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Agricultural Insurance and the World Trade Organization

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ABSTRACT

This paper examines how agricultural insurance programs are treated under the World Trade Organization (WTO). Agricultural insurance programs have grown considerably over the past 25 years and now are an integral part of many domestic support programs, not just in developed countries, but in important emerging markets as well. An often-cited impetus for the growth in insurance program is the potential treatment of such programs as exempt from WTO reduction commitments. Under Annex 2 of the Uruguay Round Agreement on Agriculture, domestic support measures that have, at most, a minimal impact on trade, so-called green box policies, are excluded from reduction commitments. Yet while WTO rules shield green box policies from reduction, few developed countries have notified agricultural insurance policies under Annex 2. Moreover, crop insurance programs have been challenged in recent WTO dispute settlement cases and domestic countervailing duty investigations.

Keywords: crop insurance, WTO, green box, safety net

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1. INTRODUCTION

Insurance programs have become an increasingly popular method for providing support to agricultural producers. Mahul and Stutley (2010) reported that in 2007, more than 100 countries had agricultural insurance programs available. In the United States, multiple-peril crop insurance was available on a limited basis as early as the late 1930s; more recently, insurance has become the dominant safety net program in the United States in terms of government outlays, overshadowing more traditional price and income support programs (Glauber 2012). Recent reforms in the European Community (EC) could potentially expand insurance programs there as well (European Commission 2013). Nor is interest in insurance programs confined to the developed world. For example, in 2014, China had a program with a total liability second in size only to that of the United States. Moreover, since the late 1990s, a number of pilot programs using weather-based and other index insurance measures have been introduced in developing countries (Miranda and Farrin 2012; Hatch et al. 2012; Kalra 2013).

An often-cited impetus for the growth in insurance programs is the potential exemption of such programs from World Trade Organization (WTO) reduction commitments (Roberts 2005; Mahul and Stutley 2010). Under Annex 2 of the Uruguay Round Agreement on Agriculture (AoA), domestic support measures that have no, or at most minimal, trade-distorting effects or effects on production are excluded from reduction commitments. Paragraph 7 of Annex 2 includes criteria that identify qualifying income insurance and income safety net programs, while paragraph 8 includes criteria that identify qualifying natural disaster assistance programs, including crop insurance (WTO 2003).

Yet, although WTO rules shield so-called green box policies from reduction, few developed countries have notified agricultural insurance policies under Annex 2 (Smith and Glauber 2012). Moreover, crop insurance programs have been challenged in recent WTO dispute settlement cases and domestic countervailing duty investigations (Schnepf 2005, 2010).

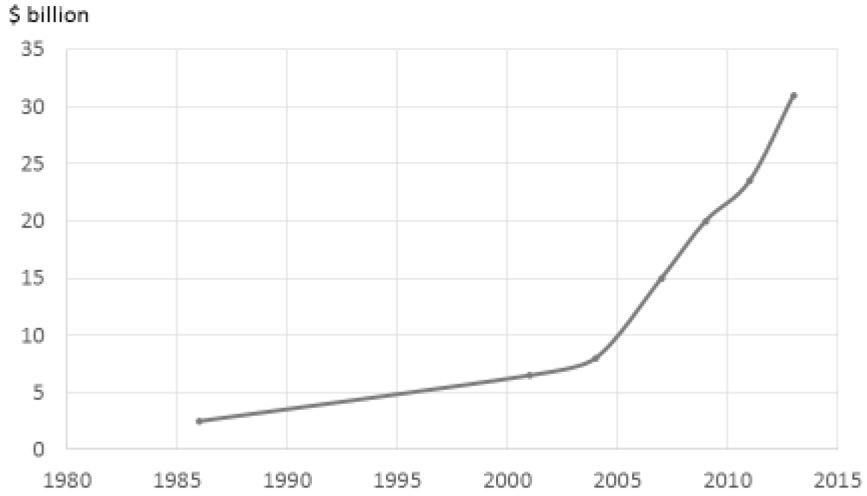
This paper examines the treatment of agricultural insurance under the WTO. Section 2 discusses the growth of insurance programs since the launch of the Uruguay Round in 1986, with a particular focus on growth over the past 10 years in developed and developing countries. The third section presents the negotiating history of Annex 2 in the AoA; of particular significance is that many countries, including the United States, had originally argued that crop insurance subsidies should be disciplined. Next is a detailed examination of the criteria in paragraphs 7 and 8 of Annex 2 in the AoA, followed by an analysis of how countries have notified their insurance programs to the WTO. The paper then turns to a discussion of how subsidies are measured, including those subsidies provided to deliver insurance to producers. The following section then presents a literature review of how agricultural insurance affects production decisions and an analysis of the treatment of agricultural insurance in trade disputes, including Brazil's WTO challenge to US support programs for upland cotton. Lastly, proposed changes to Annex 2 are discussed, including recent proposals under the Doha Development Agenda negotiations. Conclusions are offered in the last section.

2. THE GROWTH OF AGRICULTURAL INSURANCE

Although privately offered livestock and crop hail insurance was sold before 1800 (Munich RE 2011), the growth in agricultural insurance truly began in the first half of the 20th century with the establishment of government-sponsored insurance programs. In the United States, Canada, and Japan, such programs date to the late 1930s. Initially those programs were operated on a pilot basis with limited crop and regional coverage; however, with additional government subsidies, participation grew (Hazell, Pomareda, and Valdes 1986). By the time the Uruguay Round was launched in 1986, total agricultural insurance premiums for these three countries totaled about US$1.6 billion.[1] Although a number of other countries' insurance programs date to the second half of the 20th century, these were small, with total premium volume likely less than $1.0 billion in 1986 (FAO 1991).

Figure 2.1a shows the growth of agricultural insurance programs since 1986. Because the premium estimates are taken from a variety of sources (Roberts 1995; Dick and Wang 2010; Mahul and Stutley 2010; Kalra 2013; Boissonade 2015), exact intertemporal comparisons are not possible; nonetheless, the estimates suggest that premium volumes increased at an annual rate of about 16 percent between 2004 and 2013, about twice the annual growth seen between 1986 and 2004.

Figure 2.1a Growth of world agricultural insurance premium volume

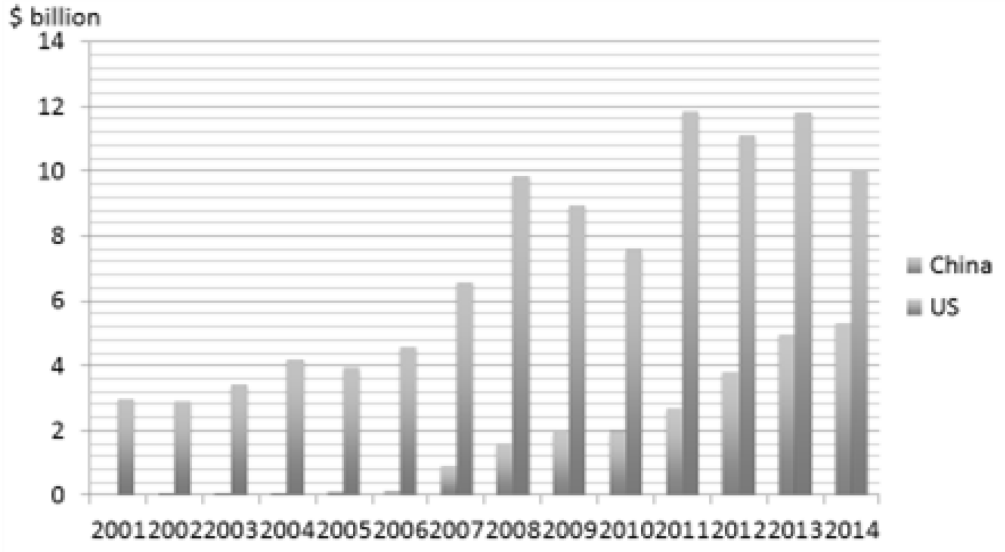


Source: Roberts (2005), Dick and Wang (2010), Mahul and Stutley (2010), Boissonade (2015).

The rapid growth in agricultural insurance markets since 2004 is attributable to several factors, including the appreciation in commodity prices; increased government subsidies, resulting in higher coverage levels in the US market; and growth of agricultural insurance in emerging economies, particularly China. Figure 2.1b shows the growth of US and China crop insurance markets since 2001. In that year, the average coverage level in the United States was 63 percent, with 48 percent of enrolled area insured at 70 percent coverage or higher. By 2013, because of increased subsidies, the average coverage level was 72 percent, with 78 percent of area insured at coverage levels of 70 percent or higher (USDA RMA 2015). China's agricultural premiums remained at relatively low levels in 2007, when premium subsidies were introduced, which resulted in premium volumes increasing from $300 million in 2007 to almost $5 billion in 2013 (Li 2014).

