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**The Paradox of Agricultural Subsidies: Measurement
Issues, Agricultural Dumping, and Policy Reform**

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The Paradox of Agricultural Subsidies: Measurement Issues, Agricultural Dumping, and Policy Reform

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Abstract

World trade talks have foundered recently, in part due to developing country demands that industrialized countries reduce their large farm support programs to allow poor farmers in the global South to compete more fairly. Claiming that Northern farm subsidies amount to over \$1 billion a day, and that the average European cow receives more in subsidies than the nearly three billion people who live on less than two dollars a day, Southern governments, farmer groups, and international aid groups have demanded steep cuts in Northern agricultural subsidies.

This paper examines the economic and policy aspects of the subsidy debate. We begin with an examination of the most widely used measure of agricultural support, the OECD's Producer Support Estimate. We identify several important flaws in its application and interpretation as a reliable subsidy measure, highlighting the particular problems this can cause in measuring the levels of farm support in developing countries whose economies may not be fully integrated with the world economy. We then review the results of economic modeling of trade liberalization and subsidy reduction, finding that overall such measures are unlikely to raise producer prices to a sufficient degree to bring relief from alleged agricultural dumping to Southern farmers by bringing export prices above production costs. We briefly examine one alternative explanation for low commodity prices, the oligopolistic nature of agricultural trade.

We conclude with an outline for policy reforms at the global and national levels to address measurement flaws, raise commodity prices, and reduce the undercutting of developing country farmers by below-cost agricultural exports from the North. Throughout, we draw on US-Mexico trade in maize as an illustrative case study. We conclude that subsidy reduction is unlikely to reduce economic pressures on Mexican maize producers from below-cost US exports, nor are such measures likely to improve the economic prospects for similar small-scale farmers growing food primarily for subsistence and the internal market. Instead, policy reforms should focus on ending agricultural dumping, reducing global commodity overproduction in key crops, and reducing the market power of agribusiness conglomerates.

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Introduction

The World Trade Organization's Cancún ministerial meeting in September 2003 broke down over a range of disagreements, none more contentious than that over agricultural trade liberalization. The new "Group of 21", led by some of the developing world's most important agricultural producers and exporters – Brazil, India, China – demanded significant reductions in US, European, and Japanese protection for and subsidies to its farm sectors. Arguing that Northern countries were unfairly excluding Southern products while subsidizing their own producers at some \$300 billion per year, the G-21 demanded an opening of markets and a rapid phase-out of agricultural subsidies, which were cited as the primary cause of export dumping in the developing world. The oft-heard claim was that while nearly three billion people in the world are forced to live on less than \$2.00 a day, European cows receive more than that amount in farm subsidies. African cotton-producing countries joined the alliance, highlighting trade barriers and high subsidies in the North. The World Bank's *Global Economic Prospects 2004: Realizing the Development Promise of the Doha Agenda*, released just prior to Cancún, fueled the fires, claiming a \$350 billion welfare gain for developing countries from trade liberalization, much of it from liberalizing agriculture.

But are agricultural subsidies the main problem? There are a number of ways the anti-subsidies campaign is missing the mark. In this paper, we examine some of the fallacies in these arguments. Some of them derive from either fallacies in the ways subsidies and agricultural support are measured or errors in interpretation of those measures, primarily the Producer Support Estimate (PSE), the most widely cited international measure of agricultural subsidies.

As we will show, the anti-subsidy campaign, and the studies suggesting large welfare gains for the rural poor, have largely failed to recognize that the bulk of agricultural support quantified in the PSE is *not* subsidy-based and that there are several important flaws in the estimation of the remaining non-subsidy support, flaws that can lead to gross overestimations of government support for agricultural producers. One important finding is that policies in exporting countries that reduce export prices can have the perverse effect of increasing the estimates of farm support in other countries, particularly developing countries.

After examining the measurement issues, using world dairy prices and US-Mexico corn trade as illustrative examples, we assess the policy implications. We review the results of economic modeling of trade liberalization and subsidy reduction to assess the extent to which such measures would, as promised, help improve the lives of the rural poor by raising producer prices and increasing market access. We then briefly examine one alternative explanation for low commodity prices, the oligopolistic nature of agricultural trade. We conclude with an outline for policy reforms at the global and national levels to address measurement flaws, raise commodity prices, and reduce the undercutting of developing country farmers by below-cost agricultural exports from the North.

Measuring Agricultural Support

The anti-subsidies torch has been carried proudly by the development group Oxfam, which mobilized support for reductions in developed country tariffs and subsidies at the Cancún WTO meetings in September 2003. Focusing on the impacts of such policies on developing country farmers, Oxfam's research director and the director general of the International Food Policy Research Institute (IFPRI) write that poverty in poor countries is concentrated in the countryside, which bears a heavy burden from Northern agricultural protectionism. They quote an IFPRI model that shows that an end to rich-country farm supports would generate US\$40 billion in annual gains for developing countries, as exports increase. They quite rightly point out that agriculture tariffs are four to five times those for manufactured goods, and much higher for processed agricultural products, which makes it more difficult for developing countries to capitalize on value-added production of their own farm products. They note the irony that in developed countries agriculture is a very small share of the economy and employment (2% or less) – particularly compared to the poorest countries (35% on average) – yet subsidies and other supports are highest for the sector, “skewing the benefits of agricultural trade in their favor” (Watkins and Von Braun 2002, p. 2).

They focus on cotton as the most egregious example of unjustified and damaging subsidy programs in the US, and here there is little dispute. Overall support to the 25,000-farmer sector was US\$3.4 billion, helping give the US a 40% share of world export markets. They quote one study that shows that these programs lowered cotton prices by 25%, which are estimated to have cost West Africa's cotton farmers about \$190 million in 2001.

Yet in their analysis, they illustrate the tendency to confuse agricultural subsidies with broader support. “Each year, rich countries spend in excess of US\$300 billion in support of agriculture...” write Watkins and von Braun. “Most of the subsidies end up supporting production and generating large surpluses, which are then dumped on world markets at prices that bear no relation to production costs” (p. 2). While the first sentence calls it “support,” the second equates this with “subsidies” and attributes to them the blame for overproduction and dumping. Many analysts show a similar tendency to confuse subsidies – government payments or services to producers – with other support programs, such as tariffs, quotas, and price supports. As we will see, the distinction is important, not only analytically but in terms of the policy reforms that flow from such an analysis.

When Are Subsidies Not Subsidies?

The measurement of subsidies in the international trade arena was largely settled by the OECD, which developed a set of measures for the purposes of comparing member countries' levels of support, types of support, and reductions under the Uruguay Round Agreement on Agriculture (URAA). The Aggregate Measurement of Support (AMS) is now used to estimate so-called “trade distorting” agricultural support measures, those support policies slated for reduction under the URAA. The Producer Support Estimate

(PSE), on the other hand, is used to estimate and categorize transfers from both taxpayers and consumers to producers and is considered the best available estimate of support to farmers. More comprehensive still, the Total Support Estimate (TSE) adds to the PSE estimates for the various broad-based agricultural subsidies and services – research, education, extension services, irrigation and other infrastructure – that fall under the heading General Services Support Estimate (GSSE). The widespread claim in recent WTO negotiations that developed country subsidies amounted to over \$300 billion per year derived directly from the TSE calculations. In developing the measures, the OECD had the explicit purpose of accounting for not just subsidies but all forms of support, including border measures, price supports, etc.

The use of the AMS is generally limited to WTO negotiations over compliance with reductions commitments, and it has received its fair share of criticism over its distinction between trade-distorting and non-trade-distorting subsidies. The PSE has gained more widespread use as a proxy for agricultural subsidies more generally. The European Union's dairy PSE was the source for the claim that the average European cow receives more than \$2.00 in subsidies while a large portion of the world's people live on less than that. But the PSE is used in domestic policy as well, to provide the working estimate of subsidy levels in a given sector, or to evaluate the competitiveness of different sectors. As debate over developed country farm policies intensifies, the PSE is heavily relied on by the press as the most reliable measure of agricultural support both within a given country and across countries (Doyon, Paillat et al. 2001, p. 1).

The acceptance of the PSE as the agricultural support estimate of choice does not mean, however, that the measure is without its critics. Until recently, those criticisms echoed only in the rarified halls of the ivory tower or the depths of the Paris databanks that generate the annual estimates. Now, however, with developing countries demanding heavy reductions in developed country subsidies, those debates are coming to light. They should, because the implications are indeed profound, and the flaws in the measure and its uses are many.

