Consumer Financed Export Subsidies and the Agreement on Agriculture

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Current agricultural trade negotiations under the auspices of the World Trade Organization (WTO) call for an elimination of export subsidies. But the current language on export subsidies in the Uruguay Round Agreement on Agriculture omits an important implicit export subsidy in the form of price discrimination with or without revenue pooling. In either case, the export subsidy can be called 'consumer only financed'. Two recent high profile trade disputes brought before the WTO concluded that price discrimination with or without price pooling constituted an export subsidy (WTO, 1999, 2004). As a result, both Canadian dairy and EU sugar export subsidies were deemed to be above that scheduled in the Agreement on Agriculture (AOA). The WTO rulings based their decision on cross-subsidization as defined by Tangermann (1997) where price support within quotas has the effect of covering fixed costs while above-quota production can be sold even if the price received for it covers only marginal cost of production. Tangermann (1997) also includes the export subsidy effect of revenue pooling in his definition of cross-subsidization.

In this paper, we develop a general theoretical framework that identifies the elements of export subsidies with or without revenue pooling. In cases were there is no revenue pooling, we show that infra-marginal transfers to producers "cross-subsidizes" production and hence act as a trade distorting subsidy even if the extra-marginal output itself is not exported. This is because declining average costs offset losses on the margin at world prices. Infra-marginal support also distorts output by deterring exit as high cost firms would not be in business otherwise. Price discrimination with revenue pooling is shown not only to be an export subsidy but is more trade distorting than an equivalent taxpayer financed export subsidy. Again, revenue pooling distorts trade even if the product is not exported. To illustrate the importance of these two types of trade

distorting consumer financed support schemes, we determine the empirical effects of such support in the U.S. dairy industry were elements of both infra-marginal support and price discrimination with price pooling exist.

The importance of cross-subsidization due to infra-marginal support cannot be underestimated as countries have moved towards more 'decoupled' support programs. As for price pooling, there are many other examples of government regulations that generate such types of export subsidies (Dixit and Josling, 1997). We extend the standard analysis of revenue pooling (Alston and Gray, 1998) by allowing for a consumer only financed export subsidy when part of domestic consumption occurs at world prices. The higher the share of domestic production consumed at the world price, the smaller the trade distortion and thus it is possible that distortion is less than that of a taxpayer financed equivalent export subsidy. We show that the extent of the trade distortion depends on the relative demand elasticities, the proportion of total production consumed domestically of the traded good, the elasticity of supply, the level of farm price desired, and the price gap between the exported and domestically consumed good.

The WTO dispute for Canadian dairy involved both price discrimination and revenue pooling while the EU sugar case involved cross-subsidization resulting from infra-marginal support only. The WTO's definition of an export subsidy is incomplete because consumer only financed export subsidies (1) are not recognized with revenue pooling under some circumstances; and (2) includes infra-marginal support that possibly distorts trade less than the revenue pooling case. This is because of an excessive reliance on the notion of "contingent on exports" rather than on the underlying characteristics of an export subsidy that has production expanding and consumption contracting simultaneously. The definition of an export subsidy in the GATT 1994 leaves room for loopholes, circumvention, and misinterpretation of what an

export subsidy is and should be more specific on those policies that have the dual effect of contracting domestic consumption and escalating domestic production. This definition would provide a solid basis to recognize different types of export subsidies that are not now explicitly listed, including a consumer only financed export subsidy.

This paper is organized as follows: the next section looks at the legal details of the Canadian dairy and EU sugar cases. Section 3 outlines the economics of cross-subsidization and revenue pooling. Section 4 provides some empirical evidence using infra-marginal subsidies and revenue pooling in the U.S. dairy sector as an example. The final section concludes.

2. Legal Aspects of the Canadian Dairy and EU Sugar cases

Canada dairy policy

In Canada, approximately 40 percent of the milk produced is consumed as fluid milk, while roughly 5-10 percent of the remaining milk processed into dairy products is exported (CDC, 2004). Overall, Canada is a net exporter of dairy products both in value and in quantity. Dairy policy is governed by the Canadian Dairy Commission (CDC) which administers a national production quota system and sets the target price for fluid milk.

