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Trade Note 26

Why Market Access is the Most Important of Agriculture's 'Three Pillars' in the Doha Negotiations

Limiting trade-distorting domestic support to farmers and phasing out agricultural export subsidies are important and necessary disciplines. However, the potential income gains from abolishing these measures are much smaller than those from eliminating tariffs. Bank research has shown that over 90 percent of the cost of global agricultural distortions (including agricultural subsidies and tariff barriers) is due to tariffs. Why? *First*, the widely-cited \$280 billion of OECD agricultural support in 2004 is derived primarily from tariffs and export subsidies. The resulting market price support (MPS) accounts for \$168bn, or 60 percent of the total. *Second*, the OECD estimates of support refer only to support to farmers (primary agriculture), and there is a great deal of support to food processing covered under the Agreement on Agriculture – virtually all of which is provided by tariffs. *Third*, trade measures are doubly costly – distorting both production and consumption – potentially roughly doubling the costs per dollar of support to producers. *Fourth*, almost all of the agricultural support outside the OECD is provided through border measures. *Fifth*, the rates of protection provided by tariffs tend to vary more than those provided by subsidies. Since the costs of any distortion rise with the square of its rate, this variability raises the cost of providing support via tariffs. *Sixth*, the costs of domestic support are reduced to some degree by decoupling from

production. Even without taking decoupling into account, World Bank research finds that domestic support accounted for only 5 percent of the global welfare cost of agricultural distortions in 2001.

Background

In the multilateral agricultural trade negotiations under the WTO's Doha Development Agenda (DDA), the OECD Secretariat's producer support estimates (PSEs) have received much attention. For high-income countries as a whole, that estimate for 2004 is \$280 billion. Developing countries have contrasted (a) the ability of developed countries to pay such subsidies with the much more limited resources available to developing countries, and (b) this wasteful largesse with the much smaller amount devoted to foreign aid by the same high-income country governments (less than \$70 billion per year).

Why, then, have economists and organizations such as the World Bank argued that barriers to agricultural imports need to be reduced in the DDA—and in developing countries as much as in high-income countries? The purpose of this note is to provide an intuitive understanding of the modeling result that suggests 93 percent of the global cost of agricultural tariff protection and subsidies is due to tariffs and only 2 percent to export subsidies.¹

The OECD's PSE is intended to provide a summary measure of the producer subsidy that would be

equivalent to all the forms of support provided to farmers, including direct farm subsidies that may or may not encourage production domestically, market price support provided by import tariffs, and assistance provided by export subsidies. All three of those components of government assistance to farmers are disciplined under the Uruguay Round Agreement on Agriculture, and have become known as the “three pillars.”

One element of the OECD’s PSE is that provided by market price support (MPS) measures. It is calculated by comparing domestic and border prices of like products so as to capture the total domestic market price effect of all trade distortions, including tariff and non-tariff import barriers as well as export subsidies. The OECD also uses the price comparison method to calculate a CSE: the consumer subsidy equivalent of those measures. The CSE is negative in countries that raise domestic food prices via restricting imports and subsidizing exports, and would only be positive if a country had direct subsidies to food consumption significant enough to offset the effect of those trade measures in raising consumer prices.

The OECD’s indicator of distortions can be compared with the extent of the distortions inserted into global economic models used to calculate the economic welfare and other consequences of these (and non-agricultural) trade-distorting measures. For more than a decade now the Global Trade Analysis Project (GTAP) at Purdue University has coordinated the compilation of a global database of trade and agricultural subsidy interventions by governments. This GTAP database has become the standard and is used in dozens of different models by hundreds of modelers throughout the world. The most recent and by far the most comprehensive release, which relates to 2001 policies, is Version 6 (Dimaranan and McDougall 2005). It incorporates all three components of support for agricultural production—producer subsidies, export subsidies and import tariffs – and thereby also the effect of the latter two on raising consumer prices of food.

How do the OECD’s PSE numbers compare with those in the most recent version of the GTAP database (that is, for 2001)?² To allow easy comparison, we present them in Table 1 on the

same subsidy-equivalent basis as the OECD numbers. To do this, we estimate the domestic subsidy amounts in the GTAP database by adding the subsidies paid to output, inputs, land and capital. We compare this with the subsidy equivalents of border measures, which are calculated by multiplying the rate of assistance assumed in the GTAP database by the value of output for each agricultural good, and subtracting the value by which the cost of intermediate inputs in producing that good is raised by market price-supporting trade measures. The rates of those subsidies and tariffs are shown in Table 2.

For domestic support in OECD countries we find that the OECD and the GTAP numbers are within 1 percent of each other (a total of \$89 billion reported by the OECD compared with \$90 billion in the GTAP database). This is not surprising because the OECD estimates are the source for that part of the GTAP protection database. To that needs to be added domestic support to primary agriculture in non-OECD countries, which is another \$7 billion in 2001 according to the GTAP database (Dimaranan and McDougall 2005, Ch.16b). These estimates are shown in row 1 of Table 1.

For market price support provided through trade measures, the GTAP database relies on applied tariff rates including preferential rates where applicable, plus export subsidy notifications by members to the WTO Secretariat (Dimaranan and McDougall 2005, Chapters 16d and 16e). By contrast, the OECD relies on domestic-to-border price comparisons to capture the combined effect of all trade measures.

For primary agriculture in OECD countries, the GTAP database reports \$46 billion compared with \$139 billion in the OECD’s PSE estimate for 2001 (see first two columns of row 3 of Table 1). The latter is higher because the GTAP method does not capture the protective effect of non-tariff barriers (NTBs) such as Sanitary and Phyto-Sanitary (SPS) measures or other technical barriers to imports that may provide additional economic protection, in contrast to the OECD measure which is based on price comparisons so as to capture the domestic price-raising effects of all trade distortions, including any NTBs.

It is necessary to go beyond primary agriculture, however, when evaluating the consequences of agricultural reforms under WTO. This is because the WTO negotiations on agriculture involve potential liberalization of a wide range of processed agricultural products as well. While domestic subsidies are not paid to agricultural processors, the extent of border protection to processing activities in OECD countries is substantial. According to the GTAP database, in 2001 that assistance amounted to \$198 billion (row 3 of Table 1).

The remaining important element to consider is the market price support provided to the agricultural and food sectors of non-OECD countries. At \$76 billion for primary agriculture plus \$82 billion for food processing, this support is a substantial addition to the support through trade barriers of \$46 billion provided to OECD primary agriculture and \$198 billion to OECD agri-processing (row 3 of Table 1). There are almost no export subsidies in non-OECD countries (row 4 of Table 1), further increasing the prominence of market access.

In summary, the OECD and GTAP databases differ to some extent in their estimates of the extent of overall support to farmers in OECD member countries (columns 1 and 2 of Table 1); but the GTAP database also includes support via the agri-processing sector in those countries plus the support to both sets of activities in non-OECD countries. In total, the GTAP database suggests only 19 percent of the dollar value of the transfers to those producers from taxpayers and consumers is in the form of domestic support and only 6 percent comes via export subsidies (see final column of Table 1).³

That is not the end of the story, however. What matters is how those policy measures affect economic welfare, to which we now turn.

Relative Importance of the Three Pillars in a Back-of-the-envelope Calculation

To assess the importance of each type of distortion for the overall welfare costs of protection, it helps

to first focus on a simple back-of-the-envelope (BOTE) demand-supply model to get a rough estimate of the welfare effects of these distortions. Using the price wedges between border prices and producer prices induced by each of the three pillars of agricultural support, described above, one can obtain the relative contribution of each policy measure to the economic welfare cost of total intervention by assuming values for the price elasticities of aggregate supply and demand for agricultural products.

Domestic support measures only accrue to the producer side of the market, while market price supports (induced by tariffs and export subsidies) distort also the consumer side of the market. If the elasticities of demand and supply were equal, that means the welfare cost of a given tariff or export subsidy would be twice as great as that from a domestic subsidy applied at the same rate.

For the OECD countries, the \$90 billion in domestic support to producers represents 13.5 percent of the value of their agricultural output at market prices. The rates of market price support are 17.0 percent from OECD import tariffs and 3.3 percent from export subsidies in agricultural and food production (Table 2). Using these rates and assuming unitary elasticities of demand and supply, the total welfare cost of agriculture protection in OECD countries is calculated at \$87 billion, from which 8 percent is induced by domestic support, 11 percent by export subsidies, and 81 percent by import tariffs. Using the same process for non-OECD countries, we calculate the cost of protection to producers at \$42 billion, from which barely 1 percent is attributed to domestic support and export subsidies so almost all is attributed to market access measures. These back-of-the-envelope calculations yield a world total cost of protection in agriculture of \$129 billion, of which 6 percent is attributed to domestic support, 8 percent to export subsidies and 86 percent to market price support (Table 3).

A feature not taken into account in this BOTE analysis, compared with a fuller computable general equilibrium (CGE) analysis, is the

Table 1: Estimates of the extent of support to agriculture and food sectors, by region and policy instrument, 2001

(US\$ billion)

	OECD estimates of support to primary agriculture	GTAP database price-based distortions (excluding non-tariff barriers)							GTAP database estimates of support to all countries agriculture and food (% in brackets)	
		GTAP database estimates of support to primary agriculture			GTAP database estimates of support to food processing					
		OECD Countries	Non-OECD Countries	All Countries	OECD Countries	Non-OECD Countries	All Countries			
Direct domestic subsidies	89	90 ^b	7	97	0	0	0	97	(19%)	
– Fully coupled to prod'n	37 ^a									
Market price support (MPS)	139	46	76	122	198	82	280	402	(81%)	
– Export subsidies ^c	na	3	1	4	26	0.1	26	30	(6%)	
– Import subsidies ^d	na	43	75	118	172	82	254	372	(75%)	
All support measures	228	136	83	219	198	82	280	499	(100%)	

a The portion somewhat decoupled from production refers to payments to farmers based on area planted, animal numbers, historic entitlements, input constraints or overall farming income. The fully coupled portion refers to payments based on output or input use or otherwise not classified. Even if all non-OECD domestic subsidies were fully coupled, that would still mean less than half [(37+7)/97= 45 percent] of domestic farm subsidization is fully coupled globally.

b The domestic support is estimated from the value wedges between payments at agents' prices and market prices in the GTAP database. These payments are collected by commodity and region in payments to final output, payments to factors, payments to domestic intermediate inputs, and payments to imported intermediate inputs. The GTAP-AGR Model allows us to identify from the GTAP database payments to land based on historical entitlements of \$8 billion (Keeney 2005, p. 85).

c Export subsidy market price support is calculated as the sum over all goods of the value of output at undistorted prices of good *i* in region *r* times the corresponding export subsidy rate of good *i* in region *r*, minus the sum of the value of each intermediate inputs used in industry *i* in region *r* times its corresponding export subsidy rate.

d Import tariff market price support is calculated as the sum over all goods of the value of output *i* at undistorted prices in region *r* times the corresponding trade weighted tariff rate of good *i* in region *r*, minus the sum of the value of each intermediate input used in industry *i* in region *r* times its corresponding tariff rate. In deriving the import weights for making these calculations, intra-EU15 trade was excluded.

e The value of OECD production of primary agriculture at undistorted prices in the GTAP database is US\$614 billion, so \$136b represents an ad valorem subsidy equivalent of 22 percent. The OECD Secretariat's estimated value of production at farm gate prices is \$653b plus \$77b worth of direct payments based on output, and \$228b of that sum of \$730b is subsidies. Hence at undistorted prices the production value is \$502b, so \$228b represents an ad valorem subsidy equivalent of 44 percent.

Sources: Authors' calculations based on OECD (2004) and the GTAP database Version 6 (see www.gtap.org).

variation in agricultural assistance rates across commodities and across countries. The average numbers discussed above would be appropriate if protection and subsidy rates were the same across commodities and countries. However, the cost of protection rises with the square of the tariff, so a situation where one commodity has high protection and another has low protection is more costly than one where each commodity has the (appropriately weighted) average tariff rate. Since domestic supports tend to be less variable than trade measures across commodities, the BOTE calculation will overstate the importance of domestic support.

Another feature of the simple BOTE results, compared with those obtained from CGE models, is the greater importance of export subsidies relative to market access and domestic

support barriers. This is due to the ability of CGE models to take into account second-best welfare interactions that we cannot easily include in back-of-the-envelope calculus. World trade is greatly affected by a wide range of distortions, almost all of which diminish trade. Export subsidies are the key exception, as they increase trade. When, for instance, an importing country with a tariff is induced to purchase more inputs by the provision of another country's export subsidy, each additional unit of imports inside the importing country costs less than it would in the absence of that export subsidy. This suggests one should expect a global CGE model's estimate of the contribution of import market access restrictions to the welfare cost of agricultural policies to be somewhat above the back-of-the-envelope estimate of 86 percent.

Table 2: Agricultural subsidies and applied tariffs, by region, 2001

(percent)

	Primary agriculture			Processed Agriculture ^d	
	Domestic production subsidies ^a	Export subsidy ^b	Import tariff ^c	Export subsidy ^b	Import tariff ^c
OECD countries	13.5	0.8	16.9	3.3	17.0
Australia	2.9	0.0	1.0	0.0	9.1
New Zealand	0.3	0.0	0.4	0.0	2.7
United States	16.2	0.0	1.1	0.2	3.2
Canada	10.6	0.0	1.3	0.0	13.6
Mexico	8.8	0.0	10.7	0.0	12.2
European Union (EU15)	17.7	4.4	7.4	8.6	17.9
Switzerland -Iceland -Norway	39.8	4.2	29.5	3.9	31.4
Other European members	10.7	0.0	6.2	1.4	17.0
Turkey	3.1	0.2	15.9	1.6	18.0
Japan	6.0	0.0	27.8	0.0	31.4
Korea	3.6	3.3	146.4	0.0	26.1
Non -OECD countries	0.7	0.0	14.9	0.0	17.5
<i>E. Europe & Central Asia</i>	<i>0.5</i>	<i>0.0</i>	<i>8.9</i>	<i>0.2</i>	<i>18.0</i>
Russia	0.6	0.0	5.1	0.0	16.7
Other E. Europe & C. Asia	0.5	0.0	10.8	0.3	18.9
<i>East Asia & Pacific</i>	<i>0.0</i>	<i>0.0</i>	<i>32.9</i>	<i>0.0</i>	<i>19.8</i>
China	0.0	0.0	50.8	0.0	18.3
Indonesia	0.0	0.0	1.8	0.0	9.0
Other E. Asia & Pacific	0.0	0.0	16.8	0.0	22.9
<i>South Asia</i>	<i>3.0</i>	<i>0.0</i>	<i>17.8</i>	<i>0.0</i>	<i>50.9</i>
Bangladesh	0.1	0.0	6.3	0.0	19.7
India	3.4	0.0	25.5	0.0	76.4
Other South Asia	2.3	0.0	13.4	0.0	29.9
<i>Middle East & North Africa</i>	<i>0.0</i>	<i>0.6</i>	<i>10.3</i>	<i>0.0</i>	<i>16.4</i>
<i>Sub-Saharan Africa</i>	<i>0.2</i>	<i>0.0</i>	<i>9.3</i>	<i>0.0</i>	<i>21.3</i>
South Africa Custom Union	0.0	0.0	6.3	0.0	8.3
Other Southern Africa	0.4	0.0	11.0	27.2	0.4
Other Sub-Saharan Africa	0.1	0.0	10.4	0.0	24.5
<i>Latin America & Caribbean</i>	<i>0.4</i>	<i>0.0</i>	<i>6.7</i>	<i>0.0</i>	<i>11.1</i>
Argentina	0.0	0.0	4.7	0.0	7.6
Brazil	1.3	0.0	2.4	0.0	8.6
Other Latin America & Carib.	0.0	0.0	8.6	0.0	11.8

^aRatio of subsidies to the value of primary agriculture production. Domestic support is estimated by measuring value wedges between payments at agents' prices and market prices. These payments by commodity and region to final output, factors of production, domestic intermediate inputs, and imported intermediate inputs.

^bExport subsidy rates are the ratio of subsidy payments over the value of exported commodities. Trade weights are used for aggregation.

^cIntra-EU15 trade is ignored in EU and world trade in calculating import weights.

^dThere are no domestic production subsidies on processed agricultural products.

Source: Authors' calculations from GTAP database 6.

Table 3: Back-of-the-envelope calculations^a of the impact of agricultural and food subsidies and tariffs on global economic welfare, by region and policy instrument, 2001

(US\$ billion and percent)

	OECD	Non-OECD	All countries	
Direct domestic support	7	0.5	8	(6%)
Market price support	80	41	121	(94%)
<i>Export subsidies</i>	10	0.1	10	(8%)
<i>Import tariffs</i>	70	41	111	(86%)
All support measures	87	42	129	(100%)

^a Even when elasticity values of 50 percent smaller or larger are used, the contribution of import tariffs in the overall welfare cost – which is 86 percent in the case of unitary elasticities – varies only between 84 and 89 percent.

Source: Authors' calculation assuming unitary elasticities of domestic demand and supply.

Table 4: GTAP-AGR Model calculations of the impact of agricultural and food subsidies and tariffs on global economic welfare, agricultural trade and net farm incomes, by policy instrument, 2001

(percent)

	All countries' liberalization of:			
	Domestic support	Export subsidies	Import market access	All measures
Contribution to economic welfare (equivalent variation in income)				
OECD countries	6	5	89	100
Non-OECD countries	1	-10	109	100
World	5	2	93	100
Contribution to world agricultural trade (by value)				
	17	-2	85	100
Contribution to change in net farm incomes (or agricultural value added)				
% contrib'n to loss ^a in OECD countries	44	3	53	100
% contrib'n to gain ^a in Non-OECD countries	38	10	52	100
% contrib'n to loss^a in World	46	-0.3	54	100

^a There is an estimated global decrease in net farm income (or agricultural value added) of 6 percent as a result of removing agricultural and food subsidies, comprising an average loss of 22 percent in OECD countries and an average gain of 4 percent in non-OECD countries.

Source: Authors' calculations drawing on Anderson and Valenzuela (2005).

Relative Importance of the Three Pillars in the GTAP Model's Estimate of Their Impact on Global Economic Welfare, Agricultural Trade, and Net Farm Incomes

How do those expectations compare with model-based estimates of the three pillars' relative contributions to the global welfare cost of current agricultural distortions? The Diao, Somwaru and Roe (2001, p37) study, using 1995 protection estimates, provides estimates that imply an 89 percent share of the total costs for import tariff market access, 10 percent for domestic support, and 1 percent for export subsidies, while the estimates from the World Bank's recent analysis reported in Anderson and Martin (2005), drawing on results in Hertel and Keeney (2006) using their GTAP-AGR Model, are 93, 5 and 2 percent, respectively. These results have been replicated and added to by Anderson and Valenzuela (2005), who also find that the cost to non-OECD country welfare is even more heavily dependent on market access barriers than is the global cost, because export subsidies are only prominent in OECD countries and contribute to the welfare of non-OECD countries by lowering the price of their food imports. These results are summarized in the first three rows of Table 4.

The middle row of Table 4 shows that import barriers have a far more important impact than do subsidies on global agricultural trade as well, accounting for 85 percent of the trade-reducing impact of the three measures. Domestic support measures explain the rest, apart from a small contribution of the opposite sign by export subsidies. Freeing all merchandise trade would raise the share of agricultural production that is traded internationally by one-fifth globally (from 9.6 to 11.7 percent), and by almost one-third for developing countries (from 7.7 to 10.2 percent), according to the GTAP-AGR Model used here (Anderson and Valenzuela 2005).

Finally, what impact do those distortions have on net farm incomes (agricultural value added) in OECD and developing countries? Again using the GTAP-AGR Model, Anderson and Valenzuela (2005) estimate that the contribution of tariffs still dominates subsidies, but by much less (bottom rows of Table 4). The reason that removal of domestic support would make so much more of a

contribution to net farm income than to global welfare is because a non-trivial part of the effects of distortions on welfare and trade comes from the consumer side of the market, and that is absent in the case of domestic support measures.

Conclusion

The above results on the relative importance of market access, domestic support, and export subsidies as sources of global economic costs of agricultural protection are important to understand, because they can influence the weight of effort trade negotiators put into liberalizing the three "pillars". The intuition behind the model results is straightforward. Agricultural market access barriers are much more important than domestic subsidies because: the amounts of support provided through market access barriers – to primary and processed agriculture – in developed (and even more so in developing) countries are much greater than the supports provided through subsidies; trade barriers distort both production and consumption whereas domestic support only distorts production (and less so the more those measures are decoupled); and market access barriers vary much more across countries and commodities, and hence generate larger costs, than do domestic support measures. These results point to the importance of ensuring that market access is high on the Doha Development Agenda's agricultural negotiations.

None of this is to suggest disciplining and reducing agricultural subsidies is unimportant, however. To the contrary, that discipline and reform is essential, because there is always the risk that negotiated tariff cuts would be accompanied by policy re-instrumentation, which could include reverting to subsidies. Also, cuts to domestic subsidies would be necessary for the United States to share with the European Union the political and adjustment 'pain' of reducing agricultural distortions globally, since the EU has a much higher dependence on trade measures for supporting farm incomes than does the US.

Notes

¹ See, for example, Anderson and Martin (2005), drawing on the chapter in their subsequent edited volume by Hertel and Keeney (2006), as well as earlier studies by Hoekman, Ng and

Olarreaga (2004) and Diao, Somwaru and Roe (2001). This note draws on the fuller analysis in Anderson, Martin and Valenzuela (2006).

² A side issue is how the OECD's PSE compares with the Aggregate Measure of Support (AMS) that members notify to the WTO as part of their commitments under the Uruguay Round Agreement on Agriculture. The AMS refers only to the domestic support pillar, and it excludes measures that are not subject to reduction commitments (so-called blue box and green box measures). For a comparison of the PSE and AMS methodologies, see Diakosavvas (2002). In 1999 (the most recent year for which there has been full notification to the WTO) the AMS was \$88 billion for high-income countries and \$2 billion for developing countries. The \$88 billion comprises \$52 billion from market price support and \$36 billion from direct domestic subsidies. By contrast, the PSE

for just OECD countries was \$273 billion in that year. Of that latter amount, \$182 billion was from market price support measures and only the residual (\$91 billion) was direct domestic subsidies. That residual is further reduced, to \$43 billion, when measures that are somewhat decoupled from production are excluded. Since those decoupled measures are not counted as part of the AMS, that \$43 billion is comparable with the \$36 billion notified to the WTO as that component of the AMS.

³ The value of the transfer to producers via export subsidies, as reflected in the GTAP database, is estimated at \$28 billion globally (row 4 of Table 1). This includes not just the budget cost of export subsidies (\$4.4 billion in OECD and \$0.5 billion in non-OECD countries) but also the transfer from domestic consumers to producers, because export subsidies raise not just producer prices but also consumer prices

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