[1] Unless otherwise indicated, all dollar amounts refer to US dollars.

Figure 2.1b Growth of US and China agricultural insurance premiums since 2001



Source: USDA RMA (2015) and Li (2014).

In developed economies such as the United States, Japan, Canada, and Europe, agricultural insurance is generally characterized by indemnity-based programs that provide crop and livestock coverage against named perils, multiple perils, and, more recently, price and revenue risks. Individual-based coverage is expensive because of the high cost of administering contracts and adjusting losses. Moreover, individual-based policies are prone to moral hazard and adverse selection problems, which add to the monitoring costs (Kalra 2013). Because of those costs and in the absence of subsidies, demand for insurance products is low, which is why private unsubsidized markets for multiple peril insurance have generally failed (Wright and Hewitt 1994; Goodwin and Smith 1995) and why the larger insurance programs in the United States, Canada, and Japan are generally highly subsidized. In their comprehensive review of agricultural insurance programs, Mahul and Stutley (2010) found that almost two-thirds of the countries surveyed reported that they subsidized premium costs. Those countries accounted for more than 90 percent of total premiums, at an average subsidy rate of 47 percent. For example, the public costs of the US program, which are estimated at about one-third of 2014 total global premium volume, are projected to exceed $8.5 billion annually over the next 10 years, an expenditure of almost 90 cents for every $1 premium written (CBO 2015).

With such high costs, it is little wonder that the larger agricultural insurance programs are generally found in developed countries. The high costs of contracting with large numbers of dispersed smallholders when there are fixed costs to contracting and poorly developed legal institutions for enforcing contracts have led many to conclude that conventional, indemnity-based insurance does not work for smallholder farmers in developing countries (Hazell 1992). To address these concerns, index-based insurance products based on specific perils or events (for example, regional yield loss, drought, or flood) and recorded at a regional level (for example, by regional weather stations) have been promoted. Examples of such products include area-yield insurance, where premiums and indemnities are based on the average yield in a region, or weather-based indices, such as rainfall insurance, where producers receive a payment if rainfall in the region falls below a designated level (Skees, Hazell, and Miranda 1999; Carter 2012). Such contracts typically minimize moral hazard and adverse selection issues (Miranda 1991) and can be provided at lower costs because loss adjustment and monitoring costs are so much lower.

Index insurance schemes have been piloted in a number of developing countries, with somewhat limited success (see Miranda and Farrin 2012; Carter et al. 2014). The primary drawback is the existence of basis risk; that is, the degree to which the regional yield or weather variable is correlated with the individual farm yield. Producers whose yields are poorly correlated with the aggregate index may find such insurance offers to be insufficient risk protection; thus, basis risk can act to limit demand. One exception is India's Weather Based Crop Insurance Scheme (WBCIS), an index-based insurance program that has grown considerably since its introduction in 2007 to include more than 9 million Indian producers in 2010–11, with a combined commercial premium volume of about $260 million (Clarke et al. 2012; Mahul, Verma, and Clarke 2012). However, the program is heavily subsidized, and participation is mandatory if producers participate in government credit programs.

Agricultural insurance has witnessed dramatic growth since the launch of the Uruguay Round, but that growth has largely been the result of substantial government support measures, which are subject to discipline under the Uruguay Round AoA.

3. AGRICULTURAL INSURANCE AND THE URUGUAY ROUND AGREEMENT ON AGRICULTURE

A landmark achievement of the 1986 Uruguay Round, and specifically of the AoA, was the full inclusion of agriculture in a system of multilateral rules and disciplines, including disciplines governing agricultural support.[2] With the launch of the Uruguay Round, trade negotiators in Geneva began to debate how best to "achieve greater liberalization of trade in agriculture and bring all measures affecting import access and export competition under strengthened and more operationally effective GATT [General Agreement on Tariffs and Trade] rules and disciplines" by "improving the competitive environment by increasing disciplines on the use of all direct and indirect subsidies and other measures affecting directly or indirectly agricultural trade, including the phased reduction of their negative effects and dealing with their cause" (GATT 1986).

In 1987, the Organization for Economic Co-operation and Development (OECD) published its seminal study measuring and analyzing the effect of select members' domestic support measures on agricultural trade.[3] The OECD report put forward the concept of the producer subsidy equivalent (PSE), developed in the 1970s (see Tangermann, Josling, and Pearson 1987). The PSE distinguished among *market price supports,* covering policies that raise market prices received by producers (and consumers); *direct income supports*, which raise the effective prices of producers through transfers rather than raising the price paid by consumers; *indirect income support*, which reduces the costs of producers; and *other support measures*, which cover measures that reduce the cost to the agricultural sector as a whole and which are of general benefit to the society but have no direct effect on producer or consumer prices (OECD 1987). Significantly, the study recognized that although the PSE represented an aggregate measure of distortion, various policy measures did not have the same relative impact on production and trade as they did on farmers' income. In particular, measures in the last category ("other support") were seen as potentially less distorting than the other three categories.

The OECD study had a large impact on subsequent negotiations (Stancanelli 2009). Initial proposals by the United States and the Cairns Group broadly endorsed the concept of the PSE and called for elimination of trade-distorting subsidies (GATT 1987a, 1987c). In line with OECD research, which classified crop insurance subsidies as indirect income support, the US proposal explicitly called for the elimination of "policies such as subsidized crop insurance" (GATT 1987a, 3).

In GATT parlance, subsidies were identified by boxes, which were given the color of traffic lights: green (permitted policies which would be exempt from reduction), amber (to be reduced) and red (prohibited policies) (Josling, Tangermann and Warley 1996)[4]. Both the US and the Cairns Group proposals would exempt from reduction any income support policies that were decoupled from production and marketing, including those that provided a safety net against natural disaster. Canada, a Cairns Group member, put forward a technical discussion paper on domestic support measurement that would classify crop insurance subsidies as "partially distorting measures" subject to discipline (GATT 1988b). Like the US proposal, Canada considered disaster payments as nondistorting measures (that is, green box). Similarly, Japan's initial proposal would have exempted "subsidies related to disaster relief," but it was unclear whether those were to include crop insurance subsidies (GATT 1987d). Finally, the EC's proposal allowed for domestic support reforms but did not mention insurance programs or disaster assistance (GATT 1987b).

Thus, at the outset of the negotiations, two of the world's largest agricultural insurance programs—Canada and the United States—were willing to put crop insurance subsidies on the table for reduction and elimination. By contrast, there was general agreement among negotiating members that

[2] For a detailed history of the negotiations, see Josling, Tangermann, and Warley (1996).

[3] The countries included Australia, Austria, Canada, the EC-10, New Zealand, Japan, and the United States.

[4] The concept of red box policies was later discarded in the agricultural negotiations. In addition, a "blue box' was defined in Article 6.5 of the AoA for amber box policies that limit production. Under the AoA, blue box policies are exempt from reduction (Josling, Tangermann and Wharley 1996).

bona fide disaster measures should be exempt from reduction commitments. By 1989, contracting parties to the GATT began to contemplate the inclusion of crop insurance in the list of permitted policies. In its comprehensive proposal, put forward in the fall of 1989, the United States distinguished among (1) policies to be phased out, (2) policies to be disciplined, and (3) permitted policies. Permitted policies included "disaster assistance keyed to bona fide production losses, including disaster payments, *crop insurance*, disaster relief, etc." (GATT 1989a, 20; emphasis added).

In July 1990, Aart de Zeeuw, chair of the agriculture negotiating group, put together the first attempt at a unifying draft proposal (Josling, Tangermann, and Warley, 1996). In its discussion of internal support measures exempted from reduction commitments, the de Zeeuw text included crop insurance and bona fide disaster assistance, as well as income safety net programs. The text called upon contracting parties to develop specific criteria as necessary. Although the measures were not subject to "progressive and substantial reduction," they were to remain subject to the overall ceiling on support, as well as to surveillance and review[5] (GATT 1990). Inclusion of safety net programs in the green box was supported by the United States, Cairns Group, and Canada, while the EC favored treating those programs as amber and hence subject to reduction (GATT 1990b)

In 1991, a series of technical discussions were held on the green box.[6] The new chairman, Arthur Dunkel, circulated language laying out the basis for exemption from reduction, as well as criteria that defined exempt government service programs as those that provided indirect benefits to producers and consumers, such as research and other general services, domestic food aid, and public stockholding programs (GATT 1991c, 1991d). Criteria for support provided through direct payments, such as decoupled income support, income safety net programs, crop insurance, and disaster programs, were debated in the fall of 1991 and captured in the Draft Final Act (the Dunkel draft) of December 1991 (GATT 1991e). Although the negotiations were not to conclude until December 1993, the language for Annex 2 (the green box) remained essentially unchanged from the Dunkel draft.

