the green box under the WTO Agreement on Agriculture (AoA), subsidies should be limited to the extra costs incurred by farmers. Tying current direct payments to sequestration or other beneficial aspects of farming activity may be subject to challenge, as they would almost certainly exceed the additional costs involved. Moreover, such a link would weaken the claim that the payments are unrelated to current production activity and hence trade-neutral. In other words, care has to be taken to ensure that climate change subsidies respect the criteria of the green box. Alternatively, the green-box criteria may need to be clarified in order to reflect desirable policy.

Including agriculture fully in a CT scheme poses a number of technical problems, including the fact that monitoring farming activities involves a large number of firms employing a wide diversity of technologies. Standard emission factors for crops and livestock production are not at present considered very reliable, although some experts view the uncertainties as being no greater than those in other sectors. Much of the domestic burden of the CT system is lifted if initial permits are given out rather than auctioned. Agriculture could argue for a significant free distribution of permits. This, combined with the ability to sell permits if emissions are reduced, would constitute a subsidy. Foreign competitors might challenge the subsidy element, particularly on export crops.

It is more likely, however, that the agricultural sector will not be required to obtain permits but will still be involved in a cap and trade market by being allowed to sell offsets to others. This also raises the issue of whether such provisions constitute subsidies. Farming practices that sequester carbon could benefit from such a scheme, although funds would be derived from the market for offsets rather than from the government in the form of permit allocation.

Climate change mitigation schemes at the national level will be enacted in the context of multilateral environmental agreements. Thus, the issue arises as to whether there should be a global obligation to incorporate agriculture in such schemes. Considering that the largest (and growing) share of agricultural greenhouse gas emissions occurs in developing countries, then for a global CT scheme to be both effective and fair, it must facilitate inclusion of developing country producers, despite the fact that they have limited ability to undertake monitoring, reporting and verifying (MRV).

The promotion of biofuels also raises questions in connection with climate change mitigation: the contribution of some biofuels (e.g. corn-based ethanol) to GHG reduction has been brought into question. Subsidies tied to specific uses of farm commodities have unintended consequences on food supplies and prices, and tying such subsidies to climate change goals is likely to confound an already confused situation.

Given these complexities, the aim should be to identify and address the positive and negative aspects of farming on atmospheric GHG concentrations that are uncontroversial and relatively easy to measure. Large-scale livestock enterprises are already potentially within the scope of Environmental Protection Agency (EPA) regulations that control emissions. Reforestation for improved sequestration could easily be given more encouragement within current conservation programmes. Co-generation of energy on farms is not difficult to reward, particularly if surplus energy can be transferred to the electricity grid. Greater emphasis on publicly funded research and development to foster lower GHG emissions in agricultural production systems or to increase sequestration could have important payoffs.

Domestic climate change legislation is constrained by international trade obligations, but a carefully crafted programme should not raise insuperable problems. It should be possible to devise domestic schemes that contribute to effective international action. However, an international consensus on what measures are likely to be effective is crucial for avoiding trade disputes. The move towards “decoupled” payments unrelated to price and current output has provided an opportunity for such a consensus. Recoupling these payments in such a way that climate change mitigation is encouraged without jeopardizing food security may be a constructive first step.

1. INTRODUCTION

Climate change legislation is currently being discussed in the Congress of the United States of America (USA). The extent to which agriculture will be included in the provisions is still under debate. Farm groups, concerned about a rise in input prices, want to ensure that the contribution that agriculture can make towards mitigation of climate change is recognized and rewarded. Meanwhile, the trade rules for agriculture in the World Trade Organization (WTO) are still under review in the Doha Round of trade talks. Subsidies to agriculture in industrial countries will need to be restrained if these talks reach a conclusion. It is therefore useful to consider the implications of policies designed to reduce greenhouse gas (GHG) emissions from agriculture and to enhance the role of agriculture in GHG mitigation in the context of existing and future WTO disciplines. The primary focus is on domestic policies that are likely to affect agriculture directly, although they may not be targeted exclusively at the sector.

This paper is composed of four main sections:

- a discussion of policy approaches to the reduction of GHG emissions from agricultural production and enhancement of the role of agriculture in GHG mitigation;
- an assessment of the potential implications of these policies for agricultural production incentives and for international trade;
- an analysis of the issues that may arise in the context of WTO constraints on subsidies and other rules that may influence the choice of policy instrument;
- a conclusion suggesting some of the more contentious farm policy and agricultural trade policy issues that may arise as countries pursue GHG reduction and other climate change policies.

2. POLICY APPROACHES TO THE ABATEMENT AND MITIGATION OF GHG EMISSIONS IN AGRICULTURE

Emissions of GHG (mainly methane, carbon dioxide and nitrous oxide) are generated throughout the entire food and agricultural supply and distribution system, from the production of agricultural inputs through to the final consumption of food products (e.g. the miles driven by shoppers to supermarkets).¹ The range of policies that can be used to address those emissions is also extensive. However, for the purposes of this study, our focus is on policies targeting emissions that are likely to have a direct effect on agricultural production.

Policy approaches that attempt to include agriculture in the abatement of GHG emissions and in GHG mitigation can take several forms. These include:

- reduction in the amount of GHG

emissions generated by agricultural crop and livestock production;

- absorption of emissions from agriculture and other sectors as a result of the process of photosynthesis and the storage of carbon in organic matter (sequestration);
- encouragement of production of crops that can aid the replacement of high GHG emitting products with potentially lower emitting products (e.g. biofuels);
- switching to alternative energy sources on farm that reduce reliance on carbon-based sources of energy (e.g. co-generation).

Agriculture may also be affected by policies that are multisectoral or economy-wide in their scope, such as cap and trade (CT) schemes or carbon taxes. Although the primary focus is on policies that are applied at the national level, some can be applied at the state and local levels.

In the following sections, we examine six categories of policy measures that are under active consideration in the USA and other countries:

- the imposition of performance standards for the agricultural and food sector
- the promotion of best-practice requirements for agriculture
- subsidies for the production and use of GHG-reducing energy sources
- carbon taxes
- CT schemes
- public support for agricultural research and extension aimed at reducing or mitigating GHG emissions.

2.1 The Imposition of Performance Standards

Performance standards are a direct way to regulate the emission of GHGs from agricultural enterprises. GHG emission standards could be specified for agricultural production processes, similar to the emission standards that target phosphorous, nitrogen or organic material in order to improve water quality. As with other forms of regulation, the effectiveness of this approach depends on the ability to monitor GHG emissions in agriculture and to impose penalty costs on those who exceed allowable standards. It is easier to achieve this for concentrated production operations, such as feedlots, which are point sources of pollution, rather than more diversified farming operations, which are non-point sources of pollution. As a result, this approach is likely to have limited application in agriculture.

It is possible to use other regulatory methods. Rather than regulating emissions directly, limitations may be imposed on the size of operations, such as the number of animals in a feedlot, or by imposing particular production requirements, for example methods for handling animal waste. This can be easier to enforce than the regulation of emissions, since it is simpler to verify that process standards are being applied than to monitor outputs from those processes. Consequently, process standards can be applied both to concentrated and to more diversified forms of production. In both cases, however, regulation is likely to be effective only if there are sanctions (costs) for producers who do not conform. In agriculture, it is often administratively (and politically) difficult to design regulatory systems that include adequate inspection requirements and sanctions for non-compliance.

2.2 Incentivizing Best-Practice Measures for Agriculture

Because of the challenges of using a regulatory approach in agriculture, the focus has often been on providing direct or indirect incentives for farmers to adopt changes in production practices that result in improved environmental outcomes. This has been the principal approach adopted in agri-environmental schemes in Europe and North America with respect to such aims as reducing water pollution or maintaining biodiversity. With respect to GHG emissions, the best-practice approach could be used to:

- change production practices in order to reduce agriculture's GHG emissions
- through the adoption of lower emission methods of crop or livestock production, for example by encouraging conversion from conventional to conservation tillage;²
- keep land out of agricultural production in order to avoid carbon emissions, for example through enrolling land in the Conservation Reserve Program in the USA;
- enhance carbon storage in trees and soils through tree planting.