Flaw 1: PSE Does Not Measure Subsidies

In the first place, the OECD acknowledged from the outset that this was not a subsidy measure but an estimate of all forms of agricultural support. In fact, subsidies represent only about one-third of the total PSE for OECD countries. The bulk of the PSE – 70% in 1999-2002 – comes in the form of “Market Price Support” (MPS), which is an estimate of the transfers to producers from consumers (as opposed to taxpayers) due to government policies that result in higher prices (OECD 2003). Most common among these policies are tariffs, quotas, and price supports (or administered prices). So the first problem with the popular understanding and use of the PSE is the assumption that it measures subsidies. It does not. Rather, it measures support, including so-called market support measures. (Notably, it also excludes GSSE subsidies, those provided collectively and in ways “non-specific” to a particular set of producers.) This is not so much a flaw in the PSE itself but rather in its use and perception.

The second problem – and the source of several internal flaws – is that the PSE doesn't actually *measure* support, it *estimates* support. (To some extent, the OECD can hardly be faulted for false advertising, since it now calls the PSE the Producer Support Estimate, an estimate, not a measure, of support, not just subsidies. Its original name – Producer Support *Equivalent* – evoked greater precision.) While taxpayer support comes in a vast and relatively well-documented array of subsidy categories – production-based, area/animal-based, input-based – market price support is very much an estimated value. The OECD, recognizing in the construction of the PSE that there was no easy way of measuring the economic impacts of tariffs and price supports, and following basic economic principles, based the estimate of the MPS on the difference between domestic prices and international prices for traded products.

The price difference between, for example, the international price for corn and the domestic price of Mexican maize could be considered the opportunity cost of such policies for Mexican consumers. That is, if Mexican consumers could have bought their corn at the prevailing international price, they would have saved the amount of the price gap, so this represents an estimate of the transfer from consumers to producers due to government policies, regardless of the form they take. These could be tariffs, which raise the price of imports. They could be quotas, which limit import levels and therefore raise average prices. They could be administered prices, a form of price subsidy that guarantees domestic producers above-market prices for their goods. Until recently, all were common features of Mexico's agricultural trade policies.

The logic is fairly straightforward. Absent market distortions, domestic prices will align with international prices and there will be no consumer transfer to producers. Conversely, if prices are not aligned, the difference is a reliable estimate of support. This takes the form within the PSE methodology of Market Price Support, which, as noted earlier, represents the bulk of the PSE for the OECD as a whole.

One key assumption embedded in this approach is that the welfare loss represented by the estimate of opportunity costs to consumers is *necessarily* the result of market-distorting government policies. The opportunity cost of such a price gap may be quite real, but its source may well not be producer support measures. In developing countries, where markets may be less integrated with the global economy, the assumption that domestic prices will align with international prices is even more questionable. As we will see in the case of US-Mexican corn trade, the widespread reduction of producer support policies in Mexico belies the relatively high MPS estimate for Mexican corn, as well as the resulting PSE.

The calculation of the PSE (and MPS) rests on a number of assumptions that have been called into question, in the greatest detail by Doyon, Paillet et al. (2001) and Berthelot (2003b). These are outlined below, with illustrative examples that draw largely from a detailed study of the PSE's flaws in estimating dairy support levels in the OECD. It is worth noting that the OECD's MPS calculations for a given country tend to be less precise than the estimates for each commodity, since a country's MPS is extrapolated

from a market basket of 10-17 commodities rather than a precise measure of a country's full range of traded agricultural production (OECD 2002).

Flaw 2: Reference Price Does Not Equal Market Price

The PSE and MPS assume that the chosen reference price is the undistorted market price for a given commodity. The measures are very sensitive to the selection of the appropriate reference price. In the world of agricultural commodities, it is very difficult – some would say impossible – to determine a world price. The OECD tends to select the most competitive price, which is generally the lowest price among exporting countries. In the best case, it can select the price from the country with the fewest market distortions (such as subsidies), but this can lead to difficulties as well. The use of low reference prices has the effect of inflating the gap with domestic prices and raising the MPS and the PSE.

Doyon, Paillat et al. demonstrate this problem in their study of dairy price supports. The OECD chose as its international reference price New Zealand's dairy export price, pointing out that of OECD countries New Zealand had eliminated the most market-distorting subsidies and price supports. Though New Zealand produces only 2% of the world's milk, it exports about 90% of its milk products, accounting for over 20% of the world market. There are a number of flaws in this selection, however:

1. New Zealand has unusually low production costs. Due to extensive grazing land, costs are much lower than in countries that produce milk more intensively. This allows New Zealand to be a price-taker in international export markets.

2. New Zealand administers its export prices, pegging prices to European levels. The New Zealand Dairy Board sets prices to compete with European exporters, which are the leading exporters of dairy products. European exporters are heavily subsidized, with export prices for most products well below European domestic prices (Shaw and Love 2001); this is the reason the OECD did not use the EU price as the reference price. As Doyon, Paillat et al. state, because New Zealand sets its prices to EU levels, “the New Zealand farm price does not reflect a subsidy-free market.” (p. 16)

3. New Zealand's export prices exclude the most costly winter months. With harsh conditions in two winter months, some production shuts down. The continued production, entirely for domestic consumption, receives a price almost double the export price. In this sense, the New Zealand export price does *not* reflect the actual costs of year-round production in the country; New Zealand's consumers pay average prices higher than export prices.

While acknowledging that there really is no such thing as an undistorted market price, Doyon, Paillat et al. use a set of econometric studies to determine a more appropriate reference price. Based on findings that US prices would show the least movement under simulations of full liberalization, they use the US price as the best estimate of the market price. Highlighting the earlier point, the same simulation suggests that New Zealand's

prices would rise by more than 50% in a free-market situation. Because the US price is significantly higher than New Zealand's – \$289/ton versus \$161/ton for 1989-94, about 80% higher – the PSE calculation changes dramatically.

	Ref Price	PSE
Australia	OECD (NZ)	72
	Adj. (US)	-186
Canada	OECD (NZ)	277
	Adj. (US)	77
Japan	OECD (NZ)	68
	Adj. (US)	49
New Zealand	OECD (NZ)	1
	Adj. (US)	-396
European Union	OECD (NZ)	166
	Adj. (US)	17
United States	OECD (NZ)	154
	Adj. (US)	10
Switzerland	OECD (NZ)	1033
	Adj. (US)	795

Source: Doyon et al., "Critical Analysis of the Concept of the Producer Subsidy Equivalent in the Dairy Sector (Dairy PSE)", 2001.

As Table 1 shows, using the US price as the reference price instead of New Zealand's reduces the PSEs for all countries because it dramatically reduces the market price support component of the PSE. Expressed as PSE per ton in national currencies – in order to avoid exchange rate distortions we will address later – the average estimated European subsidy for 1992-99 drops from 166 Euros/ton to just 17, a 90% decrease. Calculated on a per-cow basis, as has been done in the campaign against excessive Northern subsidies, the support level drops from 2.20 Euros per cow to about .22.

One interesting and important observation about this result is the appearance of negative numbers in the PSE. As Doyon, Paillat et al. point out, the OECD has recognized the feasibility of this outcome, noting that a negative MPS or PSE could come from policies that result in "discouraging exports and imposing a price lower than the world price" (Portugal 2000, p. 24). The negative estimates for Australia and New Zealand that result from the use of the US reference price suggest that government policies – such as the New Zealand Dairy Board's price-taking policies in pegging export prices to EU prices – are forcing producers to subsidize consumers with below-cost prices rather than vice versa. This is certainly a plausible scenario.

Flaw 3: Perfect Competition Does Not Prevail

The PSE is based on the assumption of perfect competition, in two important senses. On the one hand, it assumes that all countries are small, i.e., that no one country can affect world prices through its policies. Again, the fallacies of this assumption for agricultural commodities markets are obvious, since a limited number of countries control such a large portion of export markets that they are the industry “price leaders.” This affects the setting of reference prices in important ways. In the case above, the EU serves as the price leader, setting the international price at a level price-takers like New Zealand must match. The US is the price leader for corn, with 61% of world exports, generally sold at prices below estimated production costs (FAO 2003).

The PSE assumes perfect competition in a different way as well, with additional implications. The measure assumes that markets within countries are perfect, and that oligopolistic pricing practices neither affect producer price levels nor reduce the transfer from consumers to producers. In fact, agricultural markets are often dominated by a small number of large traders. As buyers, these firms put downward pressure on producer prices and, as sellers, they put upward pressure on the prices of inputs and final products. Cargill, for example, can use its market power as a buyer of feed corn to force down prices for this important input while at the same time using its market power as a seller to force up prices on final products, such as beef.

This has important ramifications for our understanding of the PSE. If intermediaries are capturing significant portions of the price gap between domestic and international prices, the producer is not receiving what is being represented as support to the producer, and the consumer may not be receiving the lower prices either. Again, this possibility has been recognized by the OECD:

“Unless there is explicit evidence to the contrary, the transfer implied by a price gap is assumed to accrue to primary producers, an assumption which depends on the relevant elasticities of supply and demand and which may not hold if the processing and distribution sectors, because they have monopolistic or oligopolistic structures, succeed in capturing a part of the transfers” (Cahill and Legg 1990, p. 26).