One significant change in the AoA (not in Annex 2, but which had implications for Annex 2 policies) was whether Annex 2 policies would be exempt from countervailing duty challenges. Under Article 7.3 of the Dunkel draft ("General Disciplines on Domestic Support"), policies conforming to Annex 2 would be considered nonactionable for the purposes of countervailing measures. That protection was dropped in the final AoA, although green box policies were protected from challenge during the AoA implementation period under the so-called Peace Clause provisions of the AoA (Article 13, "Due Restraint").

[5] Stancanelli (2009, 30) asserted that there was "no indication as to a ceiling or limit to overall support," but in a technical note circulated by the chair in March 1991, it is clear that the issue of whether the green box would be capped was still not settled (GATT 1991a). However, by the time the Dunkel draft was published in December 1991, green box spending was uncapped.

[6] I am particularly grateful to Pam Cooper for her helpful insights and excellent memory concerning the development of green box language during AoA discussions in 1991.

4. AGRICULTURAL INSURANCE IN THE GREEN BOX

Under Annex 2, domestic support measures that claim green box status must meet the general criteria of paragraph 1, as well as the policy-specific criteria articulated in 11 separate paragraphs.[7] Although the AoA includes special and differential treatment for reduction commitments for developing countries, Annex 2 criteria are the same for both developed and developing countries.

Paragraph 1 states that to be exempt from reduction commitments, domestic support measures "shall meet the fundamental requirement that they have no, or at most minimal, trade-distorting effects or effects on production" (WTO 2003). Paragraph 7 of Annex 2 includes criteria that identify qualifying income insurance and income safety net programs, while paragraph 8 includes criteria that identify qualifying natural disaster assistance programs, including crop insurance. Thus, to claim green box status, agricultural insurance programs must meet all criteria in a specific paragraph, as well as the more general criteria in paragraph 1.

The development of the language for paragraphs 7 and 8 gives some sense of the evolution and refinement of the final language. In a technical note by the secretariat circulated in early May 1991, qualifying payments for disaster relief, including crop insurance, would include "the payments of premiums and/or the settlement of claims under *financially sound* crop (including livestock) insurance programmes designed to compensate for the effects of natural disasters" (GATT 1991b; emphasis added). Given that average indemnities paid under the Canadian, Japanese, and US crop insurance programs generally exceeded premiums (including subsidies) during the 1980s (Sigurdson and Sin 1994; Glauber 2004), it is perhaps not surprising that the phrase "financially sound" was dropped in subsequent drafts; however, it is interesting that, at least in early deliberations, the concept of a financially sound insurance program was envisioned.

Natural disasters were defined in the May document as including "the damage resulting from *unexpected or unusually severe* climatic events" (GATT 1991b; emphasis added). In a paper circulated in November 21, 1991, eligibility for losses under either paragraph 7 (income insurance and income safety-net programs) or paragraph 8 (crop insurance and disaster assistance) was to be confined to covering "catastrophic" losses (GATT 1991d). What constituted a "catastrophic" loss? At the time of negotiations, the Canadian program allowed producers to insure up to 80 percent of their expected yields (Sigurdson and Sin 1994). Although the US program allowed participants to insure up to 75 percent of their expected yield, almost 75 percent of area, representing 70 percent of premiums, was insured at coverage levels of 65 percent or lower (USDA RMA 2015). Moreover, US disaster programs in the 1980s required losses of 35 percent before producers could receive payment (Glauber and Collins 2002). In the Draft Final Act, the catastrophic loss threshold was defined as losses in excess of 30 percent of average production or income.

A striking feature of paragraphs 7 and 8 is the prescriptive criteria that are often at odds with good insurance principles. The prescriptive language grew out of concern about allowing some kind of support to deal with production and income losses beyond a producer's control but not allowing unlimited support that would presumably result in market distortions. For example, both paragraphs use a three-year or five-year Olympic average (in which the highest and lowest entries are discarded) as the base period for determining losses in a current year. When Annex 2 criteria were being debated, both the United States and Canada had established yield guarantees for their crop insurance programs that were based on yield histories of up to 10 years (Sigurdson and Sin 1994; Skees and Reed 1986). From an actuarial perspective, longer time series produced a more accurate yield estimate that was thought to minimize adverse selection problems caused by producers who might buy insurance when a three-year average was high relative to their expected yield and not buy when it was lower than their expected yield (Skees and Reed 1986).

[7] The relevant paragraphs of Annex 2 are presented in the appendix.

This led to an interesting question—why did the negotiated criteria not reflect a more actuarially appropriate time period? A primary concern for the United States was ensuring that its ad hoc disaster programs qualified under paragraph 8. US disaster programs typically used a three-year average or a five-year Olympic average to establish production losses. Moreover, in the late 1980s and early 1990s, the George H. W. Bush administration had been critical of the US crop insurance program and had even proposed eliminating crop insurance and replacing it with a standing disaster program in its 1990 Farm Bill proposal (Glauber and Collins 2002; Glauber 2012).

Similarly, criteria in paragraph 8 would seem to bias reporting toward natural disaster programs rather than insurance programs. For example, paragraph 8(a) states that eligibility "shall arise only following a formal recognition by government authorities that a natural or like disaster … has occurred or is occurring;" however, such language is less appropriate for insurance programs. Indemnity-based insurance losses are, by their nature, idiosyncratic; indeed, even in years with bumper crops, individual farms may suffer losses. Thus, requirements for a public declaration of disaster would seem to preclude insurance programs from qualifying under paragraph 8.

Lastly, and perhaps most important, after the release of the Dunkel draft, there was effectively no opportunity for negotiators to make changes to Annex 2, as the text was considered "locked down" while discussions were stalled around the larger issues of total versus product-specific aggregate measurement of support (AMS) disciplines and export subsidy reduction percentages (Josling, Tangermann, and Warley 1996). In the end, only minor changes were made to Annex 2, none of which affected paragraphs 7 or 8 (Stewart 1999).

5. WTO MEMBERS' USE OF ANNEX 2 TO NOTIFY AGRICULTURAL INSURANCE PROGRAMS

Under the AoA, members are required to make annual notifications to the WTO on the extent of their domestic support measures. Given the variance of Annex 2 criteria with the provisions of selected WTO member insurance programs, how have WTO members notified their agricultural insurance programs? Paragraph 7 has been little used by WTO members. Through 2012/2013, only Australia, Canada, and the European Union (EU) have made consistent use of the provisions, and this use has largely been for safety net programs rather than true insurance schemes. Australia notifies tax savings from its whole-farm based Farm Management Deposits scheme, a tax shelter–based savings account on which farmers may draw in times of natural disasters (Commonwealth of Australia 2015). Outlays averaged $110 million from 2008/2009 through 2012/2013 (Table 5.1). Canadian income safety net programs have undergone several changes since the late 1990s but, like Australia's program, function as a producer-funded savings account in which producers receive matching deposits from the federal and provincial governments (Antón, Kimura, and Martini 2011). Federal and provincial outlays under Canada's AgriInvest program (and its predecessors) averaged $588 million from 2008/2009 through 2012/2013. The EU is the only other WTO member to consistently notify some support under paragraph 7, but the values notified have been small, averaging less than $30 million annually from 2008 through 2012. The Russian Federation began notifying an income safety net scheme under paragraph 7 in 2012/2013,[8] with reported outlays totaling $172 million.

Table 5.1 Notification of income safety net programs under Annex 2, paragraph 7, select countries (US$ millions)

Notification year	Australia	Canada	EU	Russia
2008/2009	78.0	523.2	23.8	na
2009/2010	59.5	641.2	22.4	na
2010/2011	30.9	698.4	30.4	na
2011/2012	237.9	555.8	40.3	na
2012/2013	144.8	522.0	na	171.8
Average	110.2	588.1	29.2	171.8

Source: WTO (2015b).
Note: na = not applicable.

The United States has offered revenue insurance since the mid-1990s; in 2014, revenue products accounted for two-thirds of total area insured and more than 80 percent of total premiums (USDA RMA 2015). However, most of the US revenue insurance policies are crop specific and pay when producers have either a production or revenue loss. Criteria in paragraph 7(c) state that payments "shall not relate to the type or volume of production," which would seemingly preclude product-specific revenue schemes and programs that pay on production losses, even if those losses are offset by a rise in prices (as can be the case under the US program).