The adoption of best-practice requirements by producers can occur under a range of circumstances conditioned by government

action and market forces:

- When the private return to adoption of the requirement exceeds its private cost in the absence of government action:

The adoption of best-practice requirements by producers can occur under a range of circumstances conditioned by government action and market forces.

This may apply because the practice requirement results in reduced input use or an increase in output (increased productivity of existing inputs)

in agricultural activities. Alternatively, the practice requirement may generate a new economic activity whose returns exceed its costs (e.g. the sale of wood from afforested land).

- When regulation creates a return to the adoption of a requirement: Thus, for example, input regulations (e.g. the use of animal manure) or environmental regulations (e.g. on water quality) may make it profitable to adopt alternative production practices in order to avoid the costs imposed by regulations (e.g. exceeding nitrogen concentration in ground or surface water). Note that such regulations could also be directed specifically towards the reduction of GHG emissions, such that farmers would adopt a new practice in order to reduce the costs associated with meeting a GHG emission standard.

- When the adoption of a practice is made profitable through the creation of property rights: Thus, for example, it might become profitable for farmers to adopt measures that lead to reduced GHG emissions or to sequester atmospheric carbon because a market is created for these (e.g. under a carbon trading scheme). The creation of property rights in this case is most likely due to the imposition of regulations on emissions or the expectation that such regulations will be imposed.
- When adoption is driven by direct government incentives: The imposition of practice requirements might be a condition for receiving other government benefits (e.g. direct payments that are intended to provide income support). Alternatively, practice requirements might be associated with specific financial incentives that are designed to promote the adoption of those requirements (e.g. payments under agri-environmental programmes or investment subsidies for equipment that reduces GHG emissions). Payments might be made to compensate producers for the additional costs of adopting a practice or to provide an additional incentive (a return above costs) to promote adoption. Incentive payments are likely to be needed if there are limited private benefits from adoption (e.g. the practice requirements do not result in a reduction in costs).

2.3 Subsidies for Producing and Using GHG-Reducing Energy Sources

Rather than providing incentives for changes in existing production practices, payments may be made to increase the output of products that are viewed to contribute to lower GHG emissions in the economy as a whole. Two examples of this are:

- the production of existing crops or alternative cellulosic feedstocks for the production of biofuels;
- the development of on-farm sources of

alternative energy (e.g. co-generation from biomass).

The emphasis in this case is on promoting the expansion of specific outputs, rather than a change in input use or production methods. Incentives can be provided through output subsidies (e.g. a subsidy per acre or per ton for the production of feedstock) or through investment subsidies (e.g. in co-generation equipment). Subsidies can also be provided indirectly through

energy use mandates, such as those applying to renewable energy or through consumption or blending mandates for biofuels.³ In markets where electricity prices are regulated, the price paid for farm-generated bioenergy could be set at a rate that provides an incentive to invest in on-farm generation and supply.

There has been considerable debate on whether the promotion of biofuels as alternative energy sources actually results in a net reduction in emissions of GHG (e.g. Wang et al. 2007). Particular controversy has surrounded the balance of GHG emissions associated with the use of corn for the production of ethanol, on account of the direct consumption of fossil fuels

that this involves and the possible indirect effect of opening up fresh land for corn production.

We should note that policies for the promotion of renewable energy that are not specific to agriculture are having an impact on the use of agricultural land in some countries. The principal example is the development of wind energy. This may reduce agricultural production through the use of land for wind turbines, access roads and power transmission facilities. It may also permit the intensification of production on remaining land if farmers, as landowners, realize an additional income stream from wind energy that can be used to invest in their agricultural operations.

2.4 Carbon Taxes

Most of the focus in agricultural policy tends to be on the provision of payments to farmers as a means of achieving various policy objectives. There is generally a reluctance to use taxes to achieve policy aims. This reluctance means that the full costs of agricultural activity may not be internalized, i.e. taken into account by farmers in production and resource allocation decisions. To the extent that GHG emissions contribute to climate change and climate change imposes costs on society as a whole, the failure to internalize these costs constitutes market failure. Carbon taxes are one way to internalize the costs so as to influence decision-making and resource allocation.

As far as agriculture is concerned, a significant issue is the potential impact of a carbon tax, i.e. the internalization of GHG emission costs through taxes on fossil-fuel energy sources (coal, natural gas, oil) on the profitability of the sector. Sectors that use such inputs (either directly or indirectly) most intensively would be most affected by this approach. Agriculture is a significant user of fossil fuels, not least through the natural gas that is a feedstock for fertilizer, but also through direct energy consumption in agricultural production.⁴ Without significant changes in input use, either through higher

efficiency in the use of fossil fuels or through the substitution of “green” alternatives for fossil-fuel inputs, agriculture’s costs would rise. Cost increases would be felt by the consumers of agricultural products through higher prices, and by farmers through lower profits. Given the price inelasticity of the demand for food in the aggregate, extra costs would be borne primarily by consumers, but there could be important redistributive impacts within the agricultural sector.⁵ High fossil-fuel-using activities that are prone to substitution effects in consumption would likely experience a decline in demand and would become less profitable.

The net impact of carbon taxes on GHG emissions for the economy as a whole, and in agriculture, depends on how the revenues from the taxes are used. If taxation revenue is redistributed in ways that promote consumption of high-fossil-fuel products or activities, then the impact of taxes on mitigation objectives may be diluted. In such a case, the income effect of the distribution of the tax revenue would offset the

The net impact of carbon taxes on GHG emissions for the economy as a whole, and in agriculture, depends on how the revenues from the taxes are used.

substitution effects of a change in relative prices. Conversely, if the tax revenue is distributed in such a way that it promotes the consumption of low-carbon products, or directly promotes conservation or reductions in carbon usage, then the effects of the tax may be amplified. From this perspective, expenditure on the development and adoption of new low carbon technologies or a shift in consumption from traditional to “green” products could moderate the impact of carbon taxes on agriculture.

A more direct approach to the reduction of GHG emissions in agriculture would be to impose output taxes that reflect the contribution of specific sectoral activities to emissions. Thus,

for example, livestock production has been identified as particularly problematic in its contribution to GHG emissions in agriculture (FAO 2006). Methane produced by ruminants is estimated to be over 20 times more potent on a volume-for-volume basis than carbon dioxide in terms of global warming. If this were to be reflected in livestock production, then prices of beef and dairy products, for example, would be substantially higher than in a free market (in the absence of any offsetting changes in technology). GHG taxes on output could significantly alter the pattern of production, particularly for products that are associated with high methane emissions (paddy rice is the major crop in this regard).

2.5 Cap and Trade Schemes

Most of the discussion of abatement strategies in the context of GHG emissions has been on CT schemes rather than carbon taxes. The political preference is for establishing emission limits rather than influencing behaviour through taxes. CT schemes require that a limit be placed on the total volume of GHG emissions. Firms can then buy and sell permits to emit. Initial emission allowances can be distributed to firms without cost or auctioned off to the highest bidder (or a combination of these methods can be used). Provided that the cap is binding, the former yields a windfall gain to firms and the latter results in revenue for taxpayers. To be effective, CT schemes require that compliance with emission permits be monitored. Because of the need for emissions to be limited under CT schemes, these typically require government intervention, for example the European Emissions Trading Scheme (ETS). However, there is one private scheme operated through the Chicago Carbon Exchange, where no government-imposed cap exists. In that case, participation is driven by pressure from shareholders, customers and citizens, as well as by expectations of future regulation.

There are several possible implications of CT schemes for agriculture. A key issue is whether

agriculture’s GHG emissions are included in the cap and whether its emissions would be subject to limitations. If that is the case, then farmers might be subject to the same windfall gain from the allocation of GHG entitlements as other firms. Farmers are provided with an additional asset (the emission permit) that has a market value. If they are able to reduce their emissions below their allowable limit, then the sale of unused permits yields additional income. If they are not able to do this, then the need to obtain additional permits turns CT schemes into an additional cost of production as the CT scheme acts to internalize the external costs of emissions (provided that compliance with the cap can be monitored effectively).