In another report, OECD acknowledged that “there is concern not only that oligopolistic retailing and processing structures will lead to abuse of market power but that the lion's share of the benefits of any future reforms in the farming sector may be captured by the processors and retailers....”(Lahidji, Michalski et al. 1998b, p. 16)

Doyon, Paillat et al. present an extensive analysis of the imperfections in the dairy sector, suggesting that the conditions required for perfect competition – homogenous products, perfect information, full mobility of resources, absence of artificial constraints, and a large number of buyers and sellers – do not prevail. The small number of buyers, in particular, has a strong impact on the market. They estimate the differences among countries in the transmission of prices from producers to consumers by comparing farm price trends for milk with consumer price trends for dairy products. A wide gap between

the two trend lines suggests that intermediaries are capturing a greater share of the benefits of higher retail prices.

In a comparison between the US and Canada of butter price transmission, they find a wide divergence in the US during the late 1990s (up to 20%) and a lower and steady ratio (13%) for Canada. This suggests that intermediaries are capturing a greater share of price increases in the US than in Canada. (This may not be the result of lower levels of market concentration in Canada. In fact, concentration is very high. Rather, it reflects strong cooperation among operators in the dairy industry, which counteracts the price impacts of concentration.) Australia has seen rising margins, while Great Britain has shown marked increases attributed to deregulation. In the latter case, milk prices fell by some 40%. In the PSE this would have translated into an assumed decline in transfers from consumers to producers, a reduction of support. In practice, consumers saw few price declines for dairy products, so the transfers remained high, though they were diverted to intermediaries in the production chain (Doyon, Paillat et al. 2001, p 59-60). In a similar fashion, Mexican consumers have seen little direct welfare benefit from the 70% decline in maize prices following NAFTA. According to Nadal (2000), oligopoly in corn importing and processing allowed intermediaries to capture the lion's share of the welfare gains from lower maize prices.

For international comparisons, this asymmetrical price transmission creates distortions. The PSE assumes lower prices translate into lower transfers to producers, or "producer support." In fact, the same price change can affect producers quite differently depending on the degree of concentration in the industry and the ways in which the market is organized. This makes the PSE an unreliable measure of support *to producers*.

Flaw 4: Exchange Rate Conversion Leads to Errors

As a measure of the dollar value of support to producers across products and across countries over time, the PSE suffers from its reliance on exchange rate conversions designed to make it possible to compare data for different countries. The PSE makes two conversions using the exchange rate. The first translates the reference price into domestic currencies. This creates few difficulties. The second conversion, though, which translates the estimated producer support in domestic currency into dollars for the purposes of international comparisons, can result in significant distortions.

A measure intended to estimate support to producers should take account of the buying power of that support, since it is a measure of opportunity costs to domestic consumers at domestic prices. Exchange rates tend to undervalue the purchasing power in lower income countries, because many inexpensive services are not internationally traded. Doyon, Paillat et al. argue that the use of a Purchasing Power Parity (PPP) conversion would be more appropriate, since the widely accepted measure is intended precisely to adjust for such differences. For the OECD's subsidy measure, the effect of this exchange rate distortion can lead to understating support levels for lower income countries.

Doyon's calculations using a PPP instead of the exchange rate in the dairy sector show significantly smaller impacts than did the change in the reference price. For a given country in a given year, the differences can be large, but the changes do not vary consistently in one direction for most countries for the countries studied. It is worth noting, however, that there were no developing countries in the sample and that is where one would expect to find larger discrepancies. In any case, there is a reasonable argument to be made that the PPP may represent a more appropriate conversion than the exchange rate in the calculations of the PSE, something the OECD is currently studying.

Flaw 5: PSE Fails to Account for Productivity Differences

Finally, the use of the PSE in its percentage form, which expresses support as a percentage of farm income, fails to take into account productivity differences among countries. This results in a tendency to overstate support levels for lower productivity countries. When presented as a share of farm income, the PSEs for Mexico and the US are similar, 18% and 23% respectively for 1999-2001. Support levels in the US are much higher though, which is masked by Mexico's lower productivity levels.

One simple adjustment that can account for differing productivity levels is to calculate support not as a share of farm income but on a per-hectare or per-animal basis. The OECD makes this calculation, but it is not as widely used in making international comparisons. Measured on a per-hectare basis, which adjusts for the wide disparities in land productivity, support estimates are much lower for Mexico -- \$53/hectare -- than the US -- \$122/hectare (OECD 2003). The disparity is even wider if, taking into account the questions about the estimation of market price support, one includes only true producer subsidies. For specific subsidies alone, the US has nearly five times Mexico's level per hectare, US\$88 in the US compared to US\$18 in Mexico. We will look more closely at this issue in the case of maize.

An Adjusted PSE

Doyon, Paillat et al. incorporate their observations into a new method for adjusting official PSE calculations, raising the reference price for dairy to the US price, as already discussed, and using the PPP instead of the exchange rate for conversion. The results of that recalculation for 1999 are in Table 2. PSEs are much lower for all countries, and negative for some. Most of the large changes observed are the result of the change in the reference price, as noted earlier (Doyon, Paillat et al. 2001, p 45).

Table 2
OECD vs. Alternative Method for Dairy PSE, 1999
(in US\$ per ton)

	OECD	Alternative*
New Zealand	1	-317
Australia	31	-216
European Union	190	-28
United States	191	17
Canada	202	23
Japan	580	275
Switzerland	626	340

*Doyon et al. method adjusts PSE using PPP and US reference price.

Source: OECD, 2000; Doyon et al., "Critical Analysis of the Concept of the Producer Subsidy Equivalent in the Dairy Sector (Dairy PSE)", 2001.

The OECD responded to this study saying that there is no justification for using the US price as the reference price, and that the resulting negative PSEs are “absurd” (Tangermann 2003). In a published response, Doyon and Gouin note that they used the US price not because it actually represents the free market price; in their paper they go to pains to point out that there is no reliable international market price for milk products. They explain the flaws in the use of the New Zealand reference price and offer the US price as an alternative mainly for comparison purposes.

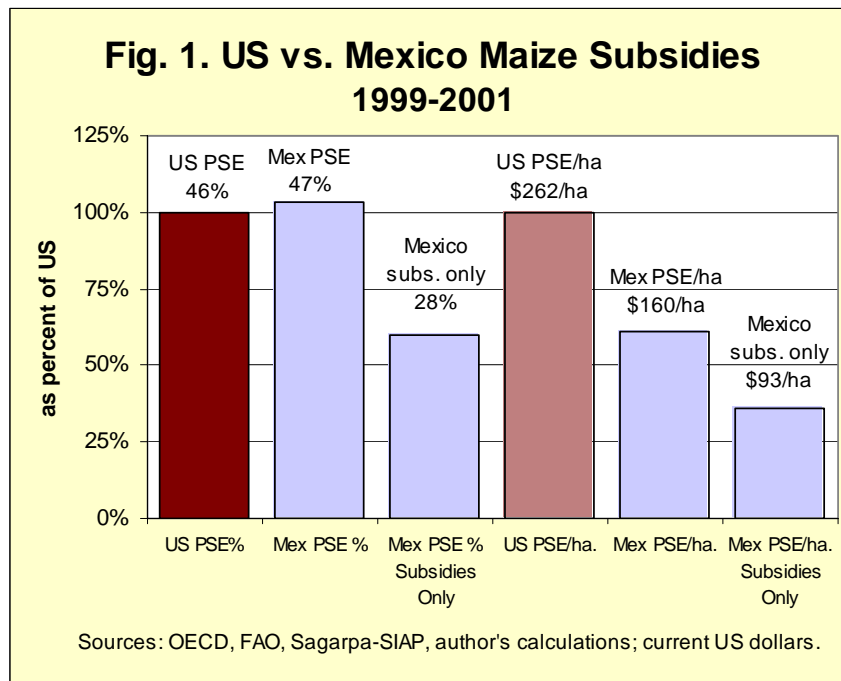
Interestingly, on the question of a negative PSE, Doyon and Gouin state that there is nothing absurd about a negative PSE, since it indicates that the gross transfer between consumers and producers is reversed. This is a classic example of negative externalities not reflected in market prices. When these externalities are not included in the market price, the consumer does not pay the real costs of production and is in a sense subsidized. In the same way, Australian consumers may pay a price for dairy products that does not reflect the actual market price, but rather a price subject to heavy downward pressure due to EU export subsidies and dumping. These consumers may in fact be receiving a transfer from producers, which would be reflected in a negative PSE (Doyon and Gouin 2003).

The PSE, Subsidies, and Mexican-US Corn Trade

An examination of the PSE’s flaws in analyzing relative subsidy levels in relation to corn in the US and Mexico reveals similar problems, and some additional issues related to the PSE’s accuracy in estimating developing country agricultural support. According to the PSE, both Mexico and the US support their corn farmers at a very high level, with Mexico’s PSE of 47% for the 1999-2001 period actually exceeding the US PSE of 46%. (See Figure 1.) As we will show, this is misleading, with important implications for international negotiations over agricultural subsidies. It also highlights the errors associated with the policy prescriptions that flow from the implication that US subsidies

are the principal factor distorting the market and that Mexico's farmers are protected from such distortions by their government's own high levels of support.