The Australian and Canadian programs appear to provide whole farm–based income safety nets, yet it is less clear whether their provisions are fully consistent with paragraph 7. Under Australia's Farm Management Deposits scheme, producers can withdraw funds whenever there is a disaster, but neither the disaster designation nor the size of the withdrawal appears to be tied to the 70 percent criteria laid out in paragraph 7(a). Similarly, under the Canadian AgriInvest program, producers can withdraw the funds at any time for risk mitigation or other investments. Little detail is known about the EU or Russian programs.

[8] It is unclear whether the reported measure is an income insurance scheme or a yield-related crop insurance scheme. (See Bobojonov, Götz, and Glauben [2014] for a discussion of Russian insurance schemes.)

Many WTO members have notified support under paragraph 8 for disaster assistance; however, the main issue surrounding these notifications is a lack of transparency. Few of the programs notified appear to be agricultural insurance–type programs; rather, they are programs responding to ad hoc disasters. Based on the numerous questions and answers exchanged during the review process of the WTO Committee on Agriculture's regular meetings, however, it is not clear that many countries actually meet all the criteria.[9]

Most developed countries that have notified crop insurance outlays to the WTO, including the United States, Canada, and the European Union (which notifies for all its member states), have notified those outlays as amber box outlays (see Table 5.2). The exception is Japan, which notifies subsidies for those insurance policies at coverage levels of 70 percent or less under paragraph 8. For policies with coverage levels in excess of 70 percent, Japan notifies the subsidies as amber (Ito and Dyck 2002).

Table 5.2 Notification of agricultural insurance, select countries (US$ millions)

	US	Japan	Canada	EU	China	India	Brazil
How reported	Amber	Green/ amber	Amber	Amber	Not reported	Green	Green
2008/2009	5,691	626	699	770	1,148	174	65
2009/2010	5,426	682	771	548	1,473	330	181
2010/2011	4,711	695	748	550	1,571	693	302
2011/2012	7,461	779	881	583	2,080	na	78
2012/2013	6,926	736	1,002	na	2,949	na	455
Average	6,043	704	820	613	1,844	399	216

Source: WTO (2015b).
Note: na = not applicable.

As discussed earlier, the past several years have seen significant growth in agricultural insurance markets in developing countries. Based on recent WTO notifications, Brazil, India, and the Philippines have notified agricultural insurance programs under paragraph 8. Chile notifies its insurance program under paragraph 6 (decoupled support payments), and Mexico has notified its subsidies under paragraph 6.2 (developmental measures that are exempt from reduction). The Republic of Korea has notified its subsidies as amber box outlays. China, which paid premium subsidies totaling almost $3 billion in 2012/2013, has yet to include agricultural subsidies as part of its domestic support notifications.

The WTO criteria have become even more out of step in light of changes in agricultural insurance programs, especially those in the United States. In addition to revenue products, the United States has developed area-based products based on average county yields and livestock and dairy margin products based on the difference between input and output prices. Index insurance products are also available, based on weather or vegetative growth indexes. These new products are even further removed from the WTO criteria developed more than 20 years ago.

In light of the incompatibility of WTO green box criteria and the actual operation of crop insurance programs, two conclusions can be drawn. One is that the criteria have adequately prevented abuse of crop insurance programs, as revealed by practically all developed country programs notifying as part of the amber box (Smith and Glauber 2012). However, the second conclusion is that the criteria are overly restrictive and ill-structured to allow for the establishment of even a modest and actuarially sound crop insurance program designed to protect producers from catastrophic losses. The latter conclusion would seem to demand the development of new WTO green box criteria that would allow for minimally trade-distorting crop insurance programs, while still reigning in production-distorting elements.

[9] Agriculture-related information notified by WTO members and questions and responses provided in the context of the review process carried out by the Committee on Agriculture can be found at http://agims.wto.org/.

6. MEASUREMENT OF AGRICULTURAL INSURANCE SUBSIDIES

Annex 3 of the AoA specifies guidelines for calculating the aggregate measurement of support, which is calculated as budgetary outlays including "revenue foregone by governments or their agents" (paragraph 2) minus "specific agricultural levies or fees paid by producers" (paragraph 4). Support is measured at both the national and subnational levels (paragraph 3). In addition, the AoA provides guidance for non–price support measures, including input subsidies and other measures such as marketing-cost reduction measures; it states that "the value of such measures shall be measured using government budgetary outlays or, where the use of budgetary outlays does not reflect the full extent of the subsidy concerned, the basis for calculating the subsidy shall be the gap between the price of the subsidized good or service and a representative market price for a similar good or service multiplied by the quantity of the good or service" (paragraph 13).

Perhaps the most straightforward method of calculating insurance outlays is to simply take the difference between indemnities paid and premiums collected for the reporting year. The United States reported insurance subsidies in that manner from 1995 to 2008. Due to the nature of the risks incurred, crop insurance indemnities can be highly variable. For example, net indemnity payments under the US crop insurance program have varied from $121.0 million in 2007 to more than $13.3 billion in 2012 (Table 6.1). Due to this variability, such ex post measures may give little insight into the level of subsidy provided by the insurance program.[10]

Table 6.1 Net indemnities paid versus premiums subsidies, US crop insurance program, 1995–2014 (US$ millions)

Year	Indemnity	Total premium	Premium subsidy	Producer premium	Net indemnity
1995	1,567.7	1,543.3	889.5	653.8	913.9
1996	1,492.7	1,838.6	982.1	856.4	636.3
1997	993.6	1,775.4	903.1	872.3	121.3
1998	1,677.5	1,875.9	947.6	928.4	749.1
1999	2,434.7	2,310.1	1,394.0	916.2	1,518.5
2000	2,594.8	2,540.2	951.2	1,589.0	1,005.9
2001	2,960.1	2,961.9	1,771.7	1,190.1	1,770.0
2002	4,066.7	2,915.9	1,741.4	1,174.5	2,892.2
2003	3,260.8	3,431.4	2,042.0	1,389.3	1,871.5
2004	3,209.7	4,186.1	2,477.4	1,708.7	1,501.0
2005	2,367.3	3,949.2	2,343.8	1,605.4	761.9
2006	3,503.6	4,579.5	2,682.0	1,897.5	1,606.1
2007	3,547.6	6,562.1	3,823.4	2,738.8	808.8
2008	8,679.9	9,851.3	5,690.9	4,160.4	4,519.5
2009	5,228.8	8,950.7	5,426.9	3,523.9	1,705.0
2010	4,251.4	7,594.4	4,711.3	2,883.1	1,368.3
2011	10,809.6	11,841.1	7,366.0	4,475.2	6,334.5
2012	17,441.9	11,113.6	6,977.3	4,136.3	13,305.6
2013	12,073.6	11,805.2	7,295.1	4,510.1	7,563.5
2014	9,057.3	10,061.4	6,208.1	3,853.3	5,203.9
Average 1995–2014	5,061.0	5,584.4	3,331.2	2,253.1	2,807.8

Source: USDA RMA (2015).

[10] From 1995 to 2002, Canada also reported an ex post measure of support calculated by multiplying indemnities paid in that year by the "long run contribution from government," given as 56 percent of the total contribution. Canada began reporting premium subsidies in the 2003 reporting period (WTO 2015b).

A more accurate measure of the ex ante benefits of a subsidized insurance program would be the producer's expected net indemnity payment at the time the planting decision was made. The expected benefit would equal the expected indemnity payment minus the premium paid by the producer, which is the premium charged minus any premium subsidy:

$$E(\text{benefit}) = E(\text{indemnity}) - (\text{premium} - \text{premium subsidy}) \quad (1)$$

Assuming premiums are set at actuarially fair rates, the premium will equal the expected indemnity. In this case, the expected benefit will be equal to the premium subsidy:

$$E(\text{benefit}) = \text{premium subsidy}. \quad (2)$$

Many countries, including the United States, the EU, Japan, and Canada, currently report premium subsidies to the WTO. However, if premiums do not accurately reflect underlying risks, premium subsidies may underestimate the benefits provided to producers. In that case, expected benefits equal the premium subsidy plus expected excess losses, defined as total indemnities minus total premiums:

$$E(\text{benefit}) = \text{premium subsidy} + E(\text{indemnity} - \text{premium}). \quad (3)$$

Glauber (2004) showed that the historical loss ratio for the US crop insurance program from 1981 to 1993 was more than 150 percent (that is, total indemnities exceeded total premiums, including premium subsidies, by 50 percent). Over that period, net indemnities averaged $411 million annually, while the average premium subsidy was only $130 million. With rate reforms initiated in the early 1990s and broader participation stemming from increased premium subsidies, loss ratio performance improved considerably over the past 20 years. From 1995 to 2014, the average loss ratio for the US crop insurance program was 91 percent.[11] Annual premium subsidies averaged $3.3 billion over the period, compared with annual net indemnity payments that averaged only $2.8 billion (see Table 6.1).