As in the case of carbon taxes, CT schemes can also impose additional costs on agriculture indirectly. For example, emissions from industries supplying agriculture with inputs (energy, chemicals, machinery) might be constrained through CT schemes. In that case, the cost of inputs will rise. If farmers are not able

A key issue is whether agriculture’s GHG emissions are included in the cap and whether its emissions would be subject to limitations.

to realize productivity gains, such that the use of inputs per unit of output falls, then their costs of production will increase and their profits will decline. This is a necessary implication of internalizing the cost of emissions as the entire cost structure of the economy adjusts.

Agriculture can benefit from CT schemes even if its emissions are not included in the cap. Agricultural producers may be allowed to offer carbon credits (offsets) resulting from carbon sequestration or other GHG-reduction activities to firms subject to emission reductions. Firms

could meet their reduction requirements in part by purchasing such offsets. Farmers might be able to realize revenues from producing biomass (e.g. planting trees) or reducing methane emissions from livestock by using manure digesters to produce biogas for electricity production. In such cases there can be two revenue streams: one from selling the initial GHG reduction credit and a second from the sale of related products (e.g. wood or energy). This dual revenue stream argument has been used to try to attract farmers to participate in the Chicago Climate Exchange scheme.

2.6 Public Support for Research and Extension Aimed at Reducing GHG Emissions in Agriculture

Public research and extension can be directed at improving animal feed use, nutrient digestion, carbon sequestration and other approaches to GHG reduction and remediation. Such research can increase the supply of new technologies that can be adopted by farmers with the aim of reducing GHG emissions from agriculture or enhancing its role in carbon capture. However, it is important to note that research that is not targeted directly to these aims but that results in productivity gains (higher output per unit of input) can also result in a relative, if not an absolute, reduction in GHG emissions. Research that results in the more efficient use of inputs whose production involves significant emissions (e.g. fertilizer, agro-chemicals or energy) can have a particularly significant impact. Indeed, to focus on absolute reductions in GHG emissions from agriculture runs the risk of conflicting with food security goals. The more useful metric in

this case may be GHG emissions per unit of food output: reductions in this measure would avoid such a clash of objectives. Productivity gains on existing arable land also contribute to climate change mitigation, since they reduce pressure to convert land from other uses, for example forests.

Public support for research and training in connection with GHG emissions rests on the same premise that underlies using public funds to enhance investment in all agricultural activities that are viewed to have a significant public good dimension. In this case, the perceived gains to society extend beyond the impact of productivity improvements on the cost of food, to perceived social benefits from reductions in GHG emissions through reduced global warming and less disruptive changes in climate.

2.7 Private versus Public Incentives and GHG Remediation

An important issue is the extent to which GHG remediation in agriculture can result from market incentives or whether it will be adopted only as the result of government actions. For private incentives to be the primary driver, a private market for the GHG-reducing output must already exist or can easily be created. Thus, for example, co-

generation through the use of alternative fuels may result naturally if the technology exists for farmers to substitute new sources of energy (e.g. electricity generated from biogas) for a conventional supply of electricity from the power grid or if producers perceive that they can exploit a profitable new activity by delivering

co-generated electricity to the grid. Neither of these necessarily requires any government action, but the rate of adoption may be influenced by government efforts to increase the supply of co-generation technology or its diffusion. Adoption will be driven primarily by whether the returns to on-farm energy production exceed its costs.

Similarly, limitations on GHG emissions outside agriculture can create property rights in the sector in the form of options for reducing its own emissions or to sequester carbon emitted by others. In addition, the balance of incentives may be affected by other government policies,

for example restrictions on the application of animal waste to cropland that make it desirable to find alternative methods for disposing of that waste. In that case, the private benefits that result from having an alternative use (higher livestock production) must be added to the value of the electricity produced in determining the incentive to adopt.

An important issue is the extent to which GHG remediation in agriculture can result from market incentives or whether it will be adopted only as the result of government actions.

3. PRODUCTION INCENTIVES AND TRADE EFFECTS OF POLICY INSTRUMENTS

The impact of GHG policies on the competitive position of agriculture and hence upon agricultural production and trade is complex. The effects depend on such factors as whether agriculture is the target of the policies or is affected by policies applied to other sectors; whether the policies generate private incentives to change production methods or the volume of output or whether this is solely generated by a publicly funded incentive; and whether the net effect of the policy is to create an incentive to increase agricultural output in the aggregate or to change its composition. In general, policies that restrict current activities (e.g. take land out of production via subsidies for sequestration) will have a depressing effect on production. Policies that subsidize particular practices will tend to encourage output. Even if the product is not ultimately destined for agricultural markets (e.g. bioethanol), its production will influence those markets. Improvements in animal nutrition could increase output, as could best practices in tillage, although subsidies for sequestration could possibly lower output levels if they led to less intensive land use.

Determining the net effect of GHG policies on production and trade is even more problematic when multiple policy instruments are applied. Since GHG emissions are not solely an issue in agriculture but are economy-wide, it is likely that

some combination of sectoral and economy-wide policies will be applied, with potentially offsetting influences on agricultural production. Thus, for example, measures to change production techniques in agriculture or to shift production towards preferred crops may serve to enhance production, whereas economy-wide carbon taxes would likely have the opposite effect. Although the internalization of the full costs of production would probably act as a production disincentive in the aggregate, it may not have that effect for individual marketable agricultural commodities. The determination of impact could be made only by examining the specifics of the policy in place and their relationship to output incentives and methods of production at the farm level.

Considering the requirement to double food production by 2050 in order to meet the needs of an expanding global population, a better understanding of the impacts not only of climate change itself but also of potential climate change policies on food production is critically important. Pursuing climate change mitigation without regard to food security is not sensible for obvious reasons. The great challenge facing agriculture is to identify effective mitigation measures that do not negatively impact, or can even contribute positively to, agricultural productivity.

4. CLIMATE CHANGE POLICY AND WTO RULES

Climate change, or at least the instruments of policy that are emerging as a response to that event, poses a multitude of challenges to the multilateral trade system. At the broadest level, an open trading system is perhaps the best guarantee against severe disruptions to economic activity as a result of climate change. As different agricultural regions face higher or lower temperatures, rainfall and other climatic changes trade will compensate for local supply disruptions. If droughts and floods are more common, then assistance flowing through established trade channels will be available more quickly. Therefore, steps such as the completion of the Doha Round of WTO negotiations make good sense even in the context of concerns over climate change.

At this broad level, the main concern is to avoid any adversarial positions that might cast the trade system as inhibiting the ability of countries to respond in ways that they see as sensible.⁶ With respect to agricultural subsidies, this is even more critical, as the domestic politics of incorporating that sector into climate change policy could well

prevail over the sensitivities of trade partners. The discussion in the first section of this paper categorizes policy response, at least in the area of agricultural production, as a choice between the establishment of performance standards, a best-practices approach to incentivize reduction and mitigation, the use of subsidies and taxes to provide an incentive to changes in fuel use and GHG emissions, the establishment of ceilings with the possibility of trading emission certificates, and the encouragement of research on ways to lower emissions or enhance sequestration. The potential clash with WTO trade rules comes both in the choice of instrument and in the way in which governments react to pressures to avoid or deflect the costs of climate change mitigation and adaptation. This section will consider these broad choices and their possible conflicts with WTO rules.

The potential clash with WTO trade rules comes both in the choice of instrument and in the way in which governments react to pressures to avoid or deflect the costs of climate change mitigation and adaptation.

4.1 Performance Standards

Mandatory performance standards (alternatively referred to as technical regulations) are a familiar issue in trade relations and are accommodated in both multilateral and regional or bilateral trade agreements. As technical regulations imposed on domestic producers tend to increase production costs, they do not in general cause concern among competing countries. This would be true in the case of agriculture. If the mandatory standard relates, say, to emissions from a particular process (livestock feeding practices or the use of fertilizer in crop production), then competing producers in other countries are unlikely to be harmed; but if the performance standard is accompanied by subsidies, then a trade issue could arise. Subsidies in compensation for the additional cost of meeting the standards are discussed below.