The errors of analysis echo many of those from the dairy example presented earlier. First, Mexico's PSE is not all subsidies. Depending on the year, 20-50% of the PSE is in the category of Market Price Support. For the 1999-2001 period, MPS averaged 41% of the total PSE. Only the remaining portion is subsidies, those the OECD classifies as specific producer subsidies. (Remember, the TSE includes a broader range of general subsidies, such as those for infrastructure, research, etc. The PSE also does not include credit subsidies, which are quite significant in the case of corn.) The US, as the price-leading exporter of corn with no market support measures protecting its corn farmers, has no recorded MPS, so the entire US PSE is accounted for by subsidies. (Prior to the 1996 Freedom to Farm Act, loan deficiency payments served as more of a price-setting mechanism, but they now function more as a subsidy.) For Mexico, counting only subsidies as a percentage of maize farm income, Mexico's PSE drops to 28%, about 60% of the US level. (See Figure 1, bar three.)

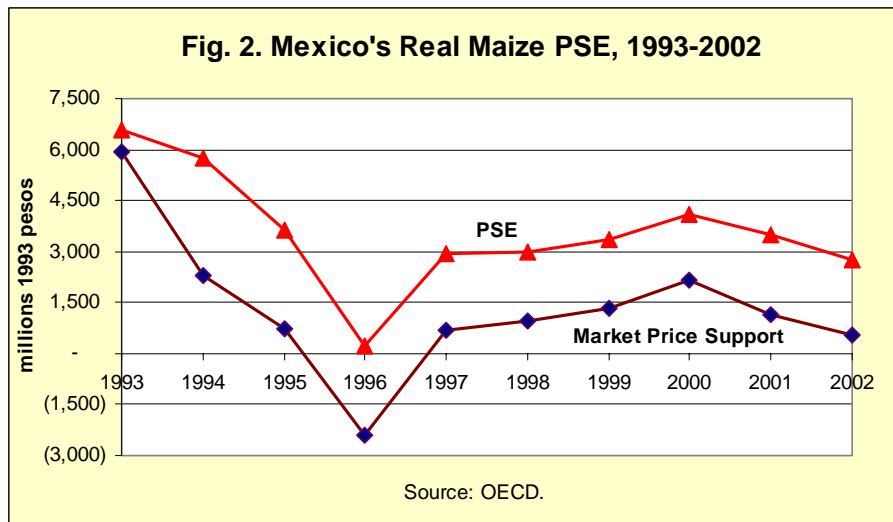


That is only the first adjustment to make to the subsidy comparison. The US, with its highly mechanized industrial farms, maintains large productivity advantages over Mexico's maize farmers, the majority of whom run small and medium-sized farms using more traditional methods. The average yield per hectare in the US is about three times that in Mexico. Thus, measuring subsidy levels as a percentage of farm income has the tendency to overstate Mexican support levels. As noted earlier, the PSE can also be reported on a per hectare basis to factor out these productivity differences. For the PSE as

a whole on a per hectare basis, Mexico's support levels are \$160/hectare, about 60% of the US level of \$262/hectare. (See bars four and five in Figure 1.)

Combining just these two adjustments – that is, counting subsidies only (not MPS) on a per hectare basis – presents a dramatically different picture than the official PSEs offer. As Figure 1 shows, instead of subsidy levels comparable to those in the US, Mexico's are just one-third of the US level, about \$93/hectare compared to \$262/hectare (bar six). This represents a more accurate assessment of the relative subsidies to corn farmers in the two countries. (Not addressed here, of course, is the highly unequal distribution of subsidies in both countries.)

But is it reasonable to discount market price support for Mexico's maize farmers? Given the problems associated with estimating MPS, the Mexican case illustrates well the limitations of this measure. Figure 2 shows Mexico's real MPS and PSE in recent years, with the lower line in the graph representing the MPS portion of the PSE and the upper line representing the total PSE. (The area between the two lines on the graph represents the part of the PSE that is not MPS but true subsidies.) As the graph shows, even after the peso crisis of 1995, the MPS has remained a significant share of the PSE.



This is curious, because government support policies toward the sector had largely been dismantled by the late 1990s. The Mexican government failed to enforce the tariff-rate quota system it negotiated as part of NAFTA, allowing corn imports since 1996 from the US well above the agreed upon quota without charging the negotiated high tariffs on above-quota corn. Price-support policies were also removed, with the dismantling of CONASUPO, the state trading agency. CONASUPO ceased to exist in 1999, but its scope and influence had been reduced significantly in maize in previous years. Subsidized credit through the government's Banrural had ceased in 1992 (Appendini 2001).

These programs, if maintained or enforced, would have constituted meaningful forms of market price support, non-subsidy policies distorting market prices in ways that the MPS

was intended to capture through its comparison of domestic prices and reference prices. But in the absence of such policies, particularly since 1998, why are Mexico's MPS levels so high?

The answer lies in the use of a distorted reference price for corn, and a host of market imperfections unrelated to Mexican government support policies. For Mexico's MPS, the reference price is the US Gulf export price, which is consistently below the price for domestic maize in Mexico. As we have seen, corn is one of the most highly subsidized crops in the US, with subsidy levels as high as 47% of farm income. Other important distortions characterize US corn markets, some more important to prices perhaps than high subsidy levels. Export credit programs from the US government, for example, reduce the cost to importers. The high degree of concentration in the US grain exporting industry, for another, exerts downward pressure on producer prices. So too do the many negative environmental externalities associated with US corn production – high water and chemical use, for example – which are not reflected in corn prices (Nadal 2000; Ackerman, Wise et al. 2003). Low US oil prices also serve as an indirect subsidy, distorting markets.

Ritchie, Murphy et al. (2003), in a recent report from the Institute for Agriculture and Trade Policy (IATP), have estimated that the US consistently exports corn and other key crops at prices below their actual costs of production. Combining USDA figures on average costs of production and shipping and handling with OECD data on input subsidies, they “construct” an estimate of the undistorted market price of corn. They compare that with export prices to calculate “dumping margins.” They estimate that dumping margins for US corn in recent years have ranged from 20%-33%.

Table 3. Mexico's Adjusted Maize PSE

	1998	1999	2000	2001	Average
Official MPS	2,522	4,030	7,376	4,095	4,506
Dumping Margin (IATP)	20%	30%	32%	33%	29%
Dumping-Adjusted MPS	-1,954	-2,178	1,146	-3,220	-1,551
Official PSE %	32%	41%	52%	49%	43%
Dumping-Adjusted PSE %	14%	16%	29%	21%	20%
Difference	18%	25%	23%	28%	24%

MPS in millions of current Mexican pesos; PSE percent of farm income.
Sources: OECD, Ritchie and Murphy (2003), author's calculations.

If US corn prices are so much lower than the costs of production, then using them to calculate Mexico's MPS can overestimate producer support. To assess the impact of this distortion on the MPS and the PSE, we adjusted the OECD's reference price by IATP's dumping margins for the 1998-2001 period. As Table 3 shows, the resulting change in the MPS is dramatic, as is the drop in the PSE. For three of the four years studied, Mexico's MPS becomes negative; it is negative for the period as a whole, falling from

4.5 billion pesos to –1.6 billion pesos. As noted earlier, Doyon et al. and the OECD have acknowledged the possibility of a negative MPS. In this case, it corresponds closely to what Mexican corn farmers say about their own experiences in competition with imported US corn. They find it difficult to compete with US prices that are below production costs and to do so they are lowering their own prices below their costs of production, in effect subsidizing consumers – or intermediaries – rather than being subsidized by consumers, *providing* rather than *receiving* subsidies.

As the table shows, adjusting the MPS in this way results in a much lower overall PSE for Mexican corn, reducing the apparent support from 43% of farm income for the period to just 20%, a reduction of more than half.

