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**Rethinking Trade Rules to Achieve a More  
Climate Resilient Agriculture**

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## **Abstract**

Recent attention has focused on "repurposing" and redirecting agricultural support programs towards achieving environmental, climate and nutritional outcomes. Under these proposals, typically equivalent levels of subsidies and other forms of government support would be focused on the reducing GHG emissions, environmental externalities and other broader public policy objectives such as improving nutrition. But questions arise as to whether new support programs would necessarily be consistent with WTO disciplines. This paper examines various measures aimed at reducing GHG emissions including imposition of carbon standards and taxes, border measures to reduce slippage, and so-called "Climate Smart" domestic support measures and considers how such measures comport with WTO trade rules.

**Keywords:** *WTO, climate smart agriculture, carbon border adjustment measures, product standards*

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## Executive Summary

Addressing the challenges of climate change through mitigation measures aimed at lower GHG emissions could have important implications for global trade and how such measures comport with existing trade provisions. Ideally, the costs of externalities caused by GHG emissions would be fully incorporated in market prices. In practice, this will likely never be the case. Instead, many countries are considering addressing climate change through emission controls, including border measures. Particularly challenging will be designing border measures that reduce the potentially undermining effects of leakage (increased imports of goods that do not face costly domestic standards or controls) but are implemented in a way that provides like treatment for domestic and foreign suppliers.

Product standards and labeling may provide means by which countries can prevent leakage in a way that reduces global emissions but avoids trade distortions and protectionism, but without international coordination such efforts may encourage a “spaghetti bowl” of standards that would likely result in legal challenges at the WTO. The creation of a standards body, modeled on the OIE or Codex Alimentarius, and building on the work of ISO 14064, International Standard for GHG Emissions Inventories and Verification, could help facilitate development and potentially avoid future disputes.

In general, Climate Smart Agriculture (CSA) policies aimed at reducing GHG emissions, or sequestering CO<sub>2</sub>, or mitigating the effects of climate change itself, should not be backdoor ways of distorting domestic production. Such policies, while attractive from a narrow domestic perspective, could depress global prices and adversely affect exporters, particularly developing countries who may be less likely to afford such support measures. In this sense, CSA policies should be compatible with the overarching conditions of Annex 2 of the WTO Agreement on Agriculture (green box) of providing minimal trade- or production-distorting support.

That is not to say that reforms to the provisions in Annex 2 should not be considered. Annex 2 provision governing insurance are not well adapted to current insurance programs, particularly index insurance and weather derivatives, which are increasingly being used in developing countries. That said, heavily subsidized insurance programs, particularly those that provide price and revenue protection, can distort production since they are directly coupled to actual production.

Increasing productivity, particularly in developing countries where yield gaps are often greatest, should be a priority of any CSA policy. More public R&D should be directed towards climate resilient varieties and towards an aim of increasing GHG efficiency. While Article 6.2 of the AoA allows for subsidized input use to increase productivity in resource poor developing countries, input subsidies for developing countries that promote less GHG-efficient production technologies should be viewed with more caution.

Resource retirement programs may offer significant opportunities for carbon sequestration through afforestation. However, the impact of sequestered carbon on GHG emissions must be analyzed in a global context in terms of land use, as well as food security concerns. Likewise, biofuel mandates should be limited to non-food and non-feed feedstocks, though land use effects of converting potential cropland to biofuel use remain an issue of concern.

# Introduction

Since the World Trade Organization (WTO) was formed more than 25 years ago, trade has become increasingly important to meeting global food needs. Agricultural exports have more than tripled in value and more than doubled in volume since 1995 (Figure 1). Import penetration rates (imports as a percent of consumption) have increased for most major cereals and oilseeds and countries have become increasingly reliant on imports as increases in consumption caused by income and population growth outstrip productivity gains within those countries. Developing countries have become increasingly important suppliers and consumers in world markets, and now account for about 40 percent of world food trade (Glauber 2022). South–South trade (not shown) now accounts for over 20 percent of world food trade (UNCTAD 2022).

Trade helps buffer domestic prices. Countries can make up for production shortfalls by importing or by exporting surpluses when there are bumper crops. These stabilizing effects are expected to become increasingly important with climate change as production shifts due to increases in global temperatures and weather variability increases (Gouel and Laborde 2018).