Different issues are raised if a link is established between domestic standards and those applied to traded goods. Normally, exporters expect to have to meet the standards of the importing country. These standards can be expressed in terms of product characteristics (product standards, PS) or of production and processing methods (PPMs). The implementation of PPMs on traded goods is problematic, as the importing country will not in general be able to verify conformity.⁷ Moreover, not only does the trade nomenclature generally not distinguish among products based on method of production or processing, but also WTO agreements (such as the Technical Barriers to Trade Agreement (TBT), discussed further below) do not allow for differential treatment of like products, i.e. where production methods do not result in observable differences in the final

shipped product. So, trade conflicts arise when unverifiable technical requirements or standards are imposed on imports.

Imposing process standards on imports is an issue with a long history in the General Agreement on Tariffs and Trade (GATT)/WTO and one that is still not fully resolved (Josling et al. 2004).

Identifying goods according to the use of energy in the production and processing, with the aim of favouring those that have a smaller carbon emission history, will challenge normal customs procedures and could lead to trade disputes.

Climate change standards are likely to rekindle many of the old controversies regarding process standards. Identifying goods according to the use of energy in the production and processing, with the aim of favouring those that have a smaller carbon emission history, will challenge normal customs procedures and could lead to trade disputes.

The WTO, through its incorporation of the GATT (1994), includes a “general exceptions” provision (Article XX) that allows considerable scope to governments in imposing trade restrictions to support domestic objectives. Among those objectives are health and safety (for human, crop and livestock populations), public morals and environmental preservation. The somewhat cryptic provisions of Article XX have subsequently been elaborated, first in the Standards Code that emerged from the Tokyo Round and later by the TBT and the Sanitary and Phytosanitary Measures Agreement (SPS) from the Uruguay Round.⁸ Any measure that

is justified on grounds of health and safety falls under the scope of the SPS; other regulations fall essentially within the purview of the TBT.

Issues that fall within the TBT are discussed in the TBT Committee. This body provides a valuable place to examine the legitimacy of standards and other measures (such as labelling) that are common instruments in climate change legislation. The criteria used to examine these measures are whether they constitute unnecessary barriers to trade, taking into account the legitimate objectives of the policy, and the implications of not applying the measures.

Most of the technical regulations that have been discussed in the TBT Committee have dealt with non-agricultural measures – fuel economy standards for cars, eco-design requirements for energy-saving appliances, and emission limits for diesel engines. The links with agriculture have not been emphasized, although clearly as a major user of agricultural machinery and transport services the connection is apparent. Domestic political sensitivities have so far prevented widespread application of industrial standards to agricultural production; but as this sensitivity is replaced by effectiveness and equity considerations, such standards are likely to spread to agriculture. Moreover, some 37 measures have been notified since 2000 on biofuels alone by 20 WTO members (see <http://www.wto.org>), and it is likely that this may signal a trend to formulate similar measures with regard to agricultural production.

4.2 Incentivizing Best Practices

A best-practices approach to climate change mitigation would seem ostensibly to pose no particular conflict with WTO rules. Trade rules focus on actions by governments that injure other parties through discrimination against, or unfair treatment of, their products or services. Adoption of best practices in one country, in the form of conservation tillage or the use of alternative energy, is not likely to have a negative

impact on the international competitive position of agriculture in other countries, unless these practices have a significant output-enhancing effect. Encouragement to switch to forestry or to sequester carbon in other ways will also tend to be in the interests of other agricultural producers.

Clearly the key question with regard to the trade policy implications of best practices is: what

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incentives are given to farms and businesses to adopt those practices? As discussed above, market opportunities may emerge to encourage changes in production and processing methods. More problematic is adoption stimulated by public policy. Thus, for example, a subsidy (or tax relief) designed to encourage the use of minimum tillage could potentially be challenged by other countries. If the subsidy were to be given to agricultural producers, then it would probably be covered by the AoA. If it can be shown to have a significant output-enhancing effect, then it might also be covered under the Subsidies and Countervailing Measures Agreement (SCM). The issue of where in the categories of agricultural subsidies such incentives might fall (i.e. in which boxes they would have to be notified) or whether they might be subject to the SCM is considered further below.

An instrument increasingly used in agriculture is that of cross-compliance (i.e. conformity with various regulations) as a pre-condition for receiving subsidies or direct payments. Thus, for example, EU single farm payments have now consolidated the compensation payments given to grain and livestock producers, as well as other direct payments from reforms in the Common Agricultural Policy (CAP), into one payment. To receive that payment, farmers have to maintain land according to good agricultural practices and to meet certain environmental standards. Cross-compliance may involve extra costs, so one could make the case that the direct payment provides compensation for those costs. But in the case of the CAP, there is no pretence of a link between the amount of the payment and the costs of compliance. The possibility of loss of the payment virtually assures compliance with the environmental regulations at issue (providing that compliance is monitored and sanctions are actually enforced). However, most of the cross-compliance obligations do not contain specific environmental objectives defined in terms of measurable outcomes or targets. In the absence

of such targets, one would expect verification difficulties as well as incentives to abuse the regulations.

Although individual producers and processors can voluntarily adopt good practices, their main attraction comes when buyers demand these as a way to ensure quality and safety as well as other attributes, such as “climate-friendliness”. These become, in effect, collective standards promoted by the private sector. Among the more recent developments in best practices for the food and agricultural sector are specific management codes typically promoted by processors and retailers in order to increase the acceptability

Among the more recent developments in best practices for the food and agricultural sector are specific management codes typically promoted by processors and retailers in order to increase the acceptability of supplies to consumers.⁹

of supplies to consumers.⁹ The focus of these standards has been on “pre-farm-gate” processes, and their application makes use of independent certification bodies. To the extent that consumers insist on (or are prepared to pay a premium for) goods with a smaller “carbon footprint”, one might expect that such best-practice requirements will spread.¹⁰

The goal of best-practice codes is for all supplying businesses to meet process standards, regardless of their location. In the case of global-warming policies, such codes might tend to conform to the requirements of the country having the highest level of climate-friendliness, on the assumption that adopting that code would necessarily meet the requirements of other countries. This potential outcome could become contentious and have important trade consequences. As a parallel example, a best-practice code specifying zero tolerance for genetically modified organisms (GMOs) would directly conflict with the WTO’s rulings under the SPS and could be a substantial barrier to technological change.

The use of collective private sector international standards has increased dramatically in recent

years (Charnovitz et al. 2008). The International Organization for Standardization (ISO; <http://www.iso.org>) is the principal global player in the establishment of guidelines for the establishment of private sector standards. With a membership of national standards institutes and private standards bodies from 157 countries, it aims to bridge the gap between the private and the public sectors.¹¹ The ISO standards are designed to be consistent with, and to facilitate compliance with, multilateral rules in the SPS and TBT. But in contrast to the three multilateral standard-setting bodies in the area of agriculture – the Codex Alimentarius Commission (CODEX), the International Plant Protection Convention (IPPC) and the International Office for Epizootics (OIE) – the ISO is not specifically mentioned in the WTO SPS.¹² However, with widespread acceptance of ISO quality-management standards and the

increased importance of global environmental regulations in international agri-food trade, the ISO has become an important part of the global standards environment (Knutson and Josling 2009).

The ISO has adopted four standards that involve requirements for quantifying and reporting GHG emissions, including lifecycle assessments. These standards do not apply specifically to particular products but are concerned with assessment procedures. But there is little doubt that further standards will be agreed and that these will have a more direct bearing on agricultural production. As ISO standards are not mandatory, they pose an interesting dilemma for governments. Should they encourage firms to adhere to these standards even if they cross the boundary lines established by the TBT?

4.3 Subsidies for Reducing GHG Emissions

Perhaps the most likely area of conflict with WTO rules relates to subsidies. The treatment of subsidies in the WTO has a complex legal history built on the experience of the GATT. Subsidies are not necessarily inconsistent with the articles of the GATT/WTO, but they are closely circumscribed. In so far as climate change policy involves actions at the border, the provisions of the GATT are relevant, particularly those that guard against discrimination among suppliers or counter actions against imports in general. The main part of the WTO that deals with subsidies is the SCM, negotiated in the Uruguay Round. For agricultural products, there are further disciplines in the AoA.