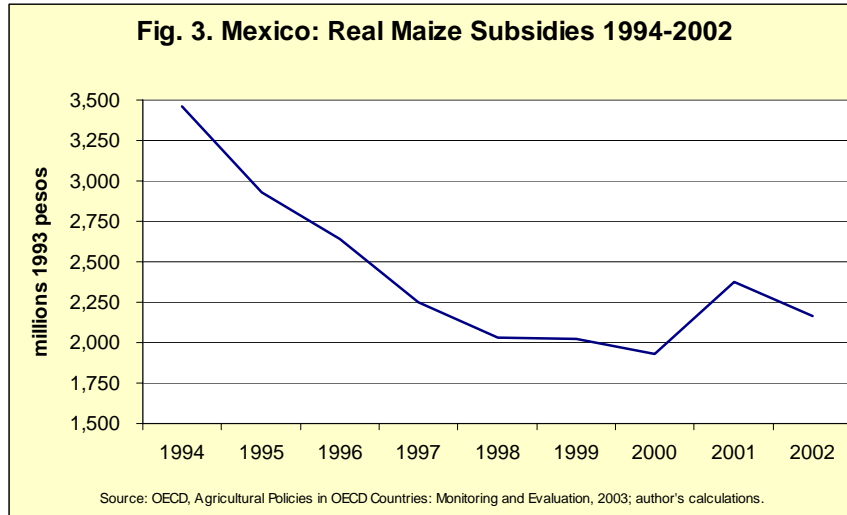
As with the Doyon, Paillet, et al. study, it is important to note that this attempt to estimate the undistorted market price for US corn exports yields only an estimate. And the question remains why domestic prices do not align with international prices. This case is, indeed, different from the dairy example discussed earlier. There, the authors argued persuasively that there is no reliable world price for dairy, and the selection of New Zealand's low export price as the reference price skews MPS and PSE calculations for all OECD countries.

In the Mexican corn example, however, it is undeniable that the effective world price is the US export price; that is the source of virtually all imported Mexican corn. The problem lies in the assumption that any price gap is the result of government producer support policies. There are alternative explanations. Many local and regional markets are not fully integrated into the international trading system. Oligopolistic market structures among importers may prevent effective price transmission between international markets and many domestic producers. Imported corn, most of it yellow corn for animal feed and for industrial uses, is not necessarily a “substantially equivalent” product to the native corn that predominates in Mexico and is used primarily for human consumption, mainly in tortillas. (In fact, the OECD makes a “quality adjustment” in its MPS calculations of 20% in the reference price to try to account for this difference, but that adjustment may simply be flawed. It is certainly overgeneralized and overly static; price differentials in Mexico have ranged from 5% to 39% in recent years.)

It is beyond the scope of this paper to analyze why Mexico's domestic maize prices have not fully aligned with US prices. What is clear, however, is that the OECD's assumption that price gaps are the result of producer support policies is seriously flawed in the case of Mexican corn. The resulting high MPS and PSE measurements imply a level of producer support that just does not exist.

Ritchie, Murphy, et al. point out that there is no such thing as an undistorted world market price for corn. They use cost-of-production data to “construct” their estimated price because the data are collected by USDA and are considered relatively reliable. They also point out that one of the definitions of dumping within the WTO is exporting at below the costs of production, though in practice this interpretation may not be actionable. It is also worth noting that their estimate could be on the low side. One other

attempt to construct prices and measure dumping used a different methodology based on price-plus-domestic-subsidy, also grounded in WTO anti-dumping disciplines. This method yielded an even higher estimate of the dumping margin for US corn in Mexico (Berthelot 2003a). Oxfam uses this methodology to derive a dumping estimate for US corn in Mexico about 40% higher than the IATP estimate (Oxfam 2003).



In any case, it is clear the PSE fails to present an accurate picture of Mexican subsidy levels for maize producers. Figure 3 presents that picture more clearly and directly, showing real subsidies to maize producers since NAFTA took effect, as measured by the OECD. Subsidy levels fell dramatically from 1994-98 and have remained low since, showing only a slight rise in 2001 to only 62% of the pre-NAFTA level.

Perhaps the most significant finding here is that distorted reference prices, which tend to be low for agricultural commodities, can have a perverse effect on the apparent agricultural support levels of many countries. According to the PSE, policies that lower prices in exporting countries – even if these are increases in domestic or export subsidies – show up in other countries' PSEs as an increase in domestic support for their own producers. Given the overwhelming tendency to equate the PSE with subsidies, this means that any increase in US farm support that reduces export prices raises not only the US PSE – as it should – but also the PSEs of other countries for which the US price is the reference price. These governments are providing no more support than they were, despite the higher PSEs; they are instead suffering from higher levels of dumping. Thus, Mexico's corn PSE rises when the US increases its farm support in a way that lowers prices.

PSE's Flaws for Estimating Developing Country Support

To summarize, the US-Mexico maize example highlights the limitations of applying the OECD's PSE methodology to developing country markets. Because the PSE, in its MPS calculations, bases its estimates on the price gap between domestic and world prices, it is

implicitly assuming three key things, all of which are questionable for developing countries:

1. **Domestic markets are fully integrated with international markets, so in the absence of market-distorting government policies prices will align.** The less developed the national economy or the sectoral market, however, the less this assumption will hold. For developing country agriculture, particularly that portion dominated by smaller producers, this seems a highly questionable assumption that will lead to misleadingly high MPS and PSE estimates.

2. **Where markets are well-integrated, the price gap necessarily represents the opportunity cost of government support policies.** In fact, there are many other possible reasons domestic prices will not align with international prices. As we saw in the case of Mexican maize, in Mexico's domestic market imported maize may not even be considered a like product for many uses, a reality reflected in the OECD's practice of adjusting its reference price upward by 20% to account for this difference. This is a recognition that domestic and international prices may not align even in the absence of market-distorting government policies.

3. **Market-distorting policies in exporting countries (e.g. export subsidies) that have the effect of lowering the reference price, will not affect other countries' PSEs.** The domestic price will still presumably align with the lower import price, even if that price reflects market distortions. Again, taking the Mexico case we can see that if prices do not necessarily align, or even if they do so only over time, lower prices in the US will appear as higher Market Price Support in Mexico's PSE.

These OECD assumptions may largely hold for developed country markets, but it seems clear they will not for many crops in many developing countries. Therefore, it is incumbent on the OECD to reassess the application of its PSE methodology for developing country markets. At the very least the OECD should test its calculations by identifying the government policies that are leading to high MPS figures. As we showed in the case of Mexican maize, in the absence of administered prices or the enforcement of NAFTA's tariff-rate-quota system, one cannot easily identify government support policies that would lead to the OECD's relatively high MPS calculations for maize.

Going Beyond Subsidies

Measurement issues aside, the key question here is the extent to which developed country farm subsidies are contributing to rural poverty in the global South. Even if the PSE misestimates agricultural subsidies, it remains the case that Northern subsidy levels are high and could have a strong impact on developing country farmers. The task remains to identify the causal relationships between Northern agricultural policies and the chronic low commodities prices that plague Southern and Northern farmers. Based on that analysis, policies can be designed with Southern interests in mind, focusing either on subsidy reduction or if necessary on other, more effective policy reforms.

In part because of the 2003 WTO ministerial meeting, with its focus on agricultural trade liberalization, there have been a number of studies that use complex economic models to assess the potential impact of trade liberalization in agriculture. Many of these disaggregate the results, running simulations of different policy reforms in isolation and in conjunction. While these models have been widely criticized for some of the fundamental flaws in their methodologies and underlying assumptions (see Gallagher 2003 for a good overview), they can provide a useful overview of the potential impact of subsidy elimination. On review, they seem surprisingly in agreement that the elimination of Northern subsidies would not, in isolation, reduce agricultural output and raise producer prices to the extent advocates of such measures might have hoped.

Most recent modeling studies do not disaggregate subsidy-reduction from broader liberalization reforms. A recent World Bank study of the potential benefits of agricultural trade liberalization, quoted widely in the lead-up to the Cancún WTO meetings, projected large welfare gains from overall trade liberalization and significant reductions in rural poverty. Based on a model that reduced both developed and developing country agricultural tariffs (to 10% and 15% respectively), eliminated export subsidies, and “decoupled” domestic subsidies from production, the report projected over \$500 billion in additional world income by 2015, with \$350 billion going to developing countries. The number of people living on less than \$2 per day was projected to drop by 144 million people. The study notes particularly strong pro-development impacts for specific commodities markets: sugar, cotton, wheat, and peanuts (World Bank 2003).

Because this study has been so widely quoted, it is worth highlighting some of its limitations in regard to our discussion of the trade-distorting aspects of subsidies, before examining some of the studies that focus more specifically on subsidies. While the report identifies commodities within which subsidy reduction would have a positive development impact, such as cotton, it suffers from the tendency to lump together border protection (market price support) and subsidies. One table, for example, carries the title: “Most subsidies go to producers – and come from border protection” (World Bank 2003, p. 120). It does not disaggregate liberalization measures the way some other models do, but it acknowledges that border protection measures are more important than subsidies. There are a number of other limitations worth noting:

1. The projected gains overall, when considered through 2015, are quite small. Developing country income gains are only 1.5% over the entire period, while rich countries gain just 0.5%. (p. 50) Over such a long period, these gains are disappointingly modest.

2. While a significant portion of the gains are achieved in agriculture and food, 80% of the projected gains are from own-country reforms, that is, from developing countries’ own liberalization measures. Overwhelmingly, these are assumed gains from the lowering of prices. The overall developing country gains from industrialized country liberalization in food and agriculture are only \$20 billion for the period. (p. 50) In other words, the kind of Northern agricultural liberalization measures widely credited with the \$350 billion income gains represent only 3% of that total.