Figure 1

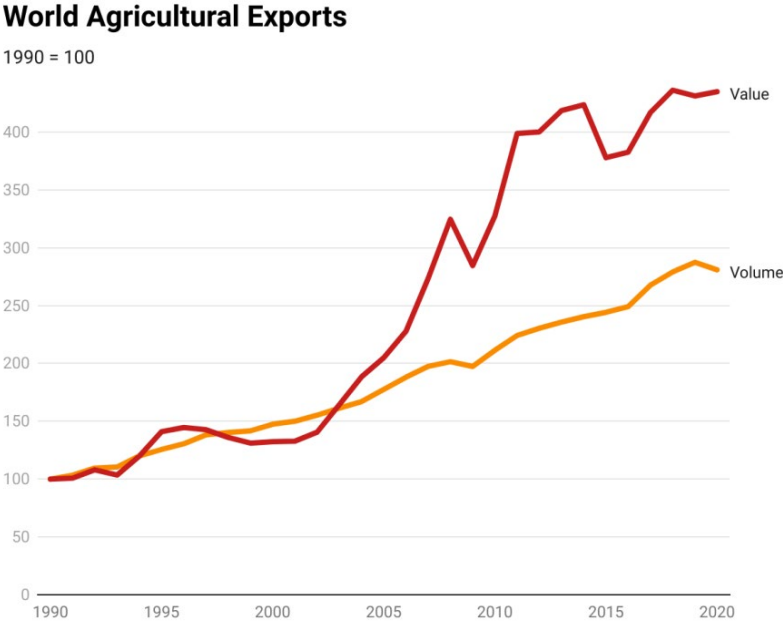


Chart: Joseph Glauber • Source: World Trade Organization

Arguably, the growth in agricultural trade over the past 25 years is in no small part due to the trading rules established under the WTO, particularly the Uruguay Round Agreement on Agriculture (AoA). The AoA was implemented in 1995 and brought substantial discipline to the areas of market access, domestic support, and export competition. Yet while trade has grown, the appetite for trade liberalization has stalled. The Doha Development Agenda was launched in 2001 with an ambitious work program aimed at reducing agricultural domestic support, lowering agricultural tariffs, and eliminating export subsidies. However, after years of negotiation, members failed to reach an agreement in July 2008 (Glauber 2019). Since then, some progress has been made, particularly in the 2015 Ministerial decision to phase out export subsidies, but progress in many other areas such as domestic support, market access and public stockholding has been lacking.

In the meantime, global agriculture has come under increasing scrutiny, in particular by those who criticize some agricultural subsidies and their potentially harmful impacts on health and the environment. Economists have long criticized agricultural support for distorting farmers' production decisions and agricultural markets (Johnson 1972). Such subsidies create large negative impacts for the broader community, contributing to poorer water quality, increased greenhouse gas (GHG) emissions, soil erosion in fragile lands, loss of wildlife habitat, deforestation, and other environmental concerns (OECD 2019). As shown in Figure 2, direct GHG emissions from agriculture exceeded 7.2 gigatonnes (7.2 million kilotonnes) in 2017 and accounted for 13.2 percent of total global GHG emissions (FAOSTAT 2022). Moreover, emissions from indirect land use change were over 3.5 gigatonnes in 2017 (6.5 percent of global emissions)<sup>1</sup>. Total agricultural emissions, including pre- and post-production emissions, accounted for about 30 percent of total global emissions (FAOSTAT 2022).

Some subsidies have also been criticized by nutritionists as encouraging "unhealthy" diets and contributing to obesity and major health care challenges such as heart disease and diabetes (Alston, Sumner and Vosti 2008; Abay, Ibrahim, and Breisinger 2022).

**Figure 2**

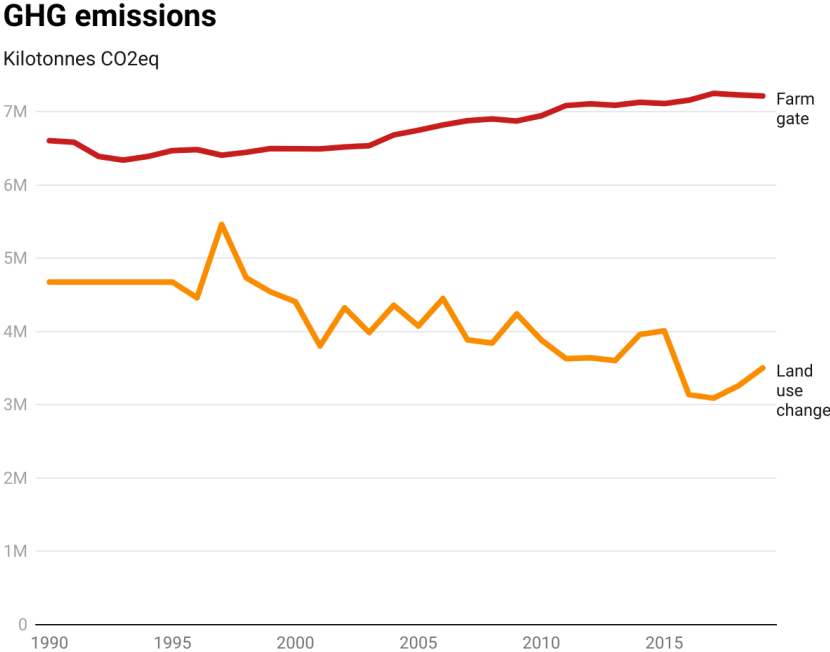


Chart: Joseph Glauber • Source: FAOSTAT

Recent attention has focused on "repurposing" and redirecting agricultural support programs towards achieving environmental, climate and nutritional outcomes (FAO, IFAD, UNICEF, WFP and WHO 2022; Gautam et al. 2022; FAO, UNDP and UNEP 2021). Under these proposals, typically equivalent levels of subsidies and other forms of government support would be focused on the reducing GHG emissions, environmental externalities and other broader public policy objectives such as improving nutrition. But questions arise as to whether new support programs would necessarily be consistent with WTO disciplines (Glauber 2018). Redirecting subsidies to "more healthy" foods, for example, could increase their production and export which could run afoul of WTO domestic support disciplines or be challenged under the more general Agreement on Subsidies and Countervailing Measures.

<sup>1</sup> Emissions from land use change arise principally from conversion of forestland or pastureland to cropland.

Domestic policies aimed at improving climate, environmental, or nutrition goals could also have implications for border measures such as tariffs or non-tariff measures such as performance standards. For example, agricultural policy reform efforts such as the EU's Farm-to-Fork strategy would impose sustainability criteria on producers that could potentially raise the costs of production (Guyomard, Bureau et al. 2020). Unless border measures are implemented, importers could import cheaper substitutes from foreign producers who do not face such standards, thus undermining the purpose of the standards ("leakage"). For that reason, the European Green Deal includes the possibility of a carbon border adjustment mechanism (CBAMs) for selected sectors (European Council 2022). In the United States, Congress is considering a bill (Clean Competition Act) that would introduce CBAMs to incentivize deeper decarbonization among foreign producers while protecting U.S. firms (Reinsch and Duncan 2022).