A related issue is how delivery costs are notified. Countries provide varying degrees of support to agricultural insurance programs (Mahul and Stutley 2010; Smith and Glauber 2012). Some countries, such as the United States, develop insurance products for producers and then separately provide reinsurance and delivery expense reimbursements to private companies to deliver such insurance to producers. In other countries, such as France, private companies develop insurance products and include delivery expenses in the insurance premiums. The government then provides subsidies to producers to cover a portion of the total premium costs.

Delivery of agricultural insurance can be quite costly (Hazell 1992; Goodwin and Smith 1995). In a 2008 World Bank survey, Mahul and Stutley (2010) found that in 29 sampled countries with subsidized insurance programs, delivery costs averaged about 25–30 percent of the gross (unsubsidized) premium. Delivery costs include marketing and acquisition costs (including commissions paid to agents and brokers), administrative expenses, and loss adjustment expenses. In his 1992 paper, Hazell measured the full economic cost of subsidized insurance to governments as the ratio of the sum of total indemnities plus delivery costs, divided by premiums paid by producers:

$$\text{Hazell ratio} = (\text{indemnities} + \text{delivery costs})/\text{producer premium} \quad (4)$$

Table 6.2 presents the full costs of the US crop insurance program for 1995–2014. Recall from Table 6.1 that indemnities paid equaled 91 percent of total premiums collected over the period (including subsidies). On average, producers received $2.25 in indemnity payments for every $1.00 they paid in

[11] The United States began notifying crop insurance support using premium subsidies (rather than net indemnity payments) in the 2008 reporting year, arguing that because the 2008 Farm Bill required crop insurance premiums to be set on an actuarially fair basis (that is, where the expected loss ratio is equal to 100 percent), premium subsidies were a more accurate estimate of the subsidy (WTO 2015a).

premiums. However, once delivery costs are included, the government paid an average $3.00 for every $1.00 received in producer premiums.

Table 6.2 Total economic costs of US crop insurance program, 1995–2014 (US$ million)

Year	Indemnity	Producer premium	Net indemnity	Delivery costs	Total insurance outlays	Producer loss ratio[a]	Hazell ratio[b]
1995	1,567.7	653.8	913.9	509.3	1,423.2	2.40	3.18
1996	1,492.7	856.4	636.2	714.0	1,350.2	1.74	2.58
1997	993.6	872.3	121.3	793.1	914.3	1.14	2.05
1998	1,677.5	928.4	749.2	715.5	1,464.7	1.81	2.58
1999	2,434.7	916.2	1,518.5	770.3	2,288.9	2.66	3.50
2000	2,594.8	1,589.0	1,005.9	824.8	2,245.3	1.63	2.91
2001	2,960.1	1,190.1	1,770.0	994.1	2,764.2	2.49	3.32
2002	4,066.7	1,174.5	2,892.2	616.0	3,508.2	3.46	3.95
2003	3,260.8	1,389.3	1,871.5	1,117.0	2,988.5	2.35	3.15
2004	3,209.7	1,708.7	1,501.0	1,590.0	3,091.0	1.88	2.81
2005	2,367.3	1,605.4	761.9	1,748.0	2,509.9	1.47	2.56
2006	3,503.6	1,897.5	1,606.1	1,787.0	3,393.1	1.85	2.79
2007	3,547.6	2,738.8	808.8	2,909.0	3,717.8	1.30	2.36
2008	8,679.9	4,160.4	4,519.5	3,111.0	7,630.5	2.09	2.83
2009	5,228.8	3,523.9	1,705.0	3,896.0	5,601.0	1.48	2.59
2010	4,251.4	2,883.1	1,368.3	3,300.0	4,668.3	1.47	2.62
2011	10,809.6	4,475.2	6,334.5	3,049.0	9,383.5	2.42	3.10
2012	17,441.9	4,136.3	13,305.6	94.0	13,399.6	4.22	4.24
2013	12,073.6	4,510.1	7,563.5	2,056.0	9,619.5	2.68	3.13
2014	9,057.2	3,853.3	5,203.9	3,324.0	8,527.9	2.35	3.21
Average 1995–2014	5,061.0	2,253.1	2,807.8	1,695.9	4,524.5	2.25	3.00

Source: Glauber (2004), USDA RMA (2015).
Notes: [a]. Indemnities divided by producer premium. [b]. Indemnities plus delivery costs divided by producer premium.

Clearly, if agricultural insurance were delivered by the private sector in the absence of any government subsidies, delivery costs would be fully loaded into premium costs. As such, delivery cost subsidies constitute a subsidy to producers. However, as pointed out by Mahul and Stutley (2010), the Hazell ratio may overstate benefits because the measure does not take into account the insurance company's performance as a financially viable or nonviable entity. The US crop insurance program, for example, has been heavily criticized for providing excessive subsidies to the private sector that have largely been captured by crop insurance agents and others (GAO 2009; Babcock 2012). Thus, for programs that subsidize delivery costs, the actual benefit to the producer expressed as a ratio of benefits to premium paid likely falls between the producer loss ratio and the Hazell ratio.

For countries where producers receive subsidies to cover a portion of fully loaded premiums (such as France), the full subsidy is captured by the premium subsidy. Where delivery costs are provided separately, they have typically not been reported to the WTO. The United States began reporting delivery costs in its 2009 WTO notification but, under paragraph 2 (general services) of Annex 2, not as an amber box subsidy.

Lastly, there is the issue of whether amber box agricultural insurance subsidies should be notified as a product-specific subsidy (for example, corn crop insurance subsidies) or as a non-product-specific subsidy (such as water subsidies that may be general available for all crops). WTO members have

generally notified amber box crop insurance subsidies as non-product-specific.[12] For example, responding to a question raised by the European Union concerning insurance subsidies, the United States defended notifying them as non-product-specific by saying, "Since the parameters are uniform by commodity and such a wide range of commodities are covered, this programme is notified as 'non-product specific'" (WTO 1999). Canada made similar arguments defending crop insurance subsidies as non-product-specific, stating that insurance is "available to almost all commercially grown commodities (more than one hundred) across Canada. Any producer in Canada is eligible to participate in the programme for agricultural products eligible for coverage" (WTO 2008a).

Yet although crop insurance may be available for "almost all crops," subsidy levels vary markedly across crops. Table 6.3 shows premium subsidy levels for selected US crops in 2014. Subsidies are calculated on a per-insured-acre basis, as well as a percentage of the value of production. While the average insured acre received a per-unit subsidy of $21.00, among the crops considered, subsidies ranged from $15.12 per acre for barley to $45.65 for upland cotton. On a value of production basis, premium subsidies for barley, corn, peanuts, rice, and soybeans were less than 5 percent in 2014, whereas premium subsidies for upland cotton, grain sorghum, and wheat all exceeded 7.5 percent.

Table 6.3 US crop insurance subsidies for selected crops, 2014

Commodity	Acres	Value of production (VoP)	Subsidy	Average subsidy per acre	Subsidy as percentage of VoP
	million	*US$ million*		*$/acre*	*%*
Barley	2.2	869.7	33.0	15.12	3.8
Corn	79.0	52,372.2	2,187.7	27.70	4.2
Cotton	10.4	4,625.8	473.1	45.65	10.2
Grain sorghum	5.3	1,670.4	134.4	25.35	8.0
Peanuts	1.2	1,122.3	38.2	30.72	3.4
Rice	2.7	3,104.6	57.3	21.51	1.8
Soybeans	73.8	40,288.5	1,391.8	18.85	3.5
Wheat	47.9	11,923.9	918.3	19.16	7.7
All crops	294.5	223,867.2	6,209.7	21.09	2.8

Source: USDA RMA (2015).

The United States began notifying crop insurance subsidies on a product-specific basis with its 2012 domestic support notification. The country noted that questions had been raised by various WTO members regarding US classification of crop insurance as non-product-specific: [13]

In preparing its 2012 notification the United States undertook a review of its notification of its crop insurance program. As a result of that review, the United States decided that because crop insurance premiums are based on production histories and expected prices of specific commodities, and because crop insurance policies are priced according to the actual crop planted and contain crop specific terms and features, and thus the associated premium support has similar crop-specific associations, the U.S. crop insurance program is more appropriately classified as product-specific support (WTO 2015a).

