Chapter 14

Agricultural protection

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14.1 Introduction

The conclusion of the Uruguay Round was a historic breakthrough. After nearly eight years of arduous negotiations, new international rules were agreed to govern trade in agriculture, manufacturing, services, and intellectual property. In agriculture, which had effectively escaped GATT disciplines for decades, new international rules were established and constraints imposed on border protection, export subsidies and domestic support. Among the most important rule changes were tariffication, binding of all tariffs,[1] minimum access commitments in products where imports were previously banned or restricted, prevention of new export subsidies and bindings on the value and volumes of existing export subsidies.

Tariffication--conversion of non-tariff barriers[2] (NTBs) to bound tariffs--moves agricultural trade towards the same treatment as manufactures within the GATT. As a first step towards liberalization, participating countries, with the exception of those covered by "special treatment" provisions (explained below), were required to convert their non-tariff measures to bound tariffs.

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1. The commitment to the maximum tariff that can be applied at the border. This means that countries can apply tariffs at or below the bound maximum, but not to raise tariffs above that, unless it is renegotiated in GATT and compensation given to affected trading partners.

2. This includes quantitative import restrictions, variable levies, minimum import prices, discretionary import licensing, non-tariff measures maintained through state trading enterprises, voluntary export restraints and all similar measures.

While the concept is not without pitfalls as discussed in the literature,[3] tariffication provides the immediate benefit of achieving transparency of import protection. In addition, tariffs are generally preferred over other import barriers since they are more predictable, non-discriminatory and easier to bind or reduce and less susceptible to corruption. They also facilitate competition in internal markets and help ensure trade adjustments by importing countries to world market changes. Moreover, even though tariffication does not deal directly with export policies, it could provide indirect control on export subsidies. Exporting countries providing export subsidies have to maintain import barriers to avoid re-importing the goods exported. Arbitrage in the market implies that in general a country cannot set an export subsidy higher than the level of the tariff plus transport costs. Hence, tariffication facilitates an indirect control on the amount of export subsidies implied by removing the non-tariff barriers to reimporting.

But how much trade liberalization will actually be achieved from the UR agreement? Recent studies (IATRC, 1994; GATT, 1994) have provided broad evaluations of the final Agreement, but to date, no systematic comparison of pre- and post-UR border protection has been made on a wide range of agricultural commodities and countries. Most countries, particularly in OECD, converted their NTBs into specific tariffs, preventing an easy assessment of protection rates. The paper estimates post-UR *ad-valorem* tariff equivalents of border measures based on the detailed results of final concessions on tariffication and export subsidy commitments on major commodities.[4]

The extent of agricultural trade liberalization as a result of the Round is evaluated by comparing post-UR protection measures with historical estimates and a hypothesized future rate of protection without the UR agreement.[5] Participating countries subject to tariffication were required to apply the UR Modalities (Annex 3) in establishing their initial base tariffs -- the tariffs to be applied in the first year of the implementation of the Agreement -- based on prices and protection levels prevailing in the base period, 1986-88. That is, the height of the tariffs in 1995 should be equal to the actual level of nominal protection received in 1986-88. A significant difference between

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3. See Deardorff and Stern (1984) and Baldwin (1988).

4. The concessions are based on the published Schedules appended to the Final Act. There are also bilateral arrangements which were not in the country Schedules. These side agreements are considered in the case of grains for the EU and the United States and for beef and veal between the United States and Japan, and between the United States and the Republic of Korea.

5. This approach overlooks the reductions in expected protection rates brought about by the introduction of bindings above current rates, but overstates the marginal reduction in protection due to bindings which reduce protection below historical levels (Martin and Francois, 1994). The effects of the tariff bindings on expected protection will be investigated in further analysis.

these two measures could be considered a form of "dirty" tariffication: this is also evaluated in this paper.[6]

The remainder of the paper is organized into 8 sections. Section 2 gives a summary of what was achieved in the area of market access, export subsidies and domestic support. Section 3 describes the methods used in estimating pre- and post-UR border protection. The results of tariffication and the changes in border protection before and after and the UR are discussed in sections 4 and 5. Estimates of trade liberalization are discussed in section 6. The implications for selected commodities and concluding comments are discussed in section 7 and 8, respectively.

14.2 What was Achieved in Market Access, Export Subsidies and Domestic Support?

14.2.1 Tariffication

The most significant aspect of the UR agreement on agriculture was a change in the rules regarding market access. Participants have agreed, except in cases of "special treatment,"[7] to convert non-tariff barriers into bound duties and not to introduce new non-tariff measures (Article 4 of the Agreement). The new bound tariffs, as well as tariffs which had been bound in previous negotiations, have to be reduced by at least 15 percent and by 36 percent, on a simple (unweighted) average over six years in industrial countries (1995-2000), and by at least 10 percent and 24 percent on a simple (unweighted) average over ten years in developing countries (1995-2004).

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6. Josling, et. al., (1994) had briefly mentioned the way countries took advantage of tariffication to raise the level of their tariff bindings.

7. Special treatment was allowed on commodities which met the following conditions: (i) commodities that are major staples in the diet, (ii) imports are less than 3 percent of domestic consumption in the base period, and (iii) no export subsidies have been provided. In return, minimum access levels were required to be introduced at 4 percent of domestic consumption rising to 8 percent over the implementation period of the Round. The principal cases of special treatment were rice imports in Japan, the Republic of Korea, and the Philippines.

In line with the "special and differential" treatment given to developing countries, the following provisions apply to the latter: (i) in commodities subject to unbound tariffs at the beginning of the Round, tariff ceiling bindings were allowed, and (ii) the least-developed countries were given the flexibility to make a ceiling binding offer in agriculture in lieu of reduction commitments.

The agreed levels of tariffs were determined by the country offers, as expressed in the tariff Schedules appended to the agreement. The methods intended to be used in the establishment of these commitments were outlined in a negotiating document entitled "Modalities for the Establishment of Specific Binding Commitments under the Reform Programme (referred to below as the Modalities)." Since the Schedules of commitments have now been mutually accepted and form part of the Final Agreement, however, the Modalities have lost their power. The implementation of the Agreement is therefore determined by the final concessions made by each participating country.

The Modalities provide a range of alternatives in establishing the tariff equivalents depending on the level of development of the participating country and the nature of the tariff and import restrictions at the beginning of the Round. That is, whether or not the tariff was already bound at the beginning of the Round and/or whether NTBs were applied. For commodities subject to bound tariffs at the beginning of the Round, participating countries were required to either (i) apply tariffication if NTBs existed, or (ii) establish the base tariffs at the current bound rate. In commodities subject only to unbound duties (i.e., no NTBs apply) at the beginning of the Round, participating countries were required to set their 1995 base tariffs and apply tariff reductions based on the level in September, 1986. If unbound duties and NTBs existed at the beginning of the Round, tariffication was required (discussed below). Developing countries were allowed to establish tariff ceiling binding in commodities subject to unbound tariffs.

A binding defines the maximum tariff that can be applied at the border. If a tariff is bound, say at 40 percent, any duty at the border greater than 40 percent is prohibited, whether it is a tax levied by the government or a "mark-up" charged by a state trading enterprise (STEs). STEs are not in conflict with the Agreement; however, NTBs maintained by STEs were required to be converted into tariffs by either applying (i) tariffication, (ii) a ceiling binding or (iii) special treatment. Under the Agreement, STEs or any import monopoly must not provide domestic protection in excess of the tariff bindings.

The tariffication of NTBs and the establishment of bindings on newly tariffied protection and existing tariffs will change the way governments can manage agricultural imports. Before the UR, bound tariffs in developed countries covered about 58 percent of all tariff lines and about 80 percent of the total value of agricultural imports. The UR concessions resulted in an increase in the share of tariff bindings to almost 100 percent of the value of imports in the industrial countries. In developing countries and transition economies, the share of tariff bindings increased from 18 percent to 100 percent and will result in bound tariffs on 100 percent of their agricultural imports (GATT Secretariat, 1994). Hence, virtually all future trade in agriculture will be conducted under bound

tariffs. Depending on the resulting level of bindings and tariffied protection, as well as the conditions under which the Special Safeguards and additional duties can be invoked (see below), this represents a significant step toward increased predictability and stability of trade barriers.

The effectiveness of tariffication is, however, reduced if the tariff bindings are set at very high levels, which would allow post-UR applied rates to remain prohibitive and could permit substantial variations in the range below the bound level. Countries can charge tariffs at varying levels within the margin of the binding, which could be linked to an internal price. The duty can be set as the difference of the given domestic price and the world price as long as the tariff charged does not exceed the binding. In practice, this could work similarly to a variable levy or a minimum price, despite the fact that the agreement states that variable levies, minimum import prices, etc. are forbidden and should be converted to tariffs (Article 4, paragraph 2) and that the Agreement in Customs Valuation generally prohibits the use of minimum prices.

14.2.2 Export Subsidies

Another reform in the rules is in the area of export subsidies. These changes are important because export subsidies have been the major mechanism of protection in exporting countries. The long history of high protection and support in the industrial countries has been associated with surplus production, a substantial part of which is sold on world markets at subsidized prices. The pre-UR policy regime provided no effective contraint on the volume of subsidized exports, resulting in uncertainty in export markets for other producers and constraining the expansion of competitive trade. The share of world exports which was covered by export subsidies was significant for major agricultural commodities, particularly in grains, livestock products, and sugar. In 1986-90, the European Union subsidized more than 95 percent of its exports of wheat and butter, more than 90 percent of cheese exports, 40 percent of its sugar exports, and more than 30 percent of its milk powder exports. US subsidized exports were largest in butter (94 percent), wheat (55 percent), non-fat dry milk (40 percent) and cheese (23 percent). The EU has been the main user of export subsidies until the late 1980s when the US and other countries also started the significant use of export subsidies to win market shares. The UR agreement marks the first effective discipline on agricultural export subsidies since the founding of GATT.

The new rules on export subsidies under the Round, while important, were not as sweeping as those for non-tariff barriers, in that the Round did not outlaw export subsidies but only imposed limits on their application. Participating countries accepted binding commitments on maximum export subsidization (Article 3), leading to an agreed reduction in expenditure on export subsidies (industrial countries by 36 percent and developing countries by 24 percent) as well as a reduction in the quantity of subsidized exports (industrial countries by 21 percent and developing countries

by 14 percent) over the implementation period.[8] The agreement also requires countries not to extend export subsidies to commodities which were not subsidized in the base period. The results of these commitments for selected commodities in major countries are shown in Table 14.1 and 14.2. As shown, export subsidies are allowed up to certain levels instead of being explicitly illegal as they are for nonagricultural products.

The impact of the export subsidy reductions will depend on the quantity of the commodities affected, the share of subsidized exports to total trade, and the policy adjustments made by major countries during the implementation period. An analysis of the final commitments indicates that the UR bindings on volumes and outlays will probably have a significant effect on trade flows and prices.

Table 14.1 Base and Final Subsidy Commitments for Selected Commodities in Major Subsidizing Countries -- 000 Metric Tons

Country	Wheat			
	Actual Exports	Subsidized Exports		
	1986-90	1986-90	1995	2000
US	36,075	18,382.4	20,238.3	14,522.1
EU	17,775	17,008.1	19,118.6	13,436.4
Canada	18,850	11,204.8	13,590.3	8,851.8
Turkey		2,306.0	2,600.2	1,461.2
Hungary		1,444.0	1,393.0	1,141.0
Total (Top5)		50,345.3	56,940.3	39,412.4
Total Export Subsidies		108,289.0		
World Trade 1991/92		95.0		
Top 5 as % of Total Export Subsidies		46.5		
Top 5 as % of World Trade in 1991/92				
Country	Rice			
	Actual Exports	Subsidized Exports		
	1986-90	1986-90	1995	2000

8. Six years for industrial countries and ten years for developing countries.

Indonesia	299.8	295.6	257.8
EU	183.7	177.3	145.1
Uruguay	53.2		45.7
US	48.8	271.7	38.6
Colombia	18.9		16.3
Total (Top5)	604.4	744.5	503.4
Total [1]	604.5		
World Trade	14,080.0		
Top 5 as % of Total Export Subsidies	100.0		
Top 5 as % of World Trade in 1991/92	4.3		

Continued

Table 14.1 Base and Final Subsidy Commitments for Selected Commodities in Major Subsidizing Countries -- 000 Metric Tons (Continued)

Country	Vegetable Oil			
	Actual Exports	Subsidized Exports		
	1986-90	1986-90	1995	2000
Brazil		552.1	544.3	474.7
Hungary		185.0	179.0	146.0
US		178.9	587.5	141.3
Canada		117.4	113.3	92.8
Turkey		72.2	94.5	76.5
Total (Top5)		1105.6	1,518.7	931.3
Total [1]		1197.2		
World Trade		21,470.0		
Top 5 as % of Total Export Subsidies		92.4		
Top 5 as % of World Trade in 1991/92		5.1		
Country	Course Grains			
	Actual Exports	Subsidized Exports		
	1986-90	1986-90	1995	2000
EU		12,624.5	12,182.6	9,973.4
Canada		4,392.0	4,418.9	3,617.6
Mexico [1]		3,577.8	3,513.1	2.951.0
US		1,9785.4	1,906.3	1,560.6
Rep. of South Africa [2]		1,893.5	1,827.3	1,495.9
Total (Top5)		24,463.2	23.848.2	19,598.5
Total [1]		28,328.6		
World Trade		91,680.0		
Top 5 as % of Total Export Subsidies		8634		
Top 5 as % of World Trade in 1991/92		26.7		

1. Corn and Sorghum subsidy volumes have been added

2. Barley, maize and maize products, oats, and grain sorghum subsidy volumes have been added together

Source: Author's calculations; basic data are from Uruguay Round country schedules.

Table 14.2 Base and Final Subsidy Commitments for Selected Commodities in Major Subsidizing Countries -- 000 Metric Tons

Country	Beef & Veal			
	Actual Exports	Subsidized Exports		
	1986-90	1986-90	1995	2000
US		1,034.3	1,118.7	817.1
Brazil		106.7	105.2	91.779
Austria		80.9	90.1	63.882
Poland		51.7	49.9	40.9
Hungary		36.0	35.0	28
Total (Top5)		1,309.6	1,398.9	1,041.7
Total		1,372.4		
Top 5 as % of Total Export Subsidies		95.4		
Country	Pigmeat			
	Actual Exports	Subsidized Exports		
	1986-90	1986-90	1995	2000
EU		508.6	490.8	401.8
Hungary		115	111	91
Poland		51.7	49.9	40.9
Sweden		47	45.4	37.1
Finaland		8.1	11.3	6.4
Total (Top5)		730.4	708.4	577.2
Total [2]		741.0		
World Trade		2,441.0		
Top 5 as % of Total Export Subsidies		98.6		
Top 5 as % of World Trade in 1991/92		29.9		
Country	Poultry			
	Actual Exports	Subsidized Exports		
	1986-90	1986-90	1995	2000
EU		367.8	440.10	290.6
Hungary		141.00	136.00	111.00
Brazil		97.94	96.57	84.23.27.99
US		35.44	34.2	13.10
Poland		16.4	15.8	526.92
Total (Top5)		658.57	722.66	
Total [2]		663.68		
World Trade		2,074.00		
Top 5 as % of Total Export Subsidies		0.99		
Top 5 as % of World Trade in 1991/92		31.75		

1. The volume of export subsidy for Poland includes all meats except for poultry

2. The Export Subsidies
Source: Author's calculations; basic data are from Uruguay Round country schedules.

Tables 14.1 and 14.2 show that the share of world trade directly covered by export subsidies was significant for many agricultural commodities. Since most developing countries impose a tax on most of their agricultural exports, there are relatively few developing countries with export subsidy commitments, namely Brazil, Colombia, Czech Republic, Poland and Venezuela.

To determine the relative importance of the constraint on volume of export subsidies, we can calculate the quantity of exports that will not be subsidized (21 percent of the volume of subsidized exports in the base period) as a share of world trade. As a share of world trade in 1989-93, the decline in the volume of subsidized exports would be most significant in wheat and wheat products (15.4 percent), dairy products such as milk powder (20 percent) and butter (17.5 percent), and in meat markets, particularly poultry (9.3 percent) and beef and veal (8.8 percent). In contrast, the reductions in the volume of subsidized exports in sugar, oilseeds and vegetable oils, and other meats represent a very small share of world trade, and hence would not likely have a significant impact on world markets in these products. While the reductions are significant in the most subsidized products, the allowable volume of export subsidies for major commodities at the end of the implementation period will remain substantial, with the largest amounts remaining in wheat (over 40 million tons), coarse grains (nearly 20 million tons), beef and veal (over 1 million tons), and vegetable oils (about 1 million tons). While the reforms undoubtedly represent an improvement over previous levels, the remaining subsidies still represent a substantial distortion in world agricultural trade.

14.2.3 Domestic Support

The third area of reform was the binding of domestic support levels. The proposal in the Dunkel package to reduce support on a commodity basis was not agreed in the Round. Instead, the new rules and bindings were established on the level of total domestic agricultural support, called Aggregate Measure of Support (AMS) which includes border price support through tariff and export subsidies discussed above (Annex 3, paragraph 8). Based on fixed external prices in the base period (1986-88), the agreement specifies the determination of the AMS and requires countries to reduce their total AMS by 20 percent over the implementation period. For several reasons, these concessions on domestic support reductions are considerably less effective than those of border measures. First, the constraint on aggregate, rather than commodity specific, support leaves much scope for continued support policies and domestic policy action on particular commodities. The lack of discipline over individual commodity policies will also likely lead to increasing policy distortions between commodities. Second, the "green box"[9] will allow many policies to continue unreduced in

9. This includes general services involving expenditures which provide services and do not involve direct payments such as research, pest and disease control, training, extension, marketing and promotion, and infrastructure services. These measures shall not involve price support to farmers. In developing countries, government measures to promote agricultural and rural development such as investment subsidies, input subsidies provided to low income farmers (cash or kind) are

participating countries. Third, the two important support measures, the EU compensation payments and the US deficiency payments are exempted from the reduction commitments, even though they are not fully production neutral. Fourth, domestic subsidies with significant production impacts play a relatively limited role in other major countries. Last, the AMS calculations are based on the outlays during 1986-88, which was a period of relatively low world prices for agricultural products and therefore high expenditures on domestic support to farmers. Because of higher world prices and recent domestic agricultural policy reforms in major countries, the new commitments may not involve any further real reductions in current levels of domestic support.

14.3 Estimates of Pre- and Post- UR Protection

How will the new UR rules and disciplines affect border protection in agriculture? This section outlines the methods used in estimating pre- and post-UR border protection measures. Agricultural protection as a result of the Round will be disciplined primarily by the outcome of tariffication and the reduction commitments on export subsidies and domestic support. In general, the results of final concessions on tariffication will affect the post-UR nominal protection on imported goods, while the export subsidy commitments will define the rate of nominal protection on exportables. In cases where exporting countries are providing export subsidies and also maintaining import barriers on homogenous goods, arbitrage implies that in general, a country cannot set an export subsidy higher than the level of the tariff. Hence, the level of the tariff equivalent sets a ceiling on the level of the export subsidy and would also be indicative of the maximum nominal protection rate. To be consistent with the tariffication provisions, I have used a measure equivalent to the nominal rate of protection. This measures the magnitude of the historical price distortion or price wedge induced by non-tariff measures. The post-UR ad-valorem tariff equivalent of border protection is estimated based on the tariffication and export subsidy commitments.

14.3.1 Pre-UR Border Protection

Any evaluation of the liberalizing effect of the Round must begin with an assessment of the protective effects of the measures which preceded it and which would have occurred without it. Had the UR not concluded, presumably these policies, or some variant of them, would have generated

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exempted.

the counterfactual future rate of protection against which the UR should be evaluated. The protective effects of pre-UR trade distortions in a particular market are measured in terms of their tariff equivalents. The UR adopted the price-gap method in establishing the tariff equivalent of non-tariff barriers. This method assumes that the difference between the domestic price and the world price is caused by the restrictive effects of all non-tariff barriers that are present in the market. The UR tariffication procedure required the establishment of initial base tariffs to afford the same level of nominal protection as the prevailing NTBs in 1986-88. That is, the post-UR base tariff, to be set at either specific or *ad-valorem rates*, would be based on the protected domestic and world prices of the relevant commodity in 1986-88. The difference between these prices would be the "price gap" which defines the specific tariff and the percentage difference between them would be the ad-valorem tariff equivalent that would replace the non-tariff barrier.

The exact measure of a non-tariff barrier in terms of its effect on prices is one which compares the domestic price that would prevail without the non-tariff barrier with the price which would prevail domestically with the non-tariff barrier, assuming that the price paid to suppliers remain unchanged. However, since these prices are usually not observable, the actual measure of non-tariff barriers are usually based on a comparison of domestic and world prices in the presence of non-tariff barriers. To apply this method, it is required to identify the appropriate prices. This is difficult because products of a particular industry that are imported into a country are usually not identical to those that are produced domestically, and they may also differ from products that are produced and traded abroad. In general, the appropriate prices to use in measuring the price impact of a non-tariff barrier are the domestic and invoice price of the imported product. Since available domestic prices do not usually distinguish domestically produced goods from imported goods, the price of the product in the domestic market is used instead.

Let P_d represent the price of the product in the domestic market and $P\omega$ as the invoice price of imports inclusive of tariffs and transport costs (c.i.f). The price comparisons are usually expressed as a percentage difference between the prices expressed as follows: $= 100 * [P_d - P\omega]/P\omega$. The latter is referred to as the *ad-valorem* tariff equivalent or the implicit protection associated with the non-tariff barrier. The ad-valorem tariff equivalents of border protection are estimated for each year depending on data availability -- from 1982-93 in developing countries and from 1979-93 in OECD countries.

In the case of exportables, export subsidies can be used to raise the domestic producer price above the world price. They can be specified in the same way as tariffs since an export subsidy is merely a negative export tax. Export subsidies raise the price received by domestic producers and paid by consumers as the domestic price is increased by arbitrage until it equals the subsidy-inclusive price on sales. The *ad-valorem* export subsidy equivalent is expressed as follows: $= [(P_d - P)/P] *100$. Data on world and domestic prices use were derived from several sources including theOrganization for Economic Cooperation and Development (OECD), US Department of Agriculture (USDA), FAO, and the World Bank. These sources are complemented by the information on internal and reference prices in 1986-88 reported in the supplementary tables in the

country Schedules. The OECD provides PSE estimates beginning in 1979 for 12 OECD trading blocs and up to 22 commodities or commodity groups. The USDA has extended this coverage to 34 countries and 48 commodities or commodity groups, for the period 1982-93.[10] Four types of measures are included in the OECD and USDA/ERS PSE calculations, namely, market price support, direct income support, indirect income support and other assistance. Price support programs, tariffs, and quotas are examples of the first set of measures, while deficiency payments comprised the second group. Indirect income supports and other assistance include input subsidies, capital grants, research etc. To estimate the tariff equivalent of border protection based on the PSE estimates, I consider only the effects of market price support measures (price support, tariffs, quotas, and other NTBs) and exclude the direct and indirect income transfers and other assistance. The tariff equivalents based on data about market price support measures from the OECD and USDA databases are calculated as follows:

(1) $= [(VPIP/VPWP)-1] *100$

where $=$ tariff equivalent

$VPIP$ $=$ value of production at internal prices

$VPWP$ $=$ value of production at world prices

The value of production at world prices, VPWP, is defined as:

$VPWP = VPIP - MPS$ where

$MPS = Q *(P_d - P_{\omega})$ or the value of market price support

$Q =$ volume of production

Therefore,

$= (Pd - P\omega)/P\omega$ or $(Pd / P\omega) -1 *100$

where P_d is the domestic price and $P\omega$ is the reference (border) price at which purchases from the world market could have taken place. MPS is the value of all market price support -- an estimate of aggregate transfers to producers as a result of measures such as tariffs, import quotas, and other trade barriers. The difference between world prices and internal prices, as a percentage of world prices is the tariff equivalent of border measures. This is measured either as an import tariff (subsidy) or an export subsidy (tax), or both. If domestic prices are above (below) world prices, the price wedge reflects an export subsidy (tax) equivalent for exportables and an import tariff (subsidy) equivalent for importables.

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10. I am grateful to Susan Leetmaa for providing the as yet unpublished data on ERS/USDA updates on PSE estimates.

For purposes of comparison, I also estimate a pre-UR tariff equivalent based on the reported internal and reference prices in the country Schedules for the base period, 1986-88. The Modalities defined internal prices at the wholesale level. However, not all countries used wholesale prices in defining their tariff equivalent (e.g. EU's tariff equivalent are based on intervention or threshold prices). Where the wholesale price is not available, I use producer prices as a measure of internal prices. The use of producer prices will result in some slight underestimation of protection by the amount of the producer-to-wholesale marketing margin.

14.3.2 Post-UR Border Protection

As explained earlier, the tariffication provisions as stated in the Modalities lose legal power once the country Schedules have been mutually accepted by participating countries. I briefly review in this section the rules on tariffication as provided in the Modalities. The methods used in estimating the post-UR tariff equivalents are then discussed.

Tariff equivalents were required to be established at the four-digit level or at the six-digit or more detailed level of the Harmonized System (HS) wherever appropriate, as in the case of certain fruits and vegetables. The Modalities also required that "actual prices, rather than constructed ones (e.g. the threshold price in the EU) be the basis for tariff equivalents." For transformed and processed agricultural products, tariff equivalents were required to be established by multiplying the specific tariff equivalent(s) for the agricultural inputs(s) by the proportion(s) in value terms or in physical terms as appropriate of the agricultural inputs(s) in the transformed processed agricultural products.

The Modalities also specified the external prices to be used in tariffication as the actual average c.i.f. import unit values for the importing country. Where average c.i.f. unit values are not available or appropriate, external prices are defined as the appropriate average c.i.f. import unit values of a near country or the estimated average f.o.b. unit values of (an) appropriate major exporter(s) adjusted by adding an estimate of insurance, freight, and other relevant costs to the importing country. External prices are converted to domestic currencies using the annual average market exchange rate for the same period as the price data. Internal prices are defined in the Modalities as the representative wholesale price ruling in the domestic market or an estimate of that price where adequate data are not available. The initial tariff equivalents have to be adjusted to take account of differences in quality or variety and applied to tariff lines which are frequently defined at 8, 10, or12 digit levels.

Where a tariff equivalent resulting from these guidelines is negative or lower than the current bound rate, countries were allowed to establish the initial base tariff equivalent at the current bound rate or on the basis of national offers for that product. The levels of tariff equivalents resulting from

tariffication using 1986-88 data, supplemented by the rules as stated above, are specified as the base level (i.e. to be applied in 1995) for the implementation of the reduction commitments on market access.

The post-UR nominal border protection rates are derived from the tariffication commitments. In this paper, the specific tariffs in the Schedule, assumed to reflect the difference between internal and border prices as defined in the Modalities, [$\tau = (P_d - P)$], are translated into *ad-valorem* tariff equivalents simply by dividing the specific tariff by the appropriate border price as defined in the Modalities. The average border prices in 1986-88 used in estimating the pre-UR tariff equivalents of NTBs are now used to convert the post-UR base specific tariffs in the Schedules into *ad-valorem rates* in the base period. To translate the final or bound specific tariffs in the schedules (tariffs to apply at the end of the implementation period) into final *ad-valorem rates,* I use either (a) constant world prices at the level during the base period, 1986-88 or (b) World Bank projections of world prices for the year 2000.

Since our estimated pre-UR tariff equivalents of NTBs are based on available data on world and domestic prices, which are usually at wholesale or farmgate level, the post-UR specific tariffs, which are at very disaggregated tariff line level in the Schedules, must be aggregated to attempt to match the pre-UR measures. An average specific tariff corresponding to the commodity defined at the 4-digit HS code is calculated by taking a simple unweighted average of the tariffs for the group under consideration. Unweighted tariffs are preferred over trade-weighted tariffs, which may be biased downward because imports that are highly taxed cost more and are, therefore, imported less. In the extreme, a tariff set at sufficiently high level as to eliminate imports would receive no weight in the aggregation.

In the case of commodities where the historical estimates of protection (based on the OECD and USDA data) are defined at the farmgate/first stage of trade, the specific tariffs of the processed items are transformed using appropriate conversion factors.[11] This is not an issue for commodities such as grains (wheat, maize, barley, oats, rye and sorghum) or white sugar, which are reasonably homogenous and whose post-UR tariff equivalents are specified in the Schedules. For dairy, where the historical protection estimates based on OECD and USDA data are for the dairy industry, the post-UR tariffs are adjusted using conversion factors to derive the milk fluid equivalent of milk powder and butter. The estimated *ad-valorem* tariff rates at the 4-digit HS are aggregated to match the commodity and regional definitions of the RUNS model using value of production at border

[11]For instance, milk is assessed as liquid milk plus fluid equivalent of butter and milk powder in the OECD and USDA calculations of PSE. The same conversion factors for butter and milk are used in this paper to estimate the average specific tariff for the milk industry.

prices.[12] The tariffs specified for "within access" commitments in the tariff-quota are assumed to be infra marginal and only to represent an income transfer.

For exportables, the post-UR border protection will be determined by the export subsidy commitments. As described in section 2, the commitments on export subsidies are in terms of maximum volume and budget outlays defined for major group of commodities. A 36 percent reduction in the value of export subsidies by a particular country would typically require a less than 36 percent reduction in the ad-valorem equivalent of the export subsidy since the decline in value would result from changes in both the rate of assistance and in the quantity exported. In the context of multilateral reforms under the Round, reductions in export subsidies are likely to raise world prices, offsetting the reduction in export volumes implied by the reductions in export subsidies. Thus, treating the export subsidy reductions in terms of reductions in export subsidy rates could be used as an approximation to the effects of the commitments. The per unit export subsidy rates at the base period is determined as follows:

$$S_s = \frac{B_s}{\psi_s X_s}$$

where s is the subsidy rate, B is the total value of export refunds and X is total volume of exports and ψ is the share of exports that is subsidized. The subscript s denotes the goods which are net exports and use export subsidies. The per unit subsidy rates during the base period are translated to ad-valorem rates using border prices in 1986-88. There are goods which are treated as net exportables in estimating historical protection based on the OECD and USDA databases but do not have export subsidy commitments in the Round. In these commodities, some imports occur and the post-UR border protection are estimated based on the tariffication commitments.[13] In most of these commodities, import restrictions are usually an essential backstop for export subsidy programs. The tariff equivalent based on the tariffication commitments defines the maximum post-UR border protection.

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[12] To facilitate further analyses of implications of the Uruguay Round Agreement, the pre- and post-Uruguay Round border protection in agriculture estimated in this paper are further aggregated to conform to the requirements of general equilibrium models.

[13] The estimates will be slightly biased by the amount of the margin between f.o.b. and c.i.f. prices which in most primary agricultural products are usually not more than 20 percent.

14.4 Results of Tariffication and Tariff Bindings

14.4.1 How "Dirty" Was Tariffication?

The UR Modalities specified that the initial base tariffs (specific or ad-valorem) should be set at levels that provide equivalent protection in 1986-88. To examine "dirty" tariffication, the estimated tariff equivalents based on the country Schedules are compared with the estimated tariff equivalent of border measures in 1986-88. The results indicate that the specific and *ad-valorem* tariffs which many countries have set in their schedules are significantly higher than the wedge between actual domestic and world market prices in the base period, hence affording higher protection than prevailed in 1986-88.

Also, the chosen base period of tariffication was a period of relatively high agricultural support and protection in the industrial countries because world prices were at their lowest level in recent decades during the period. Hence, the tariff equivalent based on the 1986-88 period would result in high levels of protection compared with any representative period.

The actual tariff equivalents of all border measures in 1986-88 and the post-UR base tariffs for several major commodities are summarized in Table 2a and 2b. In many countries, "dirty" tariffication appears to have occurred in the "sensitive" commodities such as dairy, sugar, and grains. The extent of "dirty" tariffication varied widely among countries and commodities. Among the industrial countries, the magnitude appears largest in the European Union and EFTA, where the post-UR base tariff equivalents in most commodities were set at levels way above the estimated 1986-88 price wedges. In the European Union (EU), the estimated post-UR ad-valorem tariff equivalents are significantly higher than the actual rates of protection in 1986-88 except for poultry. The largest differentials (in percentage points) are estimated for rice (207 percent), milk (97.2 percent), butter (72 percent), sugar (63 percent), barley (58.5 percent), durum wheat (52.6 percent) and sheepmeat (21 percent).

In the case of wheat, rye, barley, maize, and sorghum, the EU Schedule had set the specific duty-paid import price to be not greater than the effective intervention price (or in the event of modification of CAP, the effective support price) increased by 55 percent (EU Schedule, Section I, Headnotes). This implies that the current effective threshold price for grains would be 155 percent of the intervention price. In the case of rice, the specific duty is set at a level so that the duty-paid import price will not be greater than the effective intervention price increased by 88 percent for Japonica rice and by 80 percent for Indica rice.

Among the EFTA countries, Austria, Finland, Norway, and Switzerland established tariff equivalents which built in the scope for significantly more protection in major commodities, particularly sugar, dairy products, wheat, beef and veal, pork and sheepmeat. The United States also raised base protection in sugar by an estimated 66 percent, while Canada increased base tariffs relative to the actual 1986-88 levels by more than 100 percent in dairy products and more than 200 percent in poultry. Japan offered base tariff equivalents which were way below the actual nominal rate of protection they enjoyed in 1986-88 in all the commodities considered. However, Japan obtained a special arrangement on rice whereby tariffication is delayed, and did anyway start from very high levels.

14.4.2 Tariff Bindings in Developing Countries

Developing countries had the option of establishing ceiling binding on commodities not previously subject to bound tariffs. The results indicate large variations in patterns of pre-UR protection and post-UR agricultural tariff bindings. As in the industrial countries, many developing countries offered very high base tariffs in several major commodities. In most cases, these bindings were set at levels way above historical protection. Several countries (i.e., Egypt, Pakistan, Zimbabwe), which have maintained import subsidies or export taxes (indicated by negative historical tariff equivalents) in major food crops, also established maximum ceiling bindings.

In the case of wheat, a major importable in developing countries, significantly higher base tariff equivalents than actual pre-UR levels were established in several countries, including India (+98 percent), Pakistan (+171 percent), Colombia (+118 percent), and Morocco (+210 percent). In the case of rice, several net importing countries also offered higher base nominal protection than actual levels in the base period, with the largest differences occurring in Bangladesh, Colombia, and Mexico. The same occurred in coarse grains, where higher base tariff equivalents were set in Indonesia, the Republic of Korea, Colombia, Jamaica, Mexico, and Morocco. It is interesting to note, however, that these levels of allowable protection are below those historically applied in the industrial countries. In rice, for example, increased allowable base protection are shown in Nigeria, Bangladesh, Pakistan, Indonesia, Thailand, Colombia, Mexico, Egypt, and Czech Republic, but only at levels slightly above one-third of the rates applied in Japan.

Argentina, Brazil, and Chile generally offered lower base tariff equivalents in most commodities (ranging from 25 percent to 55 percent in 1995) than other Latin American countries. For example, the tariff equivalents in 1995 for sugar were established at high levels in Colombia (130 percent), Jamaica (100 percent), Mexico (173 percent), and Venezuela (100 percent). Similar patterns of high base tariff equivalents are observed in these countries for major products such as wheat, coarse grains, rice, dairy products and poultry. In Asia, India has bound most agricultural

tariffs at prohibitive levels but established a zero tariff binding on major grains such as rice, sorghum, and maize.