3. The report acknowledges that “farmers stand to lose the most from reductions in protection” (p. 53), so the presumed welfare benefit is not from the reduction in export dumping but from lower prices, which benefit consumers. As with most such models, the principal welfare gain comes not from *higher* farm prices but from *lower* consumer prices, quite the opposite of the claims made on this studies’ behalf.

4. The cost of displacement of agricultural livelihoods from such reforms is not taken into account, since the simulation model, like most such models, assumes both full employment and a smooth transition into other sectors (Weisbrot and Baker 2002). Neither condition applies in most economies, with factor immobility exacerbated by the limited liberalization of international labor markets.

5. Global gains can hide large regional and national losses. These can be sizable, as one model of Uruguay Round agricultural liberalization showed. It estimated welfare losses for Mexico of over \$1 billion per year, and over \$5 billion for the rest of Latin America and the Caribbean (Brown, Deardorff et al. 2002, Table 1).

6. The overwhelming change produced by such policies would be a massive shift in production from Europe and Japan primarily to the US and other OECD countries (p. 54). This is due to the high levels of farm support in Japan and Europe, which would be reduced most dramatically under the assumed reforms, and the competitive position of the US and other developed countries in taking advantage of this market opportunity. Since the greatest friction in agricultural trade negotiations tends to be between the US on one side and Japan and Europe on the other, and the EU and Japan closely guard their food security, such policy reforms stand very little chance of being negotiated.

As noted earlier, the World Bank model is less useful than some others in analyzing the specific impact of subsidy reductions. One USDA model suggests that the elimination of developed country subsidies would result in a 3.4% increase in developing country export volumes and a 5.5% rise in value, while developed countries would see a 3.4% drop in volume and a 0.9% drop in value. But according to this model, within the developing country group net agricultural importers would experience a net welfare loss. Overall, developing countries experience a net welfare loss of \$4.2 billion from the elimination of export and domestic subsidies compared to developed country gains of \$7.2 billion. In this model, Latin America, which is a net exporter of livestock and primary agricultural products, is the only developing country region to show gains (Diao, Somwaru et al. 2001). The same study found that 80% of the rise in world agricultural prices that would come with full agricultural trade liberalization would come from the ending of developed country protection and support, but the elimination of tariff protections, not subsidies, was found to be the single biggest factor (Diao, Somwaru et al. 2001, p. 27).

Another World Bank study highlights the greater value of tariff reduction in trade liberalization, highlighting the links to broader subsidy reform. The study notes that tariffs on subsidized products tend to be very high (48% for the Quad countries of Japan, Canada, the US, and the EU), suggesting (not surprisingly) that the subsidies are part of a broader set of support programs. It also found that agricultural tariffs in middle-income

countries are high and rising, and that these pose even greater obstacles to developing country farmers because they affect more developing country commodity exports. The authors note that “it appears that OECD policies have set a detrimental example and may result in perverse demonstration effects.” The authors conclude that “subsidy reforms in OECD countries are necessary, although not sufficient, for developing countries to reap significant gains from the current WTO negotiations on agriculture” (Hoekman, Ng et al. 2002, p. 12).

Corn, Subsidies, and Liberalization

Following our previous discussion of US-Mexican corn trade and the impact of high US subsidies, we can examine some of the projected effects of subsidy removal. We must remember that the purported goal of subsidy elimination is to allow price signals (low prices) to more clearly transmit to farmers, reducing production and raising prices. If high subsidies are creating incentives to overproduce, driving down world prices, then eliminating subsidies should result in a reduction in developed country production and a rise in prices. If the dumping estimates from Ritchie, Murphy et al. are a gauge of the price increases required to bring prices up toward the full costs of production, then for corn we should be looking for policy reforms that produce price increases of 20%-33%.

Model	Commodity	Liberalization	Price change
IFPRI	corn	all dev'd. country subsidies, including trade subsidies	2.9%
IADB - Hemispheric Ag Reform	coarse grains	all hemispheric subsidies	1.8%
ERS - USDA	all crops	all dev'd. country subsidies	3.7%
Iowa State University	cereal grains excluding rice & wheat	all dev'd. country output subsidies	3.3%
		all dev'd. country input subsidies	3.3%
		all dev'd. country capital subsidies	4.3%
APAC - Zero Subsidies	corn	all U.S. subsidies	-3.0%

Sources: Iowa St. - Beghin et al, 2002; ERS - Diao et al, 2001; IFPRI, 2003; IADB - Monteagudo et al, 2002; and APAC - Ray et al, 2003.

Table 4 summarizes some of the more important recent studies. What is striking is that none of the liberalization scenarios generates the kind of increase in the world price of corn that would make much of a difference for developing country farmers. The IFPRI study is perhaps the most relevant, as it models the elimination of all developed country subsidies, including export subsidies. Yet it yields only a 2.9% increase in corn prices by 2020 (IFPRI 2003). The InterAmerican Development Bank modeled the impact of subsidy elimination in the Western Hemisphere in preparation for trade negotiations on the proposed Free Trade Area of the Americas and found that subsidy elimination in all countries would generate only a 1.8% price rise for coarse grains, a category dominated by maize (Monteagudo and Watanuki 2002). The USDA’s Economic Research Service

study, mentioned earlier, models the elimination of all developed country subsidies and shows only a 3.7% rise in agricultural prices overall in a static computable general equilibrium analysis (Diao, Somwaru et al. 2001). Beghin, Roland-Holst et al. (2002), in a study that served as the basis for some of the later World Bank claims, find that eliminating specific types of subsidies yields increases in cereals prices of 3.3%-4.3%. While they offer no aggregate estimate of the price impacts of eliminating all subsidies, their scenario of full liberalization projects a rise of 14.5% in cereals prices, the only projection we reviewed that even approaches the cost-of-production-based dumping levels estimated by Ritchie and Murphy.

The Agricultural Policy Analysis Center at the University of Tennessee modeled the elimination of all US agricultural subsidies and found that corn prices would actually *fall* 3% by 2011 compared to the baseline assumptions represented by the 2002 US Farm Bill (Ray, de la Torre Ugarte et al. 2003). Interestingly, this study suggests that for most crops subsidy elimination in the US is likely to have minimal impact, but there are crops – cotton, rice – for which it could make some difference.

Ray, de la Torre Ugarte et al. also present a different scenario, one in which US policy reforms focus not on trade liberalization but on a resumption of some of the agricultural policies abandoned in the last two decades in the push toward free trade. In this alternative policy scenario, the government would resume active efforts to reduce production through targeted set-asides of land, government management of surpluses, and the establishment of price floors and ceilings. Under this simulation, corn prices would rise 37%. Such increases are large enough to have an impact on developing country corn farmers, such as those in Mexico, ending, or at least reducing, dumping. Interestingly, this scenario suggests that in the long run such policies could also reduce or end direct US corn subsidies, since higher farm incomes would make them unnecessary.

Due to the chronic nature of low commodity prices for many agricultural products, this approach is receiving renewed attention. The analysis suggests that due to the inelastic nature of both supply and demand for many agricultural commodities, agricultural land will rarely go out of production in response to low prices. Reducing cultivated area is the only effective way to reduce the chronic oversupply of a crop. According to this logic, cutting subsidies may reduce the value of land and lower the rates of return on farm activity, but it does not tend to remove land from production. Instead, land needs to be taken out of cultivation through government-directed supply-management policies, such as those that predominated in the US until the 1996 Freedom to Farm Act. These included land set-asides, non-recourse loans, government stockpiling of surpluses, and other measures. High subsidies, in this view, are not the cause of low prices but one of their effects. Government payments are high when prices are below production costs; higher prices will reduce government payments. This is an area that deserves further research, since there is some evidence subsidy removal alone will not reduce oversupply.

Subsidies and the Rural Poor

The modeling studies reviewed here suggest that developed country subsidies are not the primary cause of agricultural dumping or rural poverty and that the South may be mistaken in focusing its demands in trade negotiations too narrowly on subsidy reduction. In fact, the Mexico case suggests that neither subsidy elimination nor tariff reduction is likely to relieve the plight of many small farmers. As noted, the US has no significant border protections against foreign corn, since it is the world's largest corn producer and exporter. Certainly, Mexico's corn producers are not seeking export markets in the US. The developing country demand for greater market access and an end to subsidies therefore appears to be particularly ineffectual for the developing world's small-scale corn farmers, though some low-cost industrial farms, such as Argentina's, could gain some share of the US market.

This analysis suggests that it is crucial for the South to be very specific by crop and region about its overall demands for market access and subsidy reduction. Most analysts agree that such measures in cotton could have significant welfare benefits for poor farmers in specific regions, such as West Africa. These cases may be the exception, however. In fact, more of the world's rural poor resemble Mexico's traditional corn farmers, growing food crops for subsistence and for the domestic market, than resemble West Africa's cotton farmers, growing competitively for export.