[12] Notifying crop insurance subsidies as non-product-specific amber dates to 1992, when the United States, Japan, Canada, and other contracting parties submitted schedules of commitment (WTO 1995). At the time, comprehensive records of crop-specific insurance data were not readily available, and it seems likely that the lack of data may have been an important factor in the decision to notify subsidies as non-product-specific.

[13] The United States indicated that it would submit corrected notifications reflecting the new reporting method for 2008–2011 (WTO 2015a).

7. IMPACT OF AGRICULTURAL INSURANCE SUBSIDIES ON PRODUCTION

Recall that the general criteria for green box measures require that such measures must have no, or at most minimal, trade-distorting effects on production. Insurance generally improves welfare for risk-averse producers (Just, Hueth, and Schmitz 2005), because in the presence of contingency markets like crop insurance, these producers will grow more. However, empirical evidence for US producers suggests that these effects are likely small. Just, Calvin, and Quiggin (1999) found that for producers participating in the US federal crop insurance program, risk aversion was a minor part of the incentive to participate. Rather, the decision to participate was largely driven by the size of the expected benefit (due to premium subsidies). Recent papers by Babcock (2015) and Du, Feng, and Hennessy (2014) pointed out that if producers are participating in the crop insurance program primarily to "harvest" subsidies, they are not acting optimally (that is, they are not choosing optimal levels of coverage to maximize subsidies). These studies concluded that farmers' decisions about how much crop insurance to buy are not generally consistent with either expected profit or utility maximization. Farmers do not pick coverage levels that maximize expected subsidies, nor do they demand full insurance coverage. Over time, however, producers have tended to sign up for higher coverage levels when the per-unit subsidies tend to be higher. Glauber (2012) showed that the average coverage levels for most row crops have grown significantly and continuously since the late 1990s, when subsidies were increased for higher coverage levels.

Empirical work on insurance has focused primarily on the effects of the US crop insurance program on planted area and the effects of insurance on input use. In an analysis of Nebraska corn producers, Wu (1999) concluded that farms that purchased insurance were more likely to produce soybeans and less likely to produce forage crops. Using a simulation model with regional acreage supply equations, Young, Vandeveer, and Schnepf (2001) found that planted acreage for major field crops was only 0.4 percent higher due to subsidized insurance. Increased plantings of wheat and cotton accounted for about three-fourths of the increase. Goodwin, Vandeveer, and Deal (2004) examined Midwestern corn and soybean producers and wheat and barley producers in the Northern Plains and found that a 30 percent decrease in premium costs was likely to increase barley acreage by about 1.1 percent and corn acreage by less than 0.5 percent; soybean and wheat acreage showed no statistically significant impact. Ligon (2012) analyzed the impact of crop insurance on specialty crops and concluded that the introduction of crop insurance had a large and positive impact on tree crops but a negligible impact on nontree crops.

Although no studies have directly analyzed the effects of crop insurance on yield, much research has been done on the effects of crop insurance on input use (Horowitz and Lichtenberg 1993; Quiggin, Karagiannis, and Stanton 1993; Babcock and Hennessy 1996; Smith and Goodwin 1996; Goodwin and Smith 2003; Goodwin, Vandeveer, and Deal 2004). With the exception of Horowitz and Lichtenberg, these studies concluded that the effects of crop insurance on input use are negative, suggesting that the resulting effect on yields is also likely negative. Whether this effect is large enough to offset any positive effect on crop acreage remains an open question.

Although research on the production effects of insurance programs outside the United States is limited, similar conclusions have been drawn. Garrido, Bielza, and Sumpsi (2003) found that crop insurance subsidies had minimal effects on Spanish producers' planting decisions. In an analysis of Indian rice producers, Varadan and Kumar (2012) found that crop insurance encouraged crop specialization among Tamil Nadu farmers; however, it was unclear whether all crops were provided insurance or just rice.

Goodwin and Smith (2012) questioned whether the results of earlier studies continue to be relevant, given that subsidy levels are much higher now than when earlier research was conducted and that revenue policies have largely replaced yield coverages. For example, Goodwin, Vandeveer, and Deal (2004) examined the effects of insurance subsidies from 1986 to 1993, prior to the enactment of major legislation in 1994 and 2000, which dramatically increased subsidy levels and the introduction of revenue insurance (Glauber 2004). In 1993, government subsidies as a percentage of total premium costs averaged 25–27 percent for the crops examined in the study, compared with 60–63 percent for those crops in 2014

(Table 7.1). Average subsidies ranged from $1.33 to $2.12 per acre in 1993, compared with $15.12 to $27.70 per acre in 2014.

Table 7.1 Average subsidies, 2014 versus 1993

	Dollars per acre		Subsidy as percentage of premium	
Crop	**1993**	**2014**	**1993**	**2014**
Barley	1.41	15.12	26.9%	62.0%
Wheat	1.33	19.16	27.2%	63.2%
Corn	2.12	27.70	25.7%	60.0%
Soybeans	1.71	18.85	25.8%	61.6%

Source: USDA RMA (2015).

Recent studies by Walters et al. (2012) and Claasen, Langpap, and Wu (2015) found negligible effects of crop insurance on land use, though the latter found more significant impacts on crop choice and crop rotation. Yet, although the levels of support for insurance products have increased substantially, the relative share of subsidies across crops has remained largely the same, at least for those crops that are offered similar types of insurance products. With improvements in rate making, due in part to the wealth of farm-level data, premium rates are more in line with underlying risks, which means that relative rates should not favor one insured crop over another (Glauber 2012). Further complicating analyses is the fact that because price elections for most of the major row crops are now based on futures market prices, per-acre premiums (and subsidies) are highly correlated to harvest price expectations.

The general conclusions from this body of research are mixed and are largely based on US experience. Studies mostly indicate that crop insurance subsidies have had minimal effect, at least in areas where insurance is broadly available across crops. In addition, crop insurance likely has larger impacts on crop choice when insured crops compete against uninsured crops or when crops with available revenue products compete against crops for which only yield products are available.[14] Such distortions may become even larger with the development of new products, such as margin insurance and supplemental coverage, particularly if such products are not widely available across crops.

[14] Under the US program, revenue products are mostly available for crops for which there are viable futures markets for price discovery purposes (for example, corn, wheat, and cotton).

8. TREATMENT OF CROP INSURANCE IN TRADE DISPUTES

Crop insurance has been subject to investigation in various trade disputes, including Brazil's WTO challenge to US cotton subsidies (*US–Upland Cotton*) and several countervailing duty investigations (see Schnepf 2006; Johnson and Becker 2010). Although the international rules differ, each case addressed similar issues: (1) the crop specificity of the program, (2) the treatment of producer benefits, and (3) the treatment of company benefits.

US–Upland Cotton

The US crop insurance program was part of Brazil's WTO challenge to US support programs for upland cotton. Brazil objected to US domestic support programs based on two factors: (1) those programs provided support to upland cotton and thus needed to be included as part of the Peace Clause analysis, and (2) subsidies for upland cotton distorted US cotton production, which depressed world cotton prices (price suppression).

The first part of Brazil's challenge concerned Article 13 of the AoA (the so-called Peace Clause), which protected domestic support measures from challenge under the WTO Subsidies and Countervailing Duties Agreement if all non–green box support from those measures did not exceed support granted "to a specific commodity in excess of that decided during the 1992 marketing year" (WTO 2003). The Peace Clause determination was thus a threshold decision that determined whether Brazil could bring a price-suppression case against US cotton subsidies. Brazil included crop insurance and other price and income support programs for cotton in the Peace Clause calculation and used premium subsidies for upland cotton as the measure of that support.

The United States argued that support for crop insurance should be excluded from the Peace Clause calculation—not because subsidies were green (indeed, as presented previously, subsidies had been notified as amber), but because the insurance subsidies were not specific to cotton but were generally available for all insured crops. The United States did not contest the use of premium subsidies as measurement, even though it had been notifying net indemnities as a measure of support.[15]

A WTO compliance panel sided with Brazil, determining that crop insurance subsidies were specific to cotton and accepting Brazil's original data on premium subsidies for upland cotton as the measure of support. Thus, premium subsidies to upland cotton were included in total support to cotton during the 1999–2002 period of investigation. The panel found that the support exceeded cotton support in 1992 and thus ruled that US cotton programs were not exempt from challenge.