The SCM gives a legal definition of the term “subsidy”. According to the SCM, a subsidy must have three basic elements:¹³

- It must entail a financial contribution.
- It must be made by a government or any public body within the territory of a Member.
- It must confer a benefit.

However, even if a measure qualifies as a subsidy under the SCM, it is not subject

to the full disciplines of the SCM unless it is a specific subsidy.¹⁴ Specific subsidies are divided further into two categories: those that are prohibited and those that are allowed, subject to constraints. Two types of subsidy are prohibited: export incentive subsidies that are contingent on export performance, and local content subsidies granted for use of domestic inputs over imported goods. Other subsidies are deemed “actionable” in that they are potentially subject to challenge. The SCM provides a clear process through which actionable subsidies are identified. A WTO member can initiate remedial measures if it can prove that non-prohibited actionable subsidies cause serious prejudice to its interests. Serious prejudice may arise where one or more of the following apply: displaced imports into the market of the subsidizing country; displaced exports to third country markets as a result of the subsidy; significant price suppression as a result of the subsidy; and an increase in world market share by the subsidizing country.¹⁵

In addition to a challenge based on serious prejudice, a subsidy can be countervailed if

it causes injury to domestic producers. Such injury could also trigger other safeguard actions under Article XIX of the GATT. European biodiesel makers have, for instance, attempted to show that US producers were causing them harm through allegedly subsidized exports of B99 fuel eligible for a \$1 per gallon domestic tax credit (so-called “splash and dash” trade). Less likely, although still plausible, is the possibility of challenge under the “nullification or impairment” conditions (Article XXIII): a country could argue that ethanol subsidies were unexpected at the time when tariff schedules were agreed and that benefits accruing to it directly or indirectly under WTO agreements are being nullified or impaired.

To evaluate agricultural subsidies introduced for climate change mitigation under the SCM, the following questions would need to be addressed:

- Could the policy be classified as a “specific” subsidy and hence be covered by the SCM? A policy that conferred general benefits for the economy as a whole would not be specific, but subsidies to farmers that followed certain husbandry practices would seem to qualify. Hence, it is likely that the political imperatives that would single out categories of farmers for climate change subsidies would also tend to make those subsidies specific. If the subsidies were part of a broader climate change programme (e.g. subsidies for the use of alternative energy), then they might escape that definition.
- Could it be classified as a “prohibited” subsidy, dependent on exporting or favouring domestic over imported products? It seems unlikely that specific subsidies connected with climate change would be conditional on exports. The products themselves might be exported, but the subsidy would be given for similar goods sold on the domestic market. The more likely situation would be that the subsidy would be given conditional on the use of domestic inputs. Subsidies for

using alternative energy would need to avoid the charge that imported energy sources were being affected adversely.¹⁶

- Could it be considered an “actionable” subsidy, causing adverse effects to other WTO members? All agricultural subsidies will tend to cause adverse effects for competing producers. However, as was discussed above, the output effects of various types of climate change subsidy will vary widely. Subsidies for sequestering carbon are unlikely to have a production-enhancing effect, although they may in some cases reduce production costs. But a subsidy that compensates for the cost of GHG abatement may well have a significant impact on others competing in the marketplace.

The definition of a subsidy falling within the scope of the AoA is contained in Article 6, which refers to “all of [a Member’s] domestic support measures in favour of agricultural producers”. These subsidies are divided into distinct categories notionally representing a different potential to distort trade (Orden et al., forthcoming). The AoA exempts two categories of domestic support measures from any commitments for expenditure restraints. First, some measures are considered at most minimally trade distorting (green box). The measures included in this category, under specific criteria delineated in the AoA, are judged to serve a broad public good and to be decoupled from production and prices. By leaving the levels of support under green box measures unconstrained, the AoA by design encourages countries to adopt policies that fit into this category. A second category of measures excluded from any commitment to limit the level of support includes potentially trade-distorting payments under production-limiting programmes (blue box). Criteria specified in the AoA for these measures relate to fixed area, yields and head of livestock and the level of production on which payments are made relative to a base level.¹⁷

Remaining measures fall into a third category (often called the amber box) of interventions and

subsidies in output or input markets. Among these measures are certain production-related payments to farmers. Also included is market price support (MPS) measured specifically by the gap between “a fixed external reference price and the applied administered price” multiplied by the eligible quantity of production (WTO 1995). The sum of this trade-distorting support, the current total aggregate measurement of support (AMS), is subject to the ceiling commitment.¹⁸

In which box would climate change mitigation subsidies to agriculture fall? The green box is defined in considerable detail in the AoA (Annex 2). The Annex includes both general criteria that

In which box would climate change mitigation subsidies to agriculture fall?

all exempt payments must satisfy, and specific criteria for individual payment types. The overarching requirement is that

green box payments should have “no, or at most minimal trade-distorting effects or effects on production” (Paragraph 1). Three general criteria are specified as a way of meeting this requirement:

- Support should be provided through a publicly funded government programme.
- Support should not involve transfers from consumers.
- The measures should not provide price support to producers.

The restriction that a payment be publicly funded reflects the need to exclude transfers generated from consumers through the market, by raising output prices, or as a result of reducing input costs. Subsidies for climate change mitigation if no border instruments are used would seem to qualify under these criteria. A strict interpretation of the remaining general condition would cast doubt on the green box conformity of government schemes that result in the creation of a market for a previously unpriced service, such as carbon sequestration. However, the concept of “price support” might be interpreted to mean support of the price of the agricultural product. This price could even go down if payments for previously unpriced

services became available.¹⁹ This exception aside, most climate change subsidies are likely to fall clearly within the boundaries of the general conditions for the green box.

Among the particular types of subsidy defined in Annex 2, the one that is most likely to be used in any green box defence is that related to environmental programmes. The payments are not, however, unrestricted. To be eligible for inclusion in the green box, the payments must be part of a clearly defined environmental or conservation programme with specific conditions, including those related to production methods or inputs. Moreover, the amount of payment is limited to the extra costs or loss of income involved in complying with the programme. Therefore, payments for sequestration would be allowed under a clearly defined environmental programme (presumably climate change legislation would qualify) if they compensated farmers for the cost of such actions. This would certainly serve to remove the disincentive to participate, but it is possible that overcompensation for costs may in fact be necessary to ensure sufficient participation in a programme. That could make the payments potentially subject to challenge.

Subsidies for the production of biofuels and their incorporation into gasoline and diesel appear to pose further challenges for WTO rules on agricultural trade and policy (Howse et al. 2006). Symptomatic of the uncertainty is a lack of agreement on whether biofuels are covered by rules relating to agricultural products or whether they are industrial products and thus covered by other rules. If biofuels are to be considered agricultural in nature, then subsidies designed to promote their production should be notified to the WTO as such and may be subject to limitations under the terms of the AoA. If not, they would still have to be notified but would be subject to the SCM (Josling and Blandford 2008).²⁰

Subsidies for the production of biofuels and their incorporation into gasoline and diesel appear to pose further challenges for WTO rules on agricultural trade and policy.

If biofuel subsidies are counted as agricultural subsidies, then the issue arises as to whether they should be notified as trade-distorting (under the amber box) or as trade-neutral (under the green box). Some biofuel subsidies could be considered as providing indirect support to the producers of feedstock, mainly corn and oilseeds, and as such would be “coupled” to production. This would place the subsidies in the trade-distorting category

and they would fall under the amber box disciplines of the AoA.²¹ But others might be consistent with those classified as minimally trade-distorting, for example if the feedstock was a waste product or cellulosic material that is not a “marketable agricultural product”. In that case, biofuel subsidies could fit within the green box, as currently defined or one that might emerge from a negotiated modification.

4.4 Taxes on Carbon Emissions

Taxes applying to domestic producers rarely provoke challenges from competitive exporters. And, although importers may be the losers from such a cost-increasing tax, the avenues for complaining about such trade distortions are few. In general, this accentuates the asymmetry of the trade rules, which constrain the behaviour of governments of importing countries to a much greater extent than that of exporting countries (Mitra and Josling 2009).

replacement. The economic rationale is stronger if it is assumed that other countries were applying appropriate taxes on their producers. A border tax will act against the tax policy by reducing its effectiveness. Indeed, one could argue for an import subsidy as a complement to the domestic producer tax.