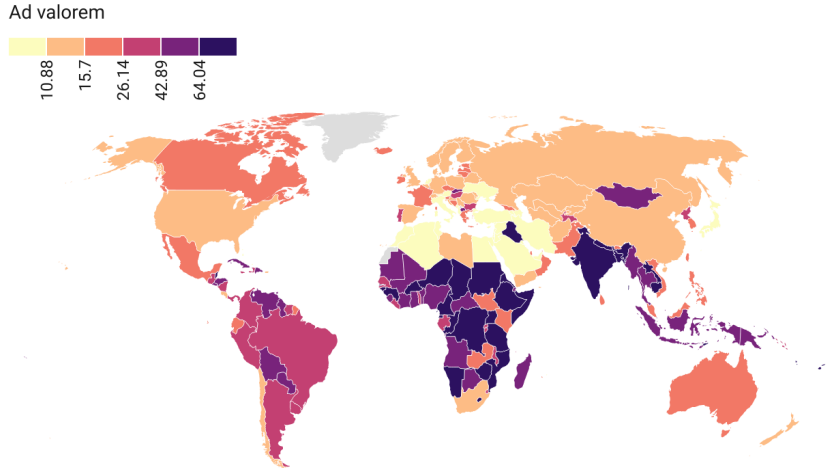
Such measures could prompt retaliation by foreign suppliers and challenges within the WTO and other bilateral and plurilateral trade agreements. Some critics have charged that measures like CBAMs and product standards introduce new forms of protectionism which ultimately hurt the most vulnerable developing countries (de Melo and Solleder 2020). Do current trade rules hamstring countries from implementing reforms that would improve climate, environmental and nutrition outcomes or is there sufficient flexibility in the AoA and other agreements that would allow such changes?

### Carbon Taxes and Border Measures

In economics, an externality is the cost or benefit that affects a party, who did not choose to incur that cost or benefit. Unregulated markets with significant negative externalities are considered inefficient in that, market prices do not reflect the true (societal) cost of that good or service. Because the cost of the negative externality is not included, producers produce more (and consumers consume more), than they would had, had the cost of the externality been reflected in the price. Taxing the producer for the cost of the externality would, in theory, "internalize" the externality, so that costs and benefits will affect mainly parties, who choose to incur them. Carbon taxes have been proposed to address the societal externalities caused by GHG emissions through global warming.

Figure 3

#### Carbon tax on beef production based on GHG emission intensity



Calculations by author based on 2017 GHG emissions intensities, carbon price = USD 50/MT CO<sub>2</sub>e; and average beef price = USD 5390/MT  
 Map: Joseph Glauber • Source: FAOSTAT; World Bank Group

A carbon tax applied to agricultural emissions, would have a number of consequences. The immediate effect would be to raise prices of agricultural products. The map in Figure 3 shows the effects of a carbon price of USD 50/MT CO<sub>2</sub>e on effective carbon taxes for beef for selected countries. The data on GHG emissions calculated using data from FAOSTAT that calculates direct GHG emissions per kg of product produced for various countries. The taxes were then compared to average annual price for beef 2021 (World Bank Group, 2022) to demonstrate their relative magnitudes.

While the map in Figure 3 is useful for illustrative purposes to show the large disparity in implied tax rates, in practice, a carbon tax would be much more difficult to implement, since GHG emissions depend on numerous factors, including practice, type of agricultural product and region (Eve et al., 2014). Any estimates derived for a carbon tax would be likely be inexact, since emissions are often from non-point sources, and this is the reason why they are difficult to measure. While direct taxes on agricultural emissions have been proposed in New Zealand (Withers 2022), a more likely approach would be for countries to impose a more targeted tax on a specific sector, such as fossil fuel production that would then have indirect impacts in energy-intensive sectors such as agriculture. Alternatively, cap and trade schemes could be introduced that limit the total amount of emissions and allow trading of emission permits. Cap and trade schemes would penalize higher emitting products and services, while providing incentives for adaption of more efficient technologies. But cap and trade schemes would still be challenging for agriculture, due to the high costs of monitoring, necessary to ensure the integrity of the trading scheme. Domestic taxes are typically not covered under international agreements since they are likely to depress, rather than enhance output. Nonetheless, as Blandford (2013) points out, exempting sectors like agriculture from emissions caps, could raise the issue of implicit subsidization by allowing exempt sectors to sell emissions credits. Like a carbon tax, the value of carbon offsets would be subject to similar uncertainty in measurement, as well as monitoring and enforcement issues. Offsets could also present food security concerns, for example, if cropland were taken out of production for carbon sequestration purposes (see Climate Smart policies below).

A major concern of domestic policies such as carbon taxes is the issue of leakage--that domestic regulations could be undermined by imports that do not face the same regulations. In a analysis of an EU carbon policy, Fellmann et al. (2018) show that without sufficient border protection measures, carbon policies could lead to an increase in EU agricultural imports that would have two potential consequences. First, increased imports could lead to price declines which would harm domestic producers. Second, there could be a significant leakage effect, with extra pollution and GHG emissions in non-EU countries (assuming those imports are from countries with relatively high emitting production). However, as Blandford (2018) points out, not all carbon leakage leads to a net increase in global GHG emissions. Carbon leakage may still be a net positive for global emissions if relatively high-emitting domestic production is replaced by lower-emitting imports (carbon reallocation).

Addressing leakage through trade measures such as carbon border adjustment measures (CBAMs) is likely to confront provisions in agreements under the WTO, particularly key provisions under the revised General Agreement on Tariffs and Trade (GATT)<sup>2</sup>. Two core provisions are GATT Article I (most favored nation treatment or MFN) and GATT Article III (national treatment). GATT Article I holds that any advantage accorded to an imported product has to be accorded to a "like" product from any other WTO member. The principle of national treatment in GATT Article III holds that an imported product should be treated no less favorably than a like domestic product.