Once the panel concluded that US support programs were not exempt from challenge under the Peace Clause, all the programs, including crop insurance, were exposed to Brazil's serious prejudice challenge. Brazil claimed that the combined US programs, by paying out large subsidies, encouraged excess US production and exports, thus driving down world prices to the disadvantage of Brazil's cotton producers.

To evaluate Brazil's claims, the panel examined the nature of the US subsidy to determine whether payments under the various programs were price contingent (WTO 2004, para. 7.1290). The panel considered it highly relevant that certain US subsidies were directly linked to world market prices, including marketing loan payments, Step 2 payments, and countercyclical payments: "We consider that the nature of the United States subsidies at issue—in terms of their structure, design, and operation—is relevant in assessing whether or not they have price suppressing effects. We see before us two general types of United States subsidies: those that are directly price-contingent, and those that are not" (WTO 2004, para. 7.1289).

[15] The difference in measures would have had little material difference in the calculation. Upland cotton premium subsidies for 1999–2002 averaged $197 million, compared with $27 million in 1992 (a difference of $170 million). Net indemnities averaged $373 million for 1999–2002, compared with $224 million in 1992 (a difference of $149 million). Thus, the difference in the measures would have been about $21 million.

The panel concluded that crop insurance—along with direct payments and their predecessor, production flexibility contract payments—were not price contingent. The panel noted that subsidized crop insurance reduced costs, affected risk considerations, and heightened economic security, all of which could have positive ramifications for producer wealth and investment and economic stability (WTO 2004, para. 7.1306). However, the panel concluded that crop insurance subsidies were more in the nature of income support and therefore did not need to be included in the final analysis of price suppression.

The panel's serious prejudice ruling for crop insurance seemingly ignores the fact that revenue insurance was available to US cotton producers and thus, arguably, was price contingent.[16] In its review of crop insurance, the panel noted that the major plan type, which was available for more than 100 commodities, was "actual production history" and that other plan types, such as area plans and revenue plans, were available for only a small number of commodities. Thus, crop insurance was viewed mainly as a program that insured crop yields.

During the period of investigation (1999–2002), revenue policies never exceeded more than 14 percent of cotton area enrolled in the program. Since revenue policies were first introduced in the mid-1990s, they have grown in popularity and now dominate US crop insurance choices.[17] In 2014, revenue policies accounted for about 80 percent of enrolled cotton area and 90 percent of cotton insurance premium subsidies. In addition, the 2014 Farm Bill replaced cotton income support programs with a supplemental area-based revenue insurance program for cotton producers; this was called the Stacked Income Protection Plan (STAX).[18] Lau, Schropp, and Sumner (2015) pointed out that recent case law from the WTO Appellate Body ruling in *US—Large Civil Aircraft* clarified that panels are to include in serious prejudice findings any subsidies with an identifiable impact on production or pricing decisions. Under the new jurisprudence, panels would arguably have to take subsidies into account, even if those subsidies are not price contingent but could be shown to have an impact on production or pricing decisions.

Crop Insurance and Countervailing Duty Challenges

In a countervailing duty (CVD) challenge, a country claims that the effect of subsidized imports of a product harms its domestic industry. US support programs for several commodities have been challenged on several occasions, and some of those challenges have involved crop insurance. The cases reviewed here include three challenges that Canada made to US programs for corn, as well as China's challenge to US chicken exports based on subsidies to corn and soybeans as feed ingredients that passed through to chicken prices. The rules for CVD investigations are different from those involved in the *US–Upland Cotton* case or in domestic support notifications to the WTO. In general, the aim of these investigations is to determine whether a subsidy is specific to a product and, if so, to determine a subsidy rate, such as dollars per bushel. (Whether the subsidized imports damage the domestic industry is a separate analysis.) The treatment of crop insurance in these investigations provides interesting insight into how different countries have measured and analyzed those programs.

[16] Brazil did not appeal the panel's decision on crop insurance, presumably because crop insurance subsidies were small relative to the other price-based programs.

[17] Revenue insurance for upland cotton was introduced in 1998.

[18] The primary motivation for the STAX program was to resolve the WTO case with Brazil. On October 16, 2014, Brazil and the United States notified the WTO Dispute Settlement Body that, in accordance with Article 3.6 of the Dispute Settlement Understanding, they had concluded a memorandum of understanding and agreed that this dispute was terminated (Schnepf 2014).

Canada–US Corn Cases

Canada challenged US corn programs three separate times under its Special Import Measures Act for the marketing years 1985, 1998–1999, and 2003–2004. In each case, crop insurance was included as an actionable subsidy specific to corn. The subsidy was measured differently each time, and unlike in the *US—Upland Cotton* case, benefits to the companies were included.

In the 1985 case, the Canadian authorities found: "The program is considered to be targeted in that, while the program is apparently available to all persons engaged in agriculture, in fact it is not" (cited in GATT 1992, 14). The amount of the subsidy was equal to the amount of indemnities paid to corn, plus the administration and operating expenses allocated to corn, minus the producer-paid premiums. The subsidy was divided by total corn production to give a subsidy per bushel of $0.003345 (GATT 1992).

In the 1998–1999 case, Canada estimated the crop insurance subsidies as total net indemnities and expenses for all crops and then allocated a portion of that total to corn based on corn's percentage of the value of all insurance (based on liabilities) and divided that by total corn production. This method resulted in a subsidy of $0.043 per bushel for 1998 and $0.056 per bushel for 1999 (Canada Border Services Agency 2001). Similar to its arguments in *US—Upland Cotton*, the United States argued that crop insurance subsidies were not specific to corn, noting the number of products insured and the large share of all crops that were insured in various states. In addition, the United States argued that Canada should use net indemnities for corn only, claiming that corn had lower loss ratios than the combined book of business. To calculate corn's share of underwriting gains and delivery expenses, the United States proposed using corn's share of total premiums, noting that underwriting gains and delivery expenses were based on premiums, not liabilities.

In its final determination, Canada rejected the US arguments about specificity, noting that three crops (corn, wheat, and cotton) received a "disproportionate share of the subsidy granted by the US Government for the Federal crop insurance program." (Canada Border Services Agency 2001, 22). On the question of method, Canada accepted the US argument that actual government costs for corn (premium subsidies and net indemnities) should be used. Canada also accepted the US method of allocating administrative and operating expenses and underwriting gains based on corn's share of total premiums. The total expenses were divided by total corn production for a subsidy of $0.051 per bushel for 1998 and $0.065 per bushel for 1999 (Canada Border Services Agency 2001).

In the 2003–2004 challenge, Canada calculated the benefit from crop insurance as the sum of premium subsidies plus administrative and operating expenses minus administrative fees paid by producers under the catastrophic insurance (CAT) program.[19] Unlike in the 2001 determination, underwriting gains were not included in the calculation of insurance subsidies (Canada Border Services Agency 2006).

China–US Poultry Case

In 2009, the Ministry of Commerce of China launched antidumping and antisubsidies investigations into chicken meat produced in the United States (Johnson and Becker 2010). China claimed that US subsidies to corn and soybeans resulted in lower feed prices, which were in turn passed through to poultry producers, resulting in lower chicken prices for exports and harming the Chinese chicken industry. Crop insurance subsidies for corn and soybeans were included with other price and income support subsidies. China calculated insurance subsidies based on premium subsidies for corn and soybeans, as well as administrative costs for delivery of corn and soybean policies. The United States argued that the most appropriate method was to use net indemnities for corn and soybeans.[20] China did not change its method

[19] Under the CAT program, producers receive free 50 percent yield coverage in exchange for a nominal signup fee.

[20] US premium subsidies for corn and soybeans totaled $3.2 billion in 2009, compared with total net indemnities of –$417 million (USDA RMA 2015).

in its final determination, which resulted in a subsidy of $0.22 per bushel for corn and $0.61 per bushel for soybeans.

In both the *US—Upland Cotton* case and the four antisubsidy cases in which crop insurance was investigated, the authorities found that US programs conferred a specific subsidy. In no case have US arguments that its crop insurance program does not confer benefits to a specific crop prevailed. In contrast to the treatment of crop insurance in the *US—Upland Cotton* case, the investigating authorities in the CVD cases always included government support to insurance companies in some fashion, as well as the benefits to producers, either in the form of premium subsidies or net indemnities.[21]

[21] In the broader issue of injury determination, the Canadian Import Trade Tribunal ruled that US corn subsidies injured producers in the 1985 case. The finding was challenged by the United States under the Subsidies and Countervailing Measures provisions of the GATT and overturned (GATT 1992). In the other two corn CVD cases brought by Canada, the Canadian Import Trade Tribunal failed to find injury. In the China poultry case, China found injury as a result of corn and soybean subsidies. However, the United States challenged the ruling in the WTO; the determination was overturned in a WTO dispute settlement ruling in 2014 (WTO 2013).