Even this analysis is inadequate when the taxes concerned are applied widely across the economy. A carbon tax would be such a broad-based tax and raise issues similar to sales taxes or value added taxes. Under such conditions, BTAs are justified to prevent distortions to international trade as a result of the incidence of these taxes. If industries are taxed at the point of production (the origin principle), then a country’s exports will be burdened and imports encouraged unless imports face the same tax and exports are taxed in the country of destination.²³ BTAs are consistent with WTO rules, although their implementation could still cause problems.²⁴ President Obama has recently indicated that he wishes to avoid potential clashes with trade rules when developing US climate change legislation. In addition, retaliation by other countries would be virtually assured. Whether the US Congress will follow a cautious path remains to be seen. When trade policies are based on superficially attractive politics but shaky economics, the scope for conflicts is enlarged.

Taxes on domestic producers can pose a challenge to trade rules when they are accompanied by border tax adjustments (BTAs) or other devices to offset the apparent competitive impacts of the domestic taxes. The political logic of granting domestic producers relief from competing with

foreign firms that do not have the burden of the tax is compelling. The economic rationale is more elusive. If the domestic

industry is being taxed to reduce the use of fossil fuels or the emission of GHG, then imports of competing goods from other countries with similar technologies will not help to achieve those objectives.²² This is often called “carbon leakage”. It could be argued that such a policy merely redistributes production of the good in question and does not achieve the broader global aim of GHG reduction or fossil fuel

The political logic of granting domestic producers relief from competing with foreign firms that do not have the burden of the tax is compelling.

4.5 Cap and Trade Schemes

The link between CT systems and trade rules is of more immediate relevance. Emissions-trading systems are already in place in Europe and Australia and are being discussed for many other countries. It is not the imposition of the cap on emissions, which would normally give foreign competitors an advantage, that causes trade problems but the response of the government to requests by domestic producers to “level the playing field”. There are two key aspects of the administration of the policy that can adversely influence trade partners. The first issue is the terms of the allocation of the permits to the sectors that require them: free distribution of a portion of the permits may be considered by competitors to be a subsidy to those firms that receive them. The second issue is whether firms exporting to the country operating the CT scheme require permits themselves.

Consideration of the legislation currently (June 2009) before the US Congress underlines these choices. Several of the bills that were under consideration specifically called for firms supplying imports to the USA to have permits (issued in their own countries) to avoid

undercutting US firms (Hufbauer et al. 2009). The bill that was approved by the House Energy and Commerce Committee (the American Clean Energy and Security Act of 2009) allows for the possibility of border taxes at a later date (after 2020) but calls for the negotiation of binding emission reductions with other countries before that time. It also provides for international reserve allowances (to begin after 2025) that would be required for imported inputs of raw materials (agriculture is not specifically mentioned) to avoid carbon leakage.

CT schemes also raise subsidy concerns. A free allocation of permits would be considered a subsidy and subject to an evaluation as outlined in the section on subsidies. With regard to offsets, it is less clear that funds from the sale of offsets from a carbon sequestration activity would be considered as a subsidy. As mentioned above, the WTO SCM Agreement defines a subsidy as a financial benefit that comes from a governmental or public entity; whether leaving the operation of the carbon market to the private sector makes the offset mechanism less of a subsidy remains to be resolved.

4.6 Research and Extension

Research on the ways in which agricultural production methods can be improved in the interests of climate change mitigation is generally considered to be a positive activity. Agricultural research, in general, is viewed to have a high payoff to society and is often the object of public funding. Moreover, as much of the outcome of the research is likely to enter the public domain, overseas firms and farms can usually make use of the research. In the AoA, the spending of funds for agricultural research and extension comes under the heading of “general services” in the green box (Annex 2, Paragraph 2(a)), and research for environmental purposes is mentioned specifically.

However, the treatment of research expenditure under the SCM is not so accommodating. The

SCM itself exempted research expenditure from the category of actionable subsidies for an initial period of five years. The exception was not renewed in 2000 and hence such expenditures are now actionable. It has been established that agricultural subsidies are governed by both the AoA and the SCM, since the expiry of the Peace Clause under the Uruguay Agreement in 2003. Inclusion of a subsidy in the green box has a direct benefit to the country in that it is excluded from the AMS and hence from reduction commitments. But such subsidies are still actionable under the SCM. Therefore, research subsidies that were viewed to grant commercial advantage to particular firms or parts of the agricultural and food sector could potentially be challenged in the WTO.

5. US AGRICULTURE AND CLIMATE CHANGE LEGISLATION

The debate on the incorporation of agriculture in a CT system is still in its infancy. For some years, agricultural politicians and lobby groups have attempted to take a defensive approach: to ensure

The debate revolves around the ability of agriculture to sell “offsets” to other sectors based on their own abatement efforts and on carbon sequestration.

that the sector would not be burdened with more restrictions in addition to other environmental and conservation regulations. Some people may still believe that agriculture can sit on the sidelines

and be exempted from GHG emission policies, but this seems unlikely. Indeed, the focus of agricultural groups has changed to one of proactive examination of how best to position the sector to benefit from climate change legislation. The debate revolves around the ability of agriculture to sell “offsets” to other sectors based on their own abatement efforts and on carbon sequestration.

are in place and subsidies for alternative fuels from biomass have spawned a significant domestic ethanol industry. States are ahead of the Federal government in many respects: the California Air Resources Board (CARB) recently agreed on a low-carbon standard for fuel in that state, and at least 11 other states may follow suit.

This change in approach has been given a boost by Secretary of Agriculture Vilsack, who has speculated that agriculture may be wise to agree to tie future direct payments to climate change mitigation (or accept a decrease in direct payments in exchange for climate change mitigation payments under CT). At present, US direct payments lack any rationale other than maintaining income flows to producers of a handful of crops in a way that is consistent with the green box.²⁵ Although the idea has not attracted much visible support from the agricultural community, the underlying message – that direct payments are vulnerable in times of fiscal frugality – has been absorbed.

Adding to the urgency is the recent decision by the Environmental Protection Agency (EPA) that GHG emission is a hazard to health. This means that under the Clean Air Act the EPA is empowered to take action to reduce emissions. Congress will certainly wish to wrest the initiative back from a Federal agency in controlling GHG emissions; and an upcoming intergovernmental meeting in Copenhagen in December 2009 will be a test of whether the USA can join other countries in collective action in facing what is a truly a global problem.

So, how might the farming sector fare under climate change legislation? The EPA issues periodic “inventories” that highlight the contribution of particular sectors to GHG emissions. Agriculture and forestry taken as a sector have a positive balance: more carbon is sequestered (taken out of the atmosphere and stored) than is released. But this favourable balance masks an uneven distribution: forestry is the main carbon sink whereas agriculture is a significant emitter of GHG. Livestock production and fertilizer use emit methane, a GHG, and cultivation and harvesting of crops use energy and emit nitrous oxide and carbon dioxide. So, a CT system, which requires the agricultural sector to reduce emissions, or provides for offsets to do the same on a voluntary basis, would potentially restrict agricultural activities and cause some shifting of production patterns. Including the possibility of offsets linked to sequestration may be necessary in order to avoid restricting agricultural production in a time of increased food demand. Moreover, mitigation actions and the build-up of soil carbon can have advantages in terms of productivity.

6. CONCLUSION

New climate change rules, regardless of whether they do or do not incorporate agriculture, will have an impact on agricultural production. Moreover, policymakers are contemplating the incorporation of climate change rules into farm policies. The impact of GHG policies on the competitive position of agriculture and hence upon agricultural production and trade is complex. Considering the requirement to double food production by 2050 to meet the needs of an expanding global population, a better understanding of the impacts not only of climate change itself, but also of various climate change policies, on food production is critically important. Pursuing climate change mitigation without regard to food security is not sensible for obvious reasons. The great challenge facing agriculture is to identify effective mitigation measures in agriculture that do not negatively impact on, or can even contribute positively to, agricultural productivity.