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<sup>2</sup> From 1948 to 1994, the GATT provided the rules for much of world trade. These provisions (so-called GATT 1947 agreement) were revised and incorporated into the World Trade Organization agreements--so-called GATT 1994 agreement.

WTO rules allow members to adjust product prices at the border. Governments can impose product taxes on imports or rebate taxes on exports, or both. For example, if a member imposes a consumption tax directly on a product, such as a sales tax, or environmental tax, it is permitted to impose like taxes on imports of that product<sup>3</sup>. Much has been written on whether CBAMs would be permissible under WTO rules (Hufbauer, Charnovitz and Kim 2009; Pauwelyn 2012; Howse 2015, Trachtman 2017; Hufbauer, Kim and Schott 2021). The consensus is that if border measures are consistent with Article I and Article III, they would likely be judged consistent with WTO provision; however, implementation of "equivalent measures" may be problematic if border measures are based on compliance costs (as opposed to an explicit carbon tax for example).

As an example, consider a cap-and-trade system where emission caps are imposed on a particular sector (for example, energy) but indirect costs are borne by other sectors (for example, agriculture). Establishing border measures for agricultural imports based on indirect impacts on production costs would likely be more problematic and likely challenged under WTO provisions as potential Article III violations. Other issues would arise when foreign supplies originate in countries that also impose carbon taxes or cap-and-trade schemes. Taxing them at the same rate as imports from countries with no such schemes may result in double taxation (Blandford 2018); exempting those countries while taxing others would likely raise Article I issues (non-discriminatory treatment between most favored nations).

Article XX of the GATT does allow exceptions for specific GATT provisions if the measure is intended to protect "human, animal, or plant life or health" (Art XXb) or the "conservation of exhaustible natural resources if such measures are made in conjunction with restrictions on domestic production or consumption" (Art XXg). However, any Article XX exemption is "[s]ubject to the requirement that that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restrictions on international trade."

Bound tariffs are specific commitments made by individual WTO member governments. The bound tariff is the maximum MFN tariff level for a given commodity line. Members have the flexibility increase or decrease their actual or "applied" tariffs (on a non-discriminatory basis) so long as they didn't raise them above their bound levels.

WTO members can always raise tariffs if their applied tariff bindings are less than their bound rates (Figure 4). Applied tariff rates for agricultural products are often far below bound rates, particularly for developing countries, but any tariff adjustment must be done in a non-discriminatory (that is, MFN) manner. As discussed above, this would preclude setting duties based on the emission intensity of a member. Thus, non-discriminatory tariffs could disproportionately affect lower carbon emitters with relatively high costs of production (including those who have internalized the cost of emissions in production) and favor higher carbon emitters with relatively low costs of production.

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<sup>3</sup> This assumes that the import and domestically-produced item are "like" products.

Figure 4

## Applied versus bound rates, agricultural products

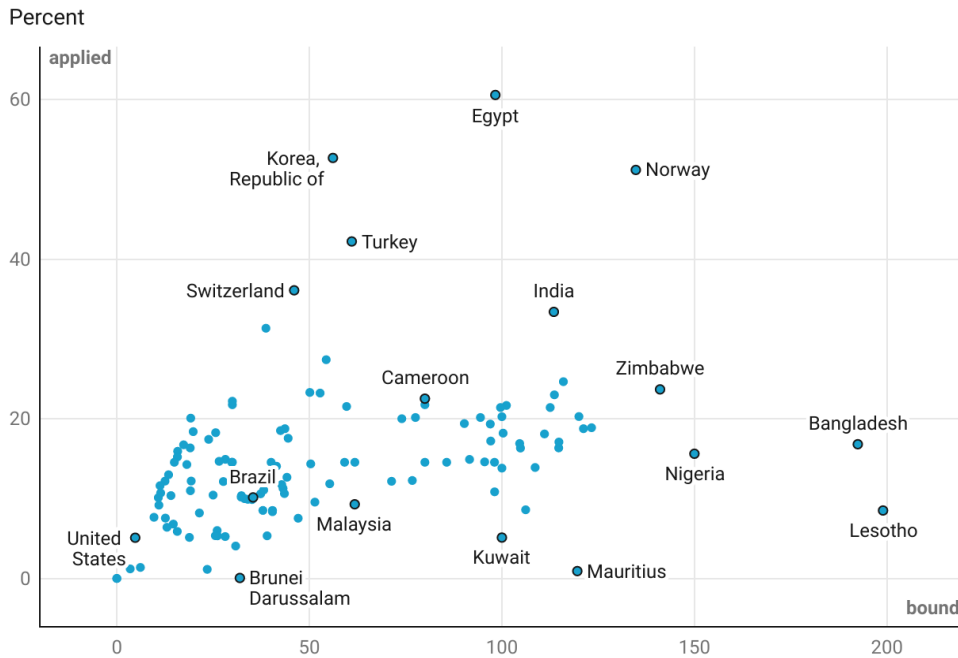


Chart: Joseph Glauber • Source: WTO Tariff profiles

## Labeling and Carbon Regulations and Standards

The technical and legal constraints on the effective application of border measures for food and agricultural products to prevent leakage in a way that reduces global emissions but avoids trade distortions and protectionism have led some to advocate an alternative approach through the use of carbon standards and labelling. Blandford (2018) points out that an added advantage of labelling is that it can help to promote changes in consumption that will be needed to reduce the carbon footprint of food and agriculture.