Between the years of 1974 and 1995, there was a penalty for both overproduction and underproduction. The penalty for underproduction was the loss of revenue that could have otherwise been earned, while the penalty for overproduction was a levy placed on out-of-quota milk. In addition, there was a producer financed export subsidy, which was funded by a levy placed on all in-quota milk and the levy on out-of-quota milk production. The producer levies acted as an export subsidy since the payment or export refund was contingent on exports; it also lead to a price gap between the price domestic consumers paid and the price producers received.

In 1995, Canadian dairy policy was modified as a result of the AOA, which required member nations to curtail domestic support and export subsidies that were tied directly to production. The production quota remained in place. However, the producer financed export subsidy was eliminated and a new classified pricing system was developed, referred to as the "Special Milk Classes". The system created five classes of fluid milk, Classes I-V. The WTO dispute focused on Class V only, which contained three major subclasses: Class Vabc (some domestic and all export sales are at the world price with pooling); Class Vd (export sales that are from in-quota production and revenues are pooled with domestic sales); and Class Ve (no price pooling and all over-quota production is exported where the marginal cost of production equals the world price).

EU sugar policy

The EU sugar policy also operates under a classified pricing system and a production quota. When first introduced, sugar produced in the EU fell into one of two categories, A or B. Classes A and B encompassed all sugar produced with in the limits of the production quota. In-quota sugar was either sold domestically at the high guaranteed price or exported. Exported A and B sugar received an export refund which was financed via producer levies placed on domestically sold A and B sugar. The levies placed on B sugar exceed the levies placed on A sugar. The role of B sugar was to act as surplus margin. The existence of the B quota allowed producers to fill their A quota without the risk of being penalized for overproduction.

The first major modification of the policy occurred in 1975 after the UK's accession. At that time, the CMO acquired the UK's commitments to certain ACP countries. The resulting ACP Protocol opened the EU market to imported sugar cane. In addition, the ACP Protocol guaranteed the EU support price for sugar imported from those countries named in the

agreement. Increased openness ultimately created the need to export sugar produced in excess of demand. Furthermore, class C was introduced in the mid-1980s when B quotas were permanently set at given production levels. The role initially assigned to B sugar was eventually taken over by C sugar or out-of-quota sugar. There were no quotas associated with C sugar. Growers producing C sugar had three options: 1) export it at the world price, 2) carry forward it to the next marketing year, or 3) sell it to domestic processors at a low negotiated price. Note that the main difference between Canadian Class Ve milk and EU class C sugar was that EU C sugar could be carried forward. Canadian milk producers did not have this option, since fluid milk is highly perishable.

EU sugar policy is further complicated by the ACP Protocol, Special Preferential Sugar (SPS), and agreements with India. These agreements set a guaranteed minimum price for a predetermined quantity of sugar imported from signor countries. The set minimum price received by the signor countries is the guaranteed EU internal price which exceeds the world price. Therefore, in some countries, domestically produced sugar is exported to the EU and sugar is then purchased on the world market to satisfy domestic demand in the signor country. In some instances, the sugar purchased in the world market is class C sugar exported from the EU. Thus, the result is a triangular trade pattern.

The second main policy modification occurred in 1995 as a result of the AOA, which placed limitations on export refunds given to producers. In addition, there was a reduction in the production quota. However, the underlying policy remained virtually unchanged. Unlike Canadian dairy, the producer financed export subsidy remained in place.

Understanding of WTO Legal Texts

In December of 1997, the US and New Zealand filed claims with the WTO regarding Canada's failure to comply with their obligations outlined in the AOA and GATT 1994. The claimants specifically cited Articles 3, 8, 9, and 10 of the AOA (WTO, 1997). In addition, the claimants argued that Canada had also violated the schedule of concessions as well as the Article 3 of the SCM Agreement.