Beyond gaining a better understanding of the interplay between climate change policies and agricultural production, the international community needs also to consider the interplay between climate change policies targeted at the agricultural sector and international agricultural trade rules. Such rules should be kept in mind as climate change policies are developed so that new policies do not inadvertently contribute to greater agricultural trade distortions. Alternatively, if trade rules present genuine obstacles to the adoption of climate change policies, then the rules may need to be revisited. Countries should be aiming for coherence in the two sets of policies.

Policymakers are contemplating the incorporation of climate change rules into farm policies. Three main questions arise in this context. Should one use subsidies to promote the reduction of GHG emissions in agriculture or an expansion of mitigation activities? Should one include agriculture in a CT scheme? And should one continue to promote biofuels? This paper has explored the implications of these

decisions in the light of obligations under multilateral trade agreements.

Rewarding beneficial climate change mitigation by agriculture is both possible and likely. The approach will probably combine best-practice promotion with the tailoring of existing subsidy systems to encourage change. Subsidies could be given for such practices as minimum tillage or the co-generation of on-farm bioenergy, or conservation payments could incorporate incentives for carbon sequestration. Although these could be challenged by foreign competitors, they would appear to be consistent with trade rules if part of a comprehensive environmental programme.

The main constraint from the viewpoint of trade rules is that subsidies should, in order to qualify for the green box, under the AoA, be in proportion to the extra costs incurred by farmers in meeting environmental standards. So, tying current direct payments to sequestration or other beneficial aspects of farming activity may be subject to challenge, as the payments would almost certainly exceed the additional costs involved. Moreover, such a link would seem to weaken the claim that the payments are unrelated to current production activity and hence trade-neutral. In other words, care has to be taken to ensure that climate change subsidies respect the criteria of the green box – or, alternatively, the green box criteria may need to be clarified to reflect desirable policy.²⁶

Including agriculture in a CT scheme poses a number of technical problems, including the fact that monitoring farming activities involves many more firms, with a wider diversity of technologies, than (say) electricity-generating plants. Standard emission factors for crops and livestock production are currently not very reliable, and one might expect some domestic litigation if farmers were to be assessed on their GHG emissions. Much of the (domestic) burden of the CT system is lifted if initial permits are given out rather than auctioned. Agriculture could argue for a significant free distribution of

permits. Combined with the ability to sell these if they reduced their own emissions, this would constitute a subsidy. It is not unlikely that foreign competitors might challenge the subsidy element, particularly on export crops.²⁷

In any case, calculating lifecycle carbon footprints for the hundreds of different farming systems seems to stretch both scientific knowledge and programme administration too thin. Emissions may be dependent on climate and other variables outside the control of the farmer, and the emissions related to inputs (such as animal feed) could also vary depending on their provenance. One would have to account for subsidies given for fertilizer use, as this would influence emissions. Moreover, a large proportion of the GHG emissions from agriculture are in developing countries – as are the opportunities for GHG abatement and mitigation. Any global scheme would have to take account of the fact that it would need to be administered in developing countries, where monitoring and verification could pose problems.

Promotion of biofuels creates a more troubling problem. Domestic ethanol from corn contributes less to GHG emissions than gasoline, but if one takes into account the expansion of cultivated land elsewhere to offset the diversion of corn from food to energy the balance can turn negative. Consequently, the CARB scored domestic ethanol low as a contributor to emissions reduction. The ethanol lobby complained that the CARB had forgotten to count the carbon emissions from extracting and transporting oil from overseas – and the energy use in the military in securing that oil supply. This illustrates the complexities and controversies that surround any form of lifecycle carbon accounting, and it leaves agriculture relying on grounds other than the contribution to GHG emissions mitigation (such as decreased reliance on imported fossil fuel) to justify ethanol subsidies.

Biofuels should be included in a more general energy strategy of the development of alternative fuels. Using ethanol subsidies as a way to

supplement farm payments has already led to poor policy choices, and tying these subsidies to climate change goals is likely to confound an already confused situation. In particular, the question of the link between biofuel policies and agricultural subsidies would be brought into sharper focus. The issue is not so much whether biofuel policies are incompatible with WTO commitments but whether they should be notified as subsidies to agricultural producers. An eventual conclusion of the Doha Round would tighten up the constraints on subsidies and add further pressures on biofuel policies.

So where does this leave the argument for linking farm policy with climate change strategy? The aim should be to identify positive and negative aspects of farming on atmospheric GHG concentrations that are uncontroversial and easy to measure. Large-scale livestock enterprises are already potentially within the scope of EPA regulations that control emissions. Reforestation for improved sequestration could easily be given more encouragement within current conservation programmes. Co-generation of energy on farm is not difficult to reward, particularly if surplus energy can be transferred to the electricity grid. Greater emphasis on publicly funded research and development to foster lower GHG emissions in agricultural production systems or to increase sequestration could have important payoffs.

Domestic climate change legislation is constrained by international trade obligations, but a carefully crafted programme should not raise too many problems. In particular, it should be possible to devise domestic schemes that contribute to effective international action. In this respect, an international consensus on what measures are likely to be effective is crucial in order to avoid trade disputes. The move towards “decoupled” payments unrelated to price and current output has provided an opportunity for such a consensus. Recoupling these payments in such a way that climate change mitigation is encouraged could prove a useful contribution to addressing the challenges posed by climate change without endangering food security.

NOTES

- 1 It is estimated that the agricultural sector accounts for roughly 8 percent of total US GHG emissions. Nitrous oxide emissions associated primarily with the breakdown of manure and nitrogen fertilizer make up roughly two-thirds of those emissions (Siikamäki and Maher 2007).
- 2 The process of tilling the soil releases carbon dioxide into the atmosphere. Minimum tillage aims to limit this process by turning the soil only enough for planting.
- 3 Economists have argued that subsidies and mandates are alternative policies: that if blending is mandated, one does not need a subsidy. Politically, the subsidy may be necessary to be able to get agreement on the mandate.
- 4 As a major user of transportation, the impact of a carbon tax on agricultural production and its location could extend far beyond the direct impacts that are the focus of this paper.
- 5 Note that if domestic consumers have access to imported products whose prices do not reflect the costs of GHG emissions, then the impact will fall entirely on domestic producers (see next section).
- 6 It should not be thought that the WTO activities in this area are all “defensive”, i.e. preventing government actions that contravene rules. The Marrakesh Agreement setting up the WTO emphasized the link between trade openness and sustainable development. A number of the items under discussion in the Doha Round address the issue of climate change in a proactive way. These include trade liberalization on environmental goods and services (including a subgroup of goods and services considered to be useful in addressing climate change) and the discussion of closer coordination between the WTO and the Multilateral Environmental Agreements (MEAs).
- 7 A further distinction is often made between product-related PPMs and non-product-related PPMs. The former are production and processing methods that are reflected in a measurable way in the nature of the product. The latter do not change the nature of the product itself and hence require monitoring and verification in the country of origin.
- 8 Dispute-settlement cases have also made a contribution, particularly in the environmental area. A notable recent example is the shrimp–turtle case (WTO, 1998).
- 9 Perhaps the most successful has been the development of GlobalGAP, a private-sector body that sets voluntary standards for the certification of agricultural products around the globe. GlobalGAP emerged from EurepGAP, which was set up in 1997 by a group of retailers in Europe in cooperation with some producers (Knutson and Josling 2008).
- 10 The concept of “food miles” promoted by some retailers highlights the difficulties with such private standards. Focusing on transport emissions alone can seriously distort trade patterns and is too easily translated into protectionist rhetoric that can be costly to efficient (developing and developed country) exporters.
- 11 The ISO seeks to promote a “free and fair global trading system” by providing the management-control underpinnings for quality, technical, procedural, safety, management

and environmental process standards. The primary beneficiaries are supposed to be consumers, workers, businesses and the general public. However, one assumes that governments also derive some benefit from the ISO's establishment of private-sector guidelines in standards setting.