In contrast to a carbon tax, carbon intensity standards could be devised for agriculture in a way that could be imposed equally on both imports and domestic production. For example, a country could set a standard based on greenhouse gas (GHG) emissions intensities. If the GHG emissions from producing the product exceeded the standard, then the product could not be sold<sup>4</sup>.

Product standards are covered under the WTO Agreement on Technical Barriers to Trade (TBT), as well as other agreement such as the Agreement on Sanitary and Phytosanitary Measures (SPS). If a carbon performance standard were analyzed under the TBT agreement, a key question would be whether it was based on an international standard. If a domestic carbon standard were not based on an international standard, then under Art 2.2 of the TBT agreement, the standard would be subject to the requirement that it “shall not be more trade-restrictive than necessary to fulfill a legitimate objective” such as protection of the environment. If the standard

<sup>4</sup> Excluding a product because of emissions due to transportation (“food miles”) would be problematic and likely viewed as discriminatory under Article I of the GATT (Hufbauer, Charnovitz and Kim 2009).

were decided not to be a TBT measure then it would have to comply with Art III.4 of the GATT to treat imported products no less favorably than domestically produced products.

Whether standards could be imposed on developing countries is unclear as the TBT agreement states that developing countries should not be expected to use international standards that are “not appropriate to their development, financial and trade needs.” (TBT Article 12.4)

Further, a proliferation of different sets of standards among major trading partners risks creating a “spaghetti bowl” of competing trade rules that increase transaction costs for businesses through variable tariffs, complicated rules of origin, and various business requirements (Baghwati 1995). For example, recent regulations put forward by the European Commission would prohibit imports of some agricultural products, such as soy, beef, palm oil, cocoa, and coffee, if they are shown to contribute to deforestation (European Commission 2021). Under its Renewable Fuel Standards (RFS), the United States determines eligibility for biofuels based on Lifecycle Analysis which includes indirect impacts on land use change. The Renewable Energy Directive of the European Union also establishes standards for eligible biofuel feedstocks that are similar to the RFS but with key differences on how maize and soybeans are treated (Panichelli and Gnansounou 2017). Smaller developing countries may be forced to choose among major trading partners or risk being left further behind, as they do not have the capacity to meet multiple sets of standards.

The use of a standards approach to regulate carbon could be facilitated through the adoption of international standards for carbon measurement and labelling. For example, the Codex Alimentarius Commission, established by the Food and Agriculture Organization (FAO) and World Health Organization (WHO) in 1963, develops harmonized international food standards, guidelines, and codes of practice to protect the health of consumers and ensure fair practices in food trade. The Codex Alimentarius is well recognized and integrated into the WTO Sanitary and Phytosanitary Agreement. Likewise the International Organization for Standardization (ISO) is a non-governmental organization with a membership of 167 national standards bodies has developed a series of standards for environmental labelling<sup>5</sup>. Establishing a similar set of standards for product labeling based on scientific research on GHG emissions and agricultural production practices could ensure that standards contribute to GHG reductions in a nondiscriminatory fashion.

## **Climate Smart Agricultural Policies and the WTO**

Climate Smart Agriculture (CSA) refers to an approach developed by the Food and Agriculture Organization of the United Nations (FAO) to develop the technical, policy and investment conditions to achieve sustainable agricultural development for food security under climate change (FAO, 2013). The CSA approach has three main pillars: 1) sustainably increasing agricultural productivity and incomes; 2) adapting and building resilience to climate change; and 3) reducing and/or removing greenhouse gas emissions, where possible. CSA aims to improve food security, help communities adapt to climate change and contribute to climate change mitigation by adopting appropriate practices, developing enabling policies and institutions, and mobilizing needed finances (FAO, 2013).

In the analysis which follows we consider CSA policies relative to existing domestic support disciplines established under the WTO Agreement on Agriculture.

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<sup>5</sup> The ISO 14020 series. See ISO 2022.

## **WTO Agreement on Agriculture**

Domestic support disciplines under the WTO Agreement on Agriculture (AoA) distinguish between programs that are viewed as minimally trade distorting (green box subsidies) and those that are not (amber box subsidies). Green box subsidies are judged to have no, or at most minimal, production-distorting effects and are exempt from reductions under the AoA and thus could be provided without budgetary limits. Amber box subsidies are judged to have more than minimal trade-distorting effects and are capped. Amber box support includes payments to producers that are tied to current production levels, market price support programs, and other policies that make payments based on current output and current market prices such as countercyclical income support programs.

Amber Box subsidies are further classified into two groups—product-specific and nonproduct-specific support—and both categories are subject to de minimis tests that exempt support below a specific share of the current value of production from the reported AMS. For developed countries, if the estimated level of support is less than 5 percent of the value of current production, support is considered de minimis and excluded from calculations of the total current AMS. The de minimis threshold for developing countries is 10 percent of the value of current production<sup>6</sup>.

WTO members who had larger subsidies than the de minimis levels at the beginning of the post–Uruguay Round reform period were committed to reduce these subsidies in aggregate (by 20 percent for developed countries and 10 percent for developing countries). Countries without domestic support reduction commitments are effectively bound by de minimis levels.

A third category of trade–distorting support, called Blue Box support, is addressed in Article 6.5 of the AoA. Any subsidies and other forms of income transfers that would normally be included in the Amber Box are placed in the Blue Box if the program under which those income transfers occur also requires farmers to limit production and base payments on fixed area and yields or made on 85 percent or less of a base level of production, or, in the case of livestock, such payments are based on a fixed number of head. Under the AoA, Blue Box expenditures are not capped and, therefore, not subject to any limitation or reduction commitments. There are also exemptions for developing countries (sometimes called a “Special and Differential (S&D) Box”), covered under provisions in Article 6.2 of the AoA. These exemptions include government measures of assistance to encourage agriculture and rural development, generally available investment subsidies, and agricultural input subsidies generally available to low-income or resource-poor farmers (Glauber 2018). To be exempt under the green box, policies must meet specific criteria laid out in Annex 2 of the AoA. To qualify, green box subsidies must not distort production or trade, or at most cause minimal distortions (Annex 2, paragraph 1). Subsidies must be government funded (not through indirect support such as higher consumer prices) and must not involve price supports. Paragraphs 2–13 of Annex 2 detail specific categories for government service programs and lay out specific qualifying criteria (Table 1).