In fact, it is possible to categorize the rural poor in the South based on their relationship to farming and to the world market. Below are four rough categories detailing which developing country groups are likely to benefit from improved market access and/or subsidy reduction:

Traditional producers for subsistence and domestic market – Like Mexico's corn farmers, these growers will gain little relief from competition with low-priced imports if subsidies are reduced and market access is improved. For those producers most removed from the market, however, lower prices constitute a short-term economic benefit.

Non-producers, especially food importers – Communities and countries that do not produce a given commodity in significant degree will be unaffected by such policies, unless they are significant importers. In this case, they may see negative welfare impacts if prices rise on imported goods.

Producers with the capacity to export – As with West African cotton growers, these producers may benefit from both tariff and subsidy reduction, though economic analysis suggests the former will have greater impact. The groups best poised to benefit are not the rural poor but Southern agribusiness firms, many of which have already achieved the scale, efficiency, and international marketing experience to compete once barriers are reduced.

Landless or low-production farmers who rely mainly on wage labor – To the extent larger, more modern farms in the South gain a competitive foothold in the global market

due to such reforms, the rural poor may benefit from job growth. Brazil’s modern soy farms, for example, may benefit greatly from such reforms, and the resulting employment opportunities could have welfare benefits in rural areas. This will only be true, of course, if such gains translate into both more and better jobs.

Market Structure as a Cause of Agricultural Dumping

Finally, one alternative approach worthy of further research suggests that the most trade-distorting aspect of international trade may be the oligopolistic nature of the market. Vertically integrated conglomerates are involved in all aspects of production and distribution, and all are internal to the company’s operation. This leaves little room for the market to set prices for the different stages of production, since there is limited competition. Since grains are an important input for many downstream products, from feed for cattle to corn sweetener for soda, the conglomerates have both the interest in and the ability to reduce prices below the actual costs of production.

It is beyond the scope of this paper to assess the impacts of market concentration on commodity export prices. Murphy (1999) provides a good overview of the issues, Vorley (2003) presents an analysis of the problem for agri-food chains globally, and MacDonald (2001), Heffernan (2002), Hendrickson, Heffernan et al. (2001), and Hayenga and Wisner (2000) look more closely at market concentration in grains industries. For this study, it is worth looking briefly at some of the implications for grains markets in general and corn markets in particular. Grains markets are very concentrated. As of 2002, just three firms controlled 82 percent and 65 percent of all corn and soybean exports in the US, respectively: Cargill-Continental, ADM, and Zen Noh; 4 firms controlled all terminal grain handling facilities in the country, two being Cargill and ADM (Hendrickson and Heffernan 2002). Table 5 shows the market shares of the top corn exporters.

	Volume (million mt)	Share
Cargill - Continental Grain	20.0	42%
Archer Daniels Midland	13.4	28%
Zen Noh	5.2	11%
Top Three	38.6	81%
All others	9.1	19%
Total	47.7	100%

* % market share are approximations
Sources: Heffernan & Hendrickson, 2002; Hendrickson, 2003; and McDonald, 2001.

By all prevailing measures, these are high levels of concentration. One common measure lists the market power of the top three or four firms in an industry; the resulting CR3 and CR4 ratios give a measure of concentration. For US corn traders, the CR3 is an extraordinarily high 82%. The Herfindahl-Hirschman Index (HHI) is more detailed and

widely applied, used by the US Justice Department in anti-trust investigations, though it has been criticized for underestimating concentration due to the exclusion of alliances, partial ownership, and other veiled forms of control (Taylor 2002). The HHI is calculated by taking the sum of the squares of market shares of all top firms in an industry. An industry with an HHI of 1000 (e.g. ten firms with 10% market shares each) or less is considered competitive, while an HHI above 1800 is considered highly concentrated. Increases of 100 or more in the HHI trigger a Justice Department merger review. The HHI for corn traders is over 2700, well beyond the 1800 indicating high concentration. The Lerner Index is one additional measure of market power, calculating the difference between price and marginal cost as a fraction of price. Higher price-cost margins indicate monopoly power in the marketplace, as firms capture a higher share of prices. Some studies have demonstrated a correlation between movements in the HHI and the Lerner Index (Cowling and Waterson 1976), but the literature is not conclusive on this relationship.

In any case, the present levels of concentration in corn exporting indicate the presence of oligopoly and the likelihood of market power, with important implications for corn dumping in overseas markets. When vertically integrated corporations can use their market power to depress the prices for inputs and simultaneously raise the prices for final products, oligopoly can be an important factor in explaining low commodities prices. When that same market power can be used politically to win government subsidies that help keep prices down and resist policies that might raise agricultural prices, the effect can be decisive. This is an area worthy of further study.

Policy Alternatives

This analysis inevitably leads to a very different set of agricultural policy reforms at the national and international levels. This final section outlines some elements of such an alternative. We have shown that for many crops, many regions, and many of the rural poor, the reduction or elimination of Northern agricultural subsidies will not alone have the price impacts its proponents suggest, nor the benefits for small farmers. As the breakdown of the Cancún WTO talks demonstrated, such reforms are also very unlikely to be negotiated. There are several reasons.

First, domestic farm programs in most Northern countries have significant political support. In the US, it is a given that no candidate will be prepared to give away farm subsidies in this presidential election year. Second, the popularity of these programs goes well beyond pork-barrel politics. In Europe and Japan, agricultural policies have their origins in post-World-War-II food shortages, and they have achieved food security at a broad level. They would be the big losers, and the US the biggest winner, in most proposals for widespread agricultural trade liberalization. This asymmetry makes such negotiations particularly difficult. Finally, such trade liberalization must take place at the WTO, which has proven a particularly difficult venue for achieving agreement on substantial liberalization measures such as this.

Instead of the single-minded focus on subsidy reductions, policy reforms should focus on three principal goals: reducing export dumping (including reducing subsidies that contribute to dumping), reducing global commodity overproduction in key crops, and reducing the market power of agribusiness conglomerates. Key policy measures to further progress toward these goals are noted below.

1. Reduce export dumping: All parties seem to agree that ending dumping should be a goal of international negotiations in agriculture. Export subsidies are already targeted for significant reduction. Based on the proposal by Ritchie, Murphy et al. (2003) and other sources, the following measures would contribute toward reducing dumping:

- **Allow the Peace Clause to expire** – The URAA’s Peace Clause, which limits anti-dumping actions in agriculture, expired at the end of 2003. It should not be renewed. This will increase the relative power of importing countries in the international trading system and provide an impetus for further concessions from Northern countries.
- **Phase out export subsidies and export credits** – Continue the reductions in export subsidies, which directly reduce the price of exports, a clear and direct contribution to export dumping. Add to the list of practices slated for elimination the provision of export credits, which are widely practiced by the US and have similar effects to export subsidies. They are currently allowed under the URAA.
- **Establish clear guidelines for full-cost accounting of commodity production** – There is no clear guideline or methodology for calculating costs of production. Develop a methodology and publish the results, establishing a baseline for each exporting country’s costs of production to be used to determine whether dumping is taking place. All input subsidies and general subsidies should be taken into account, as should indirect subsidies such as the subsidized cost of feed grains in meat and dairy products.
- **Improve reliability of subsidy and support measures** – This study reveals some of the weaknesses in the OECD’s methodology for estimating agricultural support. Particularly troubling is the finding that price reductions by industry price-leader countries can have the perverse effect of raising other countries’ estimated levels of support. A full review of the OECD methodologies for calculating and classifying subsidies and other agricultural support policies should be undertaken with the goal of reducing such errors and more correctly determining the relative trade-distorting impacts of the different policy instruments and the actual levels of government support.
- **Allow all countries a range of options to protect themselves from dumping** – All countries should be allowed to impose countervailing duties or take other protective measures if agricultural exports from other countries are being dumped at below the costs of production. To protect food security, countries should be

able to protect any key food crops without having to prove dumping is taking place.

- **Ensure the well-being of net food-importing countries** – Earmark funds to ensure that net food importers are not hurt by policies that raise prices on internationally traded food crops.

2. Reduce global commodity overproduction in key crops: The global oversupply of most commodities is structural in nature and is not caused principally by subsidies. Drawing heavily on the proposal by Ray, de la Torre Ugarte et al. (2003) for a “farmer-oriented policy blueprint,” we can identify key reforms:

- **Address structural oversupply with international supply management agreements where possible** – International agreements among producing and consuming countries can address chronic problems of oversupply. These agreements are difficult to achieve and even harder to enforce, but they should be pursued where possible, particularly in cases like coffee and cocoa where small farmers in developing countries are the main producers. West African producers in Cancún offered concrete proposals toward this end.
- **Re-establish production-limiting policies for key crops in the North** – The only way to reduce production in the North is to change government policy to take land out of production and reinstitute government management of surpluses and therefore prices. This has the added benefits of encouraging conservation, broadening the range of Northern farmers receiving support, improving incomes for family farmers, and even reducing subsidies, since many are the result (not the cause) of low prices. This is an area in need of further study.