9. EFFORTS TO REFORM GREEN BOX CRITERIA RELATING TO AGRICULTURAL INSURANCE

Given the evolution and growth of agricultural insurance programs, questions have arisen as to whether such programs are compatible with current green box criteria and whether those criteria should be modified to more closely match the structure of current insurance programs or to meet the needs of developing countries (Nassar et al. 2009). In this light, the Doha Development Agenda negotiations have put forth various proposals to amend paragraphs 7 and 8 in Annex 2.[22]

Reforming Criteria Defining Eligible Losses

Under paragraphs 7 and 8, eligible insurance programs must require a 30 percent loss threshold before losses are paid. Presumably, contracting parties agreed that a 30 percent loss threshold defined a "catastrophic loss" for production and income losses. However, for area-indexed policies and weather derivatives, a 30 percent loss threshold may be more stringent than the threshold established for indemnity-based, individual losses. Research on area-indexed products suggests that producers must typically carry insurance with higher coverage levels in order to obtain similar protection to indemnity-based products (Miranda 1991; Smith, Chouinard, and Baquet 1994; Skees, Black, and Barnett 1997). The Revised Draft Modalities for Agriculture, circulated by the chair of the agriculture negotiations in December 2008, included changes to allow developing countries to establish loss thresholds of less than 30 percent for compensation for income or production losses under paragraphs 7 and 8. That variance would not apply to developed countries.

Reforming Criteria Determining Yield and Revenue Guarantees

Current criteria for establishing production and revenue guarantees are based on the previous three years or the previous five years, excluding high and low entries. Many countries, such as Canada and United States, base guarantees on longer time series, arguing that doing so gives a more accurate estimate of a producer's expected yield or revenue. In the Revised Draft Modalities, paragraph 8 is modified to allow members to base production guarantees on "a period demonstrated to be actuarially appropriate" (WTO 2008b, 41). However, that change applied to paragraph 8 only; no comparable changes are proposed for paragraph 7.

Reforming Criteria in Paragraph 7 Concerning Revenue Insurance

Currently, use of paragraph 7 has largely been confined to income safety net programs such as those used in Australia and Canada. Although revenue insurance programs exist, most are incompatible with the current criteria. For example, under the US program, most revenue insurance policies are offered on an individual crop basis, not on a whole farm basis as called for in paragraph 7.[23] Moreover, in the US program, revenue products are based on futures prices that are arguably more reflective of planting time expectations for harvest prices as compared with guarantees based on historical prices under current criteria.

[22] Under the Agreed Framework adopted by WTO members on August 1, 2004, it was agreed that "Green Box criteria will be reviewed and clarified with a view to ensuring that Green Box measures have no, or at most minimal, trade-distorting effects or effects on production. Such a review and clarification will need to ensure that the basic concepts, principles, and effectiveness of the Green Box remain and take due account of non-trade concerns. The improved obligations for monitoring and surveillance of all new disciplines foreshadowed in paragraph 48 below will be particularly important with respect to the Green Box" (WTO 2004).

[23] The United States offers whole farm revenue insurance, but uptake has been limited. Changes in the 2014 Farm Bill were aimed at making whole farm insurance policies more attractive.

Another issue concerns whether loss thresholds for gross income should necessarily be the same as for insurance products based on net income. Current criteria in paragraph 7 call for thresholds to be made on an "equivalent" basis but do not specify how that should be done. Given the growth and interest in income margin insurance, the cost of production insurance, and other net income schemes, more research would seem warranted in this area. The Revised Draft Modalities are silent on paragraph 7, perhaps reflecting members' concerns about exempting revenue insurance schemes from domestic support disciplines.

Increased Transparency

An important goal of the Doha Development Agenda negotiations has been to enhance monitoring to ensure full transparency (WTO 2004; WTO 2008b). Agricultural insurance programs are particularly complicated, and detailed data on program operation (participation data, premiums, indemnities, subsidies, delivery costs, and so on) are often difficult to obtain. Increased reporting requirements would enhance transparency and allow members a better understanding of how those programs may affect production and trade.[24]

24 As the section on trade disputes shows, improved transparency is important not just for the AoA but also for the Agreement on Subsidies and Countervailing Measures and the AoA (see Josling 2015).

10. CONCLUSIONS

Agricultural insurance programs have grown considerably over the past 25 years and now make up an integral part of many domestic support programs in developed countries and important emerging markets. There is considerable interest in the use of insurance products, including weather derivatives, as important tools to promote risk-management strategies in developing economies.

The AoA seemingly encourages the development of insurance programs in lieu of more trade- and production-distorting programs, such as price supports or production-linked subsidies. However, criteria in paragraphs 7 and 8 of Annex 2 appear to be poorly fitted for most modern insurance programs. That said, the overarching criterion of Annex 2—for programs to "have no, or at most minimal, trade-distorting effects or effects on production"—requires that care and consideration be given to any proposed changes to guard against introducing potential distorting subsidies under the guise of safety net programs.

Recent papers suggest that insurance subsidies could come under renewed scrutiny in potential WTO cases against countries with large insurance programs, such as the United States (Lau, Schropp, and Sumner 2015) and China (DTB Associates 2014; Hudson 2015). Recent WTO cases, such as *US—Upland Cotton,* provide a ready blueprint for such challenges (Andersen and Taylor 2009–2010). In this vein, Josling (2015) recently suggested that a future scenario for reform could be to abandon the AoA altogether and subsume domestic support rules in the category of actionable subsidies under the Agreement on Subsidies and Countervailing Measures. Such a move would require increased transparency and monitoring of the growing variety of agricultural insurance programs around the world.

APPENDIX: PROVISIONS IN ANNEX 2 ENCOMPASSING INSURANCE PROGRAMS

Appendix: Provisions in Annex 2 Encompassing Insurance Programs

Annex 2
Domestic Support: The Basis for Exemption from the Reduction Commitments

1. Domestic support measures for which exemption from the reduction commitments is claimed shall meet the fundamental requirement that they 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;

plus policy-specific criteria and conditions as set out below.
. . .

2. Direct payments to producers

Support provided through direct payments (or revenue foregone, including payments in kind) to producers for which exemption from reduction commitments is claimed shall meet the basic criteria set out in paragraph 1 above, plus specific criteria applying to individual types of direct payment as set out in paragraphs 6 through 13 below. Where exemption from reduction is claimed for any existing or new type of direct payment other than those specified in paragraphs 6 through 13, it shall conform to criteria (b) through (e) in paragraph 6, in addition to the general criteria set out in paragraph 1.
. . .

3. Government financial participation in income insurance and income safety-net programmes

(a) Eligibility for such payments shall be determined by an income loss, taking into account only income derived from agriculture, which exceeds 30 per cent of average gross income or the equivalent in net income terms (excluding any payments from the same or similar schemes) in the preceding three-year period or a three-year average based on the preceding five-year period, excluding the highest and the lowest entry. Any producer meeting this condition shall be eligible to receive the payments.

(b) The amount of such payments shall compensate for less than 70 per cent of the producer's income loss in the year the producer becomes eligible to receive this assistance.

(c) The amount of any such payments shall relate solely to income; it shall not relate to the type or volume of production (including livestock units) undertaken by the producer; or to the prices, domestic or international, applying to such production; or to the factors of production employed.

(d) Where a producer receives in the same year payments under this paragraph and under paragraph 8 (relief from natural disasters), the total of such payments shall be less than 100 per cent of the producer's total loss.

4. Payments (made either directly or by way of government financial participation in crop insurance schemes) for relief from natural disasters

   (a) Eligibility for such payments shall arise only following a formal recognition by government authorities that a natural or like disaster (including disease outbreaks, pest infestations, nuclear accidents, and war on the territory of the Member concerned) has occurred or is occurring; and shall be determined by a production loss which exceeds 30 per cent of the average of production in the preceding three-year period or a three-year average based on the preceding five-year period, excluding the highest and the lowest entry.

   (b) Payments made following a disaster shall be applied only in respect of losses of income, livestock (including payments in connection with the veterinary treatment of animals), land or other production factors due to the natural disaster in question.

   (c) Payments shall compensate for not more than the total cost of replacing such losses and shall not require or specify the type or quantity of future production.

   (d) Payments made during a disaster shall not exceed the level required to prevent or alleviate further loss as defined in criterion (b) above.

   (e) Where a producer receives in the same year payments under this paragraph and under paragraph 7 (income insurance and income safety-net programmes), the total of such payments shall be less than 100 per cent of the producer's total loss.

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