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<sup>6</sup> As a condition of their accession to the WTO, the de minimis thresholds for China and Kazakhstan are set at 8.5 percent of the value of production.

**Table 1—Green Box Categories (Annex 2 of the WTO Agreement on Agriculture)**

Paragraph	Description
1	Overall chapeau outlining fundamental requirement that domestic support measures for which exemption from the reduction commitments is claimed shall have no, or at most minimal, trade-distorting effects or effects on production. Accordingly, all measures for which exemption is claimed shall conform to the following basic criteria: a) the support in question shall be provided through a publicly-funded government programme (including government revenue foregone) not involving transfers from consumers; and, b. the support in question shall not have the effect of providing price support to producers. Criteria for specific measures are set out below
2	Provision of general services that provide benefits to agriculture or the rural community such as research and extension, pest and disease control, inspection services, marketing and promotion services and infrastructural services
3	Public stockholding programs for food security purposes
4	Domestic food aid programs
5	Direct payments to producers (chapeau for paras 6-13)
6	Decoupled income support to producers
7	Government financial participation in income insurance and income safety-net programs
8	Payments (made either directly or by way of government financial participation in crop insurance schemes) for relief from natural disasters
9	Structural adjustment assistance provided through producer retirement programs
10	Structural adjustment assistance provided through resource retirement programs
11	Structural adjustment assistance provided through investment aids
12	Programs for environmental programs
13	Payments to producers in disadvantaged regions under regional investment programs

Source: World Trade Organization, Agreement on Agriculture, Annex 2. [https://www.wto.org/english/docs\\_e/legal\\_e/14-ag\\_02\\_e.htm#annII](https://www.wto.org/english/docs_e/legal_e/14-ag_02_e.htm#annII)

### ***CSA measures to increase agricultural productivity***

Generally, increasing agricultural productivity is one of the most effective ways to address climate change. For example, a 2009 study showed that if production technologies were frozen at 2005 levels, because of land-use change, carbon emissions (assuming no mitigation strategies) would be over 70 billion tons higher over the 21st century because greater amounts of land would have been necessary to produce the same amount of food. Some of these productivity gains may be partially offset by increased production at least at the national level because of improved profitability, which is sometimes called the “rebound effect.” At the global level, rebound impacts are likely smaller since consumption only moderately responds to lower prices caused by productivity gains (Jones and Sands 2013).

Livestock and dairy production are both large sources for GHG emissions (principally methane). Improving productivity among those countries with the highest GHG intensities could have significant impacts on global agricultural emissions. Figure 5 shows country-level data collected by the Food and Agriculture Organization (FAO) of the United Nations for 2017. The data show how GHG emissions per unit of milk produced decline

rapidly as productivity per cow increases until milk production reaches roughly 2 metric tons per cow, at which point, GHG emissions per metric ton of output remain roughly the same. In a recent report, Gautam et al. (2022) found that repurposing a portion of government spending on agriculture each year to develop and disseminate more emission-efficient technologies for crops and livestock could reduce overall emissions from agriculture by more than 40 percent. As Figure 5 illustrates, improving productivity in many developing countries could have large improvements in GHG efficiency.

**Figure 5**

**GHG emissions per output fall with milk productivity gains**

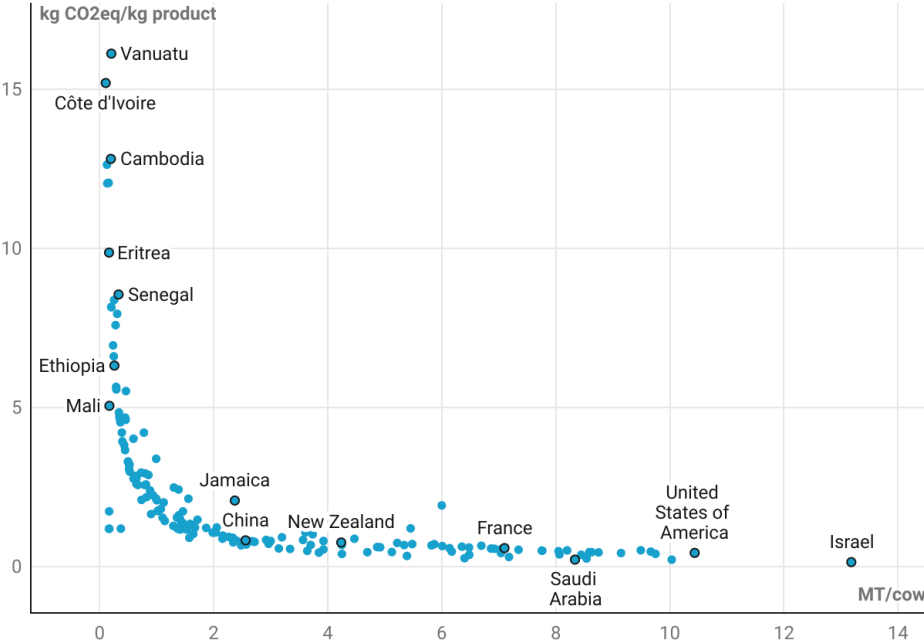


Chart: Joseph Glauber • Source: FAOSTAT

Public expenditures for CSA research and development would most likely be consistent with paragraph 2 of Annex 2 of the AoA. Other examples of general services policies would be technical assistance programs aimed at helping crop and livestock producers develop and implement nutrient management plans and research activities that promote soil health and reduce GHG emissions from cropland and livestock. Those policies do not involve direct payments to producers or processors, nor are the activities funded by transfers from consumers. Such policies would therefore qualify as green box measures under WTO rules. International funding would likely be necessary to assist poorer countries in making large development assistance of this kind.