- 12 Although it is referenced in the TBT, the ISO is not accorded the same standard-setting role as the OIE, the IPPC and the CODEX are in the SPS. The ISO is given the task of monitoring the Code of Good Practice for the Preparation, Adoption and Application of Standards that is included as Annex 3 of the TBT.
- 13 SCM Article 1.
- 14 SCM Article 2. The definition of a specific subsidy is discussed in Howse et al. (2006).
- 15 SCM Article 6:3.
- 16 Hence, in the case of US ethanol policy, the blending subsidy (tax credit) applies on the use of imported ethanol, but the special duty on such imports is fashioned to negate the possible use of imported ethanol.
- 17 Developing countries can also exclude investment support for agriculture and input subsidies for low-income and resource-poor farmers (special and differential treatment) that in developed countries would be subject to constraint as trade-distorting.
- 18 However, provisions of the AoA allow for *de minimis* amounts of product-specific and non-product-specific support to be exempt from the current total AMS.
- 19 The question would arise in such cases as to whether carbon credits that could be sold to other industries for use as offsets to their own GHG emissions are “products” whose price is being supported. It is not unreasonable to consider carbon sequestration as a part of farming activity and the rewards as part of farm revenue.
- 20 The USA does indeed report its ethanol-related subsidies under the SCM as a non-agricultural subsidy (although it has also argued in the Doha Round that ethanol should not be included in a list of environmental goods, as it is an agricultural product). Tax credits to blenders could be considered as subsidies to that industry and not to agriculture. (Tax credits to agricultural producers have not, however, been notified as subsidies and are considered to be excluded from the definition used in the AoA.) But the fact remains that these credits maintain the demand for ethanol and hence for corn. The benefits are undoubtedly passed through to the farmer. Normally, demand-expanding subsidies receive little criticism in trade, but in this case it is competing corn producers that are likely to complain that a subsidy to US corn farmers is going uncounted.
- 21 Inclusion of the climate change subsidies as blue box payments (i.e. tied to a base level of production) may seem far-fetched. But both the USA and the European Union (EU) have considerable scope for increasing blue box payments if needed (Orden et al., forthcoming).
- 22 It could be argued that such a policy merely redistributes production of the good in question and does not achieve the broader global aim of GHG reduction or fossil-fuel replacement. The

economic rationale is stronger if it is assumed that other countries were applying appropriate taxes on their producers.

- 23 Taxation at the point of consumption also in principle requires BTAs in order not to favour export sectors.
- 24 BTAs are allowed if the additional tax levied on imports matches any indirect tax that has been paid on the domestic production of similar products. A regulation is not a tax, and so an import levy designed to match the cost of compliance with domestic rules is not strictly a BTA (see Hufbauer et al. 2009, p.66).
- 25 Although the green box status of current direct payments has been thrown into question by the WTO ruling on the case brought by Brazil against US cotton programmes (WTO 2004, 2005).
- 26 It is possible that some clarification of green box criteria will be necessary as climate change mitigation policies proliferate. The use of “extra costs or loss of income” may not be the best criteria in cases where income is small but benefits from mitigation are large.
- 27 On the other hand, the cost of permits purchased by agriculture could be subtracted from existing non-exempt payments in evaluating conformity with WTO domestic support commitments (total AMS). Adjustments for commodity-specific levies and taxes are already included in US notifications of domestic support to the WTO. Consequently, no increase in subsidies might be involved, and competitors would have to argue that it was a change in the method of payments that was causing injury.

REFERENCES

- Charnovitz, S. Earley, J. and Howse, R. (2008). "An Examination of Social Standards in Biofuels Sustainability Criteria". IPC discussion paper – Standards Series. International Food and Agricultural Trade Policy Council. Washington, DC. USA. Food and Agricultural Organization of the United Nations (FAO) (2006). "Livestock's Long Shadow: Environmental Issues and Options". Food and Agricultural Organization of the United Nations. Rome. Italy.
- Howse, R., Van Bork, P. and Hebebrand, C. (2006). "WTO Disciplines and Biofuels: Opportunities and Constraints in the Creation of a Global Marketplace". IPC discussion paper. International Food and Agricultural Trade Policy Council. Washington, DC. USA.
- Hufbauer, G.C., Charnovitz, S. and Kim, J. (2009). "Global Warming and the World Trade System". Peterson Institute for International Economics. Washington, DC. USA.
- Josling, T and Blandford, D. (2008). "Biofuel Subsidies and the Green Box". International Centre for Trade and Sustainable Development. Geneva. Switzerland.
- Josling, T, Roberts, D. and Orden, D. (2004). "Food Regulation and Trade: Toward a Safe and Open Global System". Peterson Institute for International Economics. Washington, DC. USA.
- Knutson, R and Josling, T. (2008). "New Generation of Standards". Presented at the NAAMIC conference, Austin, TX, USA, May 2008.
- Mitra, S. and Josling, T. (2009). "Agricultural Export Restrictions: Welfare Implications and Trade Disciplines". IPC position paper – Agricultural and Rural Development Policy Series. International Food and Agricultural Trade Policy Council. Washington, DC. USA.
- Orden, D., Josling, T. and Blandford D. (eds) (forthcoming). "Disciplining Domestic Agricultural Support through the WTO".
- Siikamäki, J. and Maher, J. (2007). "Climate Change and U.S. Agriculture" in *Assessing U.S. Climate Policy Options. Resources for the Future*, R.J. Kopp and W.A. Pizer.
- Wang, M., Wu, M. and Huo, H. (2007). "Life-Cycle Energy and Greenhouse Gas Emission Impacts of Different Corn-Ethanol Plant Types". *Environmental Research Letters* 2: 1–13.
- World Trade Organization (WTO) (1995). "Results of the Uruguay Round of Multilateral Trade Negotiations – The Legal Texts". World Trade Organization. Geneva. Switzerland.
- World Trade Organization (WTO) (1998). "United States – Import Prohibition of Certain Shrimp and Shrimp Products". Report of the Appellate Body, WT/DS58/AB/R (12 October 1998). World Trade Organization. Geneva. Switzerland.
- World Trade Organization (WTO) (2004). "United States – Subsidies on Upland Cotton". Report of the Panel, WT/DS267/R (8 September). World Trade Organization. Geneva. Switzerland.

World Trade Organization (2005). “United States – Subsidies on Upland Cotton”. Reports of the Appellate Body, WT/DS265/AB/R, WT/DS266/AB/R and WT/DS267/AB/R (adopted 21 March). World Trade Organization. Geneva. Switzerland.

About the Platform

In 2008 the International Food & Agricultural Trade Policy Council (IPC) and the International Centre for Trade and Sustainable Development (ICTSD) launched The ICTSD-IPC Platform on Climate Change, Agriculture and Trade: Promoting Policy Coherence. This interdisciplinary platform of climate change, agricultural and trade experts seeks to promote increased policy coherence to ensure effective climate change mitigation and adaptation, food security and a more open and equitable global food system. Publications include:

- International Climate Change Negotiations and Agriculture. Policy Brief No.1, May 2009
- Greenhouse Gas Reduction Policies and Agriculture: Implications for Production Incentives and International Trade Disciplines Issue Brief No.1, by D. Blandford and T. Josling, August 2009
- Climate Change, Agriculture and International Trade: Potentials Conflicts and Opportunities. Issue Brief No.2, by J. Earley (forthcoming)
- Carbon Standards Policies and Agricultural Trade from Developing Countries. Issue Brief No.3, by James Macgregor (forthcoming)

About the Organizations

The International Centre for Trade and Sustainable Development was established in Geneva in September 1996 to contribute to a better understanding of development and environment concerns in the context of international trade. As an independent non-profit and non-governmental organization, ICTSD engages a broad range of actors in ongoing dialogue about trade and sustainable development. With a wide network of governmental, non-governmental and inter-governmental partners, ICTSD plays a unique systemic role as a provider of original, non-partisan reporting and facilitation services at the intersection of international trade and sustainable development. More information is available at www.ictsd.org.

The International Food & Agricultural Trade Policy Council promotes a more open and equitable global food system by pursuing pragmatic trade and development policies in food and agriculture to meet the world's growing needs. IPC convenes influential policymakers, agribusiness executives, farm leaders, and academics from developed and developing countries to clarify complex issues, build consensus, and advocate policies to decision-makers. More information on the organization and its membership can be found on our website: www.agritrade.org.