The Canadian case went on for several years. The results of the first panel were appealed. New Zealand and the US requested that a second dispute settlement panel be assembled, since they believed that actions taken by Canada to come into compliance remained in violation of its obligations. The arguments in the second case mimicked those of the first dispute, with the exception of an additional argument of cross-subsidization. The EU sugar case soon followed in which cross-subsidization was the central argument.

Article 1 of the AOA provides the "Definition of Terms" for export subsidies. Article 1(c) defines the term "budgetary outlays" to include revenue foregone, meaning that the government can finance an export subsidy simply by not collecting a tax or levy. The inclusion of revenue foregone in the definition of budgetary outlay is important to both Canadian dairy and the EU sugar disputes, since none of the policies in question involved a charge to the public account. Export subsidies can be financed via producer or consumer transfers as well. Article 1(e) defines exports subsidies as "subsidies contingent upon export performance" including those subsidies explicitly listed in Article 9 of the AOA. The phrase contingent upon export performance indicates that a producer must engage in export activities in order to reap the benefits of the subsidy. We show export subsidies can occur even if without export contingency. In both disputes, over quota production had to be exported and thus the payment was contingent on exports. While Article 1 is

not explicitly stated in the claimants' petition, it appears frequently throughout the disputes as the source of numerous definitional arguments.

The "Definition of a Subsidy" appears only in Article 1 of the Subsidies and Countervailing Measures (SCM) Agreement. Article 1.1(b) of the SCM Agreement defines a subsidy as requiring a benefit to be conferred. In each of the disputes, the panels had to first determine whether the payment or benefit constituted a subsidy in order to determine if the payment constituted an export subsidy.

Article 9 of the AOA identifies export subsidies subject to reduction commitments. Article 9.1(a) consists of three aspects. First, it indicates that support does not have to be provided directly by the government. Support can also be provided by a governmental agency, including marketing boards. This is particularly important for the Canadian dairy cases, in which the panel determined that the CDC was an agency of the government. Furthermore, Article 9.1(a) states that direct subsidies including payments-in-kinds are also subject to reduction commitments.[1] It also reiterates that export subsidies subjected to reduction are those subsidies contingent upon export performance. Article 9.1(c) states that export subsidies do not require budgetary outlays to be subject to reduction commitments; payments financed by virtue of governmental action not involving a charge to the public account, are also subject to reduction. This includes producer and consumer financed support.

Article 3 of the AOA indicates that a member country must not provide export subsidies in excess of specified budgetary outlays or quantity level commitments outlined in the countries reduction schedule. While Article 8 of the AOA prohibits member countries from providing export subsidies not in conformity with the AOA. Article 10 of the AOA addresses issues associated with circumvention of a member's outlined reduction commitments. Article 10.1 states that export

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[1] The first Canadian dairy case also involved payments-in-kind to processors in the form of lower prices.

subsidies not explicitly prohibited that attempt to circumvent reduction commitments are also prohibited. Article 10.3 places the burden of proof on the defendant. Any exports in excess of the reduction commitment amount are assumed to have been subsidized unless the defendant provides proof to the contrary. Both countries were exporting at quantities well above the levels specified in their schedule of concessions. Hence, the defendants assumed the burden of proof pursuant to Article 10.3 of the AOA.

The claimants utilized two main strategies in the disputes, focusing on theses Articles. They first argued that the alleged export subsidies were prohibited under both the SCM Agreement and the AOA. The claimants argued that alleged export subsidies circumvented commitments outlined in the AOA. The second argument was that if the alleged export subsidies were not prohibited under the SCM Agreement or the AOA, then they should be included in the schedule of concessions. Since both countries were exporting above their scheduled levels, including the subsidies in the schedule of concessions would cause both countries to be over their limits, thus in violation of the AOA

In both the EU and Canadian cases, the panels first had to decide whether the product(s) in question fell under the jurisdiction of the AOA in accordance with Article 2 and Annex 1 of the AOA. The next aspect of the dispute considered by the panel in the Canadian dairy case was whether the CDC was a governmental agency. Once the CDC was deemed to be an agency of the government, then its actions fell under the jurisdiction of the AOA. Next, the panels had to decide if the alleged export subsidies were actually export subsidies. The panel for the Canadian dairy case defined the term payment as requiring a benefit to be conferred. Furthermore, that benefit had to have been award to exports, thus the payment was said to be contingent on exports. The EU sugar panel determined that an export subsidy required three things: (1) a payment to be

made, (2) that payment to be made on exports, and (3) the payment to be financed by virtue of the government. However, the payment did not have to result in a charge to the public account. The identification of an export subsidy by means of payment, benefit, or export contingency is somewhat misleading as will we show in the subsequent sections.

Once it was determined that a "payment" or "benefit" had been conferred and that payment/benefit constituted an export subsidy, then the panels' duty was to determined whether the export subsidy was an acceptable export subsidy. If the export subsidy was administered in a manner consistent with the AOA, then the panel's discussion turned to whether it was in compliance with the member country's schedule of concessions. If the export subsidy was not administered in a manner consistent with the Article 9 of the AOA, then the panel had to decide if the export subsidy was generally prohibited, constituted circumvention or both.

Canadian Dairy Case

Essentially, the complainants argued that if the "special milk classes" scheme was consistent with Article 9 of the AOA, then the resulting subsidies should have been counted against Canada's export subsidy reduction commitments, otherwise the resulting subsidies were prohibited or constituted circumvention.

Canada claimed that the special class scheme did not confer a benefit to producers. Thus, it was not a subsidy in the sense of Article 1 of the SCM Agreement and therefore it could not be considered an export subsidy (WTO, 1999). Furthermore, Canada argued that no budgetary outlays occurred; hence, the special class scheme could not be deemed an export subsidy under Article 9 of the AOA. Canada argued that the CDC was not a governmental agency, maintaining that government merely provided the framework for the organization. However, the CCD had filed notification as a State Trading Enterprise under Article 17 of GATT 1994 on September 29,

1995, several years prior to the dispute (WTO). The panel ruled that the CDC was an agency of the Canadian government, and thus its (subsidizing) actions must be in compliance with the WTO legal texts.

Discussion then turned to what constituted "payments". The panel used domestic price as the criterion for determining whether exports received a payment; products sold globally below the domestic price were deemed to have received an export subsidy (WTO, 1999).

Once it was established that a payment had been rendered, talks turn to its source of financing. All parties agreed that no government funds were directly involved. However, the panel held that by granting the CDC the exclusive rights to govern milk production, the Canadian government indirectly provided the export subsidy on Class Ve and Class Vd milk. The export subsidy was received in the form of high domestic prices resulting from the revenue pooling scheme. Thus, the export subsidy was "financed by virtue of governmental action". High domestic prices received by the farms for domestically sold milk enabled them to sell exports well below the domestic price in the world market. Furthermore, the panel held that the export subsidy was contingent on exports, since the farm had to be an exporter in order to receive the benefits. The panel also found that Canada had acted inconsistently with its obligations under the Article 3 and 9 of the AOA.

The panel determined Class Vd and Class Ve to be export subsidies, but not Class Vabc because the latter could also be accessed by processors for the domestic market and was not "contingent upon export performance." Class Vd and Ve provided a lower price to exporters than could have been obtained from other sources and was supplied through a government sanctioned system. Milk sold at the world price, below domestic prices, was deemed to be a "preferential" price because it required farmers to "share the cost" of selling milk at a price lower than the

pooled price from domestic sales. The WTO ruled that such a scheme is a producer financed export subsidy because farmers had to "forgo revenue" to provide the subsidy and it was "contingent on exports". We will show at the export subsidy was actually consumer only financed in the form of higher domestic consumer prices. In addition, we will show Class Vabc was also subsidized since revenue pooling acts as an export subsidy even if part of the output is sold domestically at world prices.

Canada appealed the decision. The appellate body ruled that