***CSA measures to enhance adaptation and build resilience to climate change<sup>7</sup>***

Under the AoA, the Green Box accommodates several adaptation measures that can help producers adjust to increased weather volatility that will likely accompany climate change. Agricultural insurance is available in over 100 countries (Mahul and Stutley, 2010). Annex 2 of the AoA also accommodates public reserve programs that can help buffer the impacts of production shortfalls to meet food security needs. For producers, whose livelihoods are adversely affected by climate change, Annex 2 allows structural adjustment programs, such as producer retirement programs to transition producers, to more economically viable livelihoods.

<sup>7</sup> Much of the discussion in this section is drawn from Glauber (2018).

**Agricultural insurance.** The strict criteria in paragraph 7 (income insurance) or paragraph 8 (natural disaster and crop insurance) of Annex 2 of the AoA may make it difficult to report insurance programs in the Green Box (Glauber 2017). For example, both Paragraphs 7 and 8, limit coverage to 70 percent of expected income or yield and establish guarantees based on 5 years or less of historical data. Most area-based yield programs or weather-based derivative products tend to offer higher coverage levels and coverage levels tend to be based on expected yield or income outcomes, which may differ from averages of past outcomes. In part because insurance programs do not meet the Annex 2 criteria, most countries that notify insurance programs to the WTO notify them as Amber Box programs<sup>8</sup>.

Increased yield variability due to climate change will increase the costs of insuring these risks, as premium costs will rise. This may reduce the attractiveness of agricultural insurance as an adaptation option, unless governments continue to subsidize a large share of the premium costs. And insurance companies may be less willing to underwrite risks without large public support in the form of reinsurance and/or delivery subsidies (Glauber, 2004).

**Structural Adjustment payments.** Climate change could have severe adverse implications for producers in affected regions. In cases where climate change has dramatically affected crops or livestock production, structural adjustment programs could help countries mitigate those impacts by providing aid to build regional infrastructure to support alternative crops, or even by taking land out of crop or livestock production, or in more extreme cases by assisting producers who leave agriculture altogether. Structural measures that are designed to assist permanently disadvantaged producers or regions, are covered in Annex 2 of the AoA under Paragraph 9 (producer retirement programs), Paragraph 10 (resource retirement programs), Paragraph 11 (regional investment aids) and Paragraph 13 (regional adjustment programs). Due to the costs of such programs, the measures – covered under Paragraphs 9, 10, 11 and 13 – have been largely used by developed members, such as the European Union and the United States of America. Like with general services, international funding would likely be necessary to assist poorer countries in making large structural adjustments of this kind.

**Public stockholding programmes.** Like trade, stocks serve to mitigate the impact of production shortfalls (Williams and Wright, 1991). However, some public stockholding (PSH) programs are considered to be trade distorting when they involve purchases from farmers at prices fixed by the governments, known as “supported” or “administered” prices. Under the provisions of Annex 3 of the Agreement on Agriculture, market price support is calculated as the gap between a fixed external reference price and the administered price, multiplied by the quantity of eligible production. For most members the fixed external reference price is based on a 3-year average price between the years 1986–1988<sup>9</sup>.

After almost a decade of relatively flat price levels since the implementation of the Agreement on Agriculture, commodity prices rose significantly between 2005 and 2011, yet the fixed external reference prices have not been updated (Figure 6). Some members such as the G-33 developing country coalition have argued that the current rules reduce policy space for PSH programs because of the effective price gap implied by the “outdated” reference period used in the calculation of support (Glauber and Sinha, 2021).

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<sup>8</sup> For example, to be considered eligible for exemption under paragraph 8 of Annex 2, a formal of recognition of a natural disaster must be made by government authorities. While such declarations are often made in the case of disaster programmes they are less typical with agricultural insurance programmes (Glauber 2017).

<sup>9</sup> Some recently acceded countries base their external reference prices on a more recent base period. For example, China, who acceded to the WTO in 2001, uses the 1996-1998 period as its base.

**Figure 6**



Chart: Joseph Glauber • Source: FAO

The WTO's interim 2013 Bali decision to exempt PSH programs from legal challenge under certain conditions appears to be the most promising avenue for resolution. More technical fixes, such as updating the methodology for establishing a fixed external reference price, would have broader implications for calculating support under more general price support programs. Moreover, changing the way in which the fixed external price is calculated could raise questions on whether domestic support bindings would need to be adjusted to reflect the new methodology<sup>10</sup>. One potential avenue would be to expand the Bali decision to include a broader group of eligible foodstuffs than traditional staple crops, but only if the reporting requirements were maintained. Members could consider whether to agree to refrain from challenges under the dispute settlement mechanism support provided by LDCs.

### ***CSA measures to mitigate GHG emissions***

CSA measures to encourage practices that reduce GHG emissions or sequester carbon are likely to be consistent with Annex 2 criteria and thus not subject to reduction commitments under the AoA (and are thus unlimited) if measures are not tied to input use and production and meet the specific criteria of paragraphs 6 through 13.

**Payments Tied to Output or Input Use.** Direct output or input subsidies to encourage adoption of new GHG technologies would generally be considered amber box programs since they are tied to production or the input itself. For example, paying farmers to adopt no-tillage practices would presumably be based on planted area, which would arguably tie the payment directly to production. The AoA does allow certain exceptions for resource-poor, low-income farmers in developing countries who could claim those measures under Article 6.2 of the AoA<sup>11</sup>.

<sup>10</sup> And global prices could reverse recent trends which could result in new reference price based on an updated base period higher than current price levels and thus distortionary.

<sup>11</sup> Article 6.2 of the AoA exempts from reduction commitment government measures of assistance to encourage agriculture and rural development, generally available investment subsidies, and agricultural input subsidies generally available to low-income or resource-poor farmers in developing countries.

**Cost-Share Subsidies.** Cost-share programs for establishing conservation practices on agricultural and have supported implementation of farming practices and structures that reduce loss of fertility through soil erosion; facilitate improved drainage, water storage, and more efficient irrigation; and provide manure storage and assistance with meeting nutrient management regulations (Claassen, Horowitz, Duquette and Udea, 2014).

Infrastructural services such as water supply facilities, dams and drainage schemes, and infrastructural works associated with environmental programs are generally exempt from reduction commitments under paragraph 2(f) of Annex 2 of the AoA. To qualify as an environmental program consistent with paragraph 12 of Annex 2 of the AoA, the amount of the payment must be limited to the “extra costs or loss of income involved with complying with the government programme” (Paragraph 12(b)). To the extent that such measures also provide an incentive component to encourage adaptation, this may make them ineligible for Green Box protection.

**Carbon Sequestration Measures.** CSA policies to encourage carbon sequestration could include putting cropland into long term set asides such as the Conservation Reserve Program (CRP), an environmental program operated by the United States since 1986. Under the CRP, producers are paid a yearly rental payment in exchange for removing environmentally sensitive land from agricultural production and planting species that will improve environmental quality. CRP contracts are competitively awarded based on environmental benefits and typically extend for 10 to 15 years.

The reduction in land use intensity, provided by long term easements and set asides, can provide multiple environmental benefits, including substantial GHG mitigation, that occurs as carbon is sequestered in soils or vegetation. To be consistent with Annex 2 criteria for resource retirement programmes (paragraph 10), eligibility for such payments shall be determined by reference to clearly defined criteria in programmes designed to remove land or other resources, including livestock, from marketable agricultural production. Payments must be conditional upon the retirement of land from marketable agricultural production for a minimum of three years, and in the case of livestock on its slaughter or definitive permanent disposal. Payments shall not require or specify any alternative use for such land or other resources which involves the production of marketable agricultural products. Payments shall not be related to either the type or quantity of production or to the prices, domestic or international, applying to production undertaken using the land or other resources remaining in production.

**Biofuel Policies.** Biofuel mandates have been touted as climate smart policies, though they remain controversial, because of their potential impact on GHG emissions, when agricultural production practices and direct and indirect land use effects are considered (USDA, 2016). WTO domestic support issues are potentially raised, when subsidies are used to encourage biofuel production or consumption, which, in turn, has potential impacts on feedstock production (for example, corn for ethanol production, soybeans for soybean oil-based biodiesel production). As such, biofuel policies potentially distort feedstock production and exports. Policies which affect imports of feedstocks and biofuels are covered above under the discussion of border measures and standards.

## Conclusions

Addressing the challenges of climate change through mitigation measures aimed at lower GHG emissions could have important implications for global trade and how such measures comport with existing trade provisions. Ideally, the externalities caused by GHG emissions would be fully incorporated in market prices. In practice, this will likely never be the case. Particularly challenging will be designing border measures that reduce the potentially undermining effects of leakage but are implemented in a way that provides like treatment for domestic and foreign suppliers.

Product standards and labeling may provide means by which countries can prevent leakage in a way that reduces global emissions but avoids trade distortions and protectionism, but without international coordination such efforts may encourage a “spaghetti bowl” of standards that would likely result in legal challenges at the WTO. The creation of a standards body, modeled on the OIE or Codex Alimentarius, and building on the work of ISO 14064, International Standard for GHG Emissions Inventories and Verification, could help facilitate development and potentially avoid future disputes.

In general, CSA policies aimed at reducing GHG emissions, or sequestering CO<sub>2</sub>, or mitigating the effects of climate change itself, should not be backdoor ways of promoting protectionism or distorting domestic production. Such policies, while attractive from a narrow domestic perspective, will likely have more consequential adverse impacts in international markets, particularly for developing countries who will be less likely to afford such support measures. In this sense, CSA policies should be compatible with the overarching conditions of the Green Box of providing minimal trade- or production-distorting support.

That is not to say that reforms to the provisions in Annex 2 should not be considered. Annex 2 provision governing insurance are not well adapted to current insurance programs, particularly index insurance and weather derivatives, which are increasingly being used in developing countries (Miranda and Farrin, 2012). That said, heavily subsidized insurance programs, particularly those that provide price and revenue protection, can distort production since they are directly coupled to actual production (Glauber et al. 2021).

Increasing productivity, particularly in developing countries where yield gaps are often greatest, should be a priority of any CSA policy. More public R&D should be directed towards climate resilient varieties and towards an aim of increasing GHG efficiency. While Article 6.2 of the AoA allows for subsidized input use to increase productivity in resource poor developing countries, input subsidies for developing countries that promote less GHG-efficient production technologies should be viewed with more caution.

Resource retirement programs may offer significant opportunities for carbon sequestration through afforestation. However, the impact of sequestered carbon on GHG emissions must be analyzed in a global context in terms of indirect land use as well as food security concerns. Likewise, biofuel mandates should be limited to non-food and non-feed feedstocks, though land use effects of converting potential cropland to biofuel use remain an issue of concern.

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