3. Reduce the market power of agribusiness conglomerates: Because market concentration contributes to both the levels of export dumping and the base of political support for its continuation, policies must directly address the market distortions caused by concentration. In line with proposals from US farm groups as well as Ritchie, Murphy et al. (2003) and others:

- **Apply WTO transparency measures to private firms** – Transparency measures currently force state trading enterprises to disclose their degrees of market power; similar requirements should apply to private firms to reduce the undue influence of agribusiness conglomerates in international markets.
- **Increase anti-trust enforcement in agri-food industries** – There has been substantial criticism by US farm groups of the weak enforcement of US anti-trust laws in agriculture, the recent merger of Cargill and Continental Grain being only the largest and most dramatic example.

These measures face many obstacles, most notably the concerted opposition of the powerful firms that currently benefit most from the global trading system in agriculture. These proposals offer a number of advantages, though, that make them at least as plausible as the proposal to eliminate Northern farm subsidies. They create alliances among farmers in the North and South, most of whom gain little from current policies. They build on the emerging strength of the G-21 countries in the international trading system, giving them more practical proposals to address their common concerns. They build on some existing WTO/URAA disciplines, such as countervailing duties, safeguard measures, and special and differential treatment. They infringe less on national sovereignty, allowing countries to choose the measures they prefer for the agri-food systems they want, as long as it does not result in export dumping. Finally, to the extent global commodities prices rise, Northern budget outlays for subsidies will fall significantly. In the constrained fiscal climates in the US and the EU, this would win additional political support for reform.

Unlike the demand for reduced subsidies and increased market access, these proposals move away from the recent trend toward trade liberalization, which contributes to the generalized problem of commodities-price deflation. They call for increased involvement by governments in the economy, and allow for expanded protections in international trade. Their implications for US farm policy are no less significant, calling for a reversal of the policies in place since the 1996 Freedom to Farm Act. Such dramatic policy shifts will be needed if the stated goals of the WTO's Doha Development Round – particularly that of reducing rural poverty in the global South – are to be achieved.

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REFERENCES

- Ackerman, F., T. A. Wise, et al. (2003). Free Trade, Corn, and the Environment: Environmental Impacts of US-Mexico Corn Trade Under NAFTA. Trade and Environment in North America: Key Findings for Agriculture and Energy. North American Commission for Environmental Cooperation. Montreal, North American Commission for Environmental Cooperation.
- Appendini, K. (2001). De la Milpa a los Tortibonos: La Restructuración de la Política Alimentaria en México. Mexico City, El Colegio de México; Instituto de Investigaciones de las Naciones Unidas para el Desarrollo Social.
- Beghin, J. C., D. Roland-Holst, et al. (2002). Global Agricultural Trade and the Doha Round: What are the Implications for North and South? Ames, Iowa, Center for Agricultural and Rural Development, Iowa State University.
- Berthelot, J. (2003a). Comments on the methodology used by IATP to estimate the dumping of US exported crops. Paris, Solidarité: 3.
- Berthelot, J. (2003b). From clarifying the black box of basic concepts of agri-food trade to proposals for an Alternative Agreement on Agriculture. Paris, Solidarité: 17.
- Brown, D. K., A. Deardorff, et al. (2002). CGE Modeling and Analysis of Multilateral and Regional Negotiating Options. Ann Arbor, Michigan, School of Public Policy, University of Michigan.
- Cahill, C. and W. Legg (1990). "Estimation of Agricultural Assistance Using Producer and Consumer Subsidy Equivalents: Theory and Practice." OECD Economic Studies **13**: 13-42.
- Cowling, K. and M. Waterson (1976). "Price-Cost Margins and Market Structure." Economica **43**(171): 267-274.
- Diao, X., A. Somwaru, et al. (2001). A Global Analysis of Agricultural Reform in WTO Member Countries. Agricultural Policy Reform in the WTO - The Road Ahead. M. Burfisher, Economic Research Service: 25-40.
- Doyon, M. and D.-M. Gouin (2003). "A propos du concept d'ESP : commentaires et réponse." Economie Rurale **276**(Juillet-Août 2003): 69-73.
- Doyon, M., N. Paillat, et al. (2001). Critical analysis of the concept of the producer subsidy equivalent in the dairy sector (dairy PSE). Québec, Groupe de recherche en économie et politique agricoles, Université Laval: iii, 69 leaves ; 28 cm.
- FAO (2003). FAOSTAT, Food and Agricultural Organization. **2003**.
- Gallagher, K. P. (2003). The Environmental Review of the FTAA: Examining the U.S. Approach. Washington, Carnegie Endowment for International Peace, Trade, Equity, and Development Series: 8.
- Hayenga, M. and R. Wisner (2000). "Cargill's Acquisition of Continental Grain's Grain Merchandising Business." Review of Agricultural Economics **22**(1): 252-266.
- Heffernan, W., Mary Hendrickson (2002). Multi-national Concentrated Food Processing and Marketing Systems and the Farm Crisis. Annual Meeting of the American Association for the Advancement of Science, The Farm Crisis: How the Heck Did We Get Here?, Boston.
- Hendrickson, M. and W. Heffernan (2002). Concentration of Agricultural Markets. Columbia, MO, Department of Rural Sociology, University of Missouri: 4 pp.

- Hendrickson, M., W. D. Heffernan, et al. (2001). Consolidation in Food Retailing and Dairy: Implications for Farmers and Consumers in a Global Food System. Columbia, Missouri, Department of Rural Sociology, University of Missouri: 18.
- Hoekman, B., F. Ng, et al. (2002). "The Incidence of Agricultural Support Policies on Developing Countries." World Bank paper: 31.
- IFPRI (2003). Impact of Alternative Agricultural Trade Policies on Developing Countries. Washington D.C., International Food Policy Research Institute (IFPRI).
- Lahidji, R., W. Michalski, et al. (1998b). The Future of Food: An Overview of Trends and Key Issues. The Future of Food: Long-term Prospects for the Agro-Food Sector. OECD. Washington, OECD: 7-20.
- MacDonald, J. M. (2001). "Agribusiness Concentration, Competition and NAFTA." Research paper, ERS, USDA.
- Monteagudo, J. and M. Watanuki (2002). Evaluating Agricultural Reform under the FTAA and Mercosur-EU FTA for Latin America: A Quantitative CGE Assessment. Washington, D.C., Inter American Development Bank.
- Murphy, S. (1999). "Market Power in Agricultural Markets: Some Issues for Developing Countries." Working Paper, T.R.A.D.E, South Centre.
- Nadal, A. (2000). The Environmental & Social Impacts of Economic Liberalization on Corn Production in Mexico. Gland, Switzerland and Oxford, UK, WWF International and Oxfam GB: 1-113.
- OECD (2002). Methodology for Measurement of Support for Use in Policy Evaluation, OECD. **2003**.
- OECD (2003). Agricultural Policies in OECD Countries: Monitoring and Evaluation.
- Oxfam (2003). Dumping Without Borders: How US agricultural policies are destroying the livelihoods of Mexican corn farmers. Washington, Oxfam International: 33.
- Portugal, L. (2000). Producer and Consumer Support Estimates OECD Database. Geneva, OECD: 36.
- Ray, D., D. de la Torre Ugarte, et al. (2003). Rethinking US Agricultural Policy: Changing Course to Secure Farmer Livelihoods Worldwide. Knoxville, Tenn., Agricultural Policy Analysis Center, University of Tennessee: 59.
- Ritchie, M., S. Murphy, et al. (2003). United States Dumping on World Agricultural Markets. Minneapolis, MN, Institute for Agriculture and Trade Policy.
- Shaw, I. and G. Love (2001). Impacts of Liberalizing World Trade in Dairy Products. Washington, DC, ABARE Research Report 01.4: 105.
- Tangermann, S. (2003). "A propos du concept d'ESP : commentaires et réponse." Economie Rurale **276**(Juillet-Août 2003): 69-73.
- Taylor, R. C. (2002). Hiding the True Extent of Concentration and Market Power with Partial Ownership and Strategic Alliances, Auburn University College of Agriculture.
- Vorley, B. (2003). Food, Inc.: Corporate concentration from farmer to consumer. London, UK Food Group: 89.
- Watkins, K. and J. Von Braun (2002). Time to Stop Dumping on the World's Poor. 2002-2003 Annual Report: Trade Policies and Food Security. IFPRI. Washington, International Food Policy Research Institute: 18.

Weisbrot, M. and D. Baker (2002). The Relative Impact of Trade Liberalization on Developing Countries. Washington, Center for Economic and Policy Research: 32.

World Bank (2003). Global Economic Prospects 2004: Realizing the Development Promise of the Doha Agenda. Washington, World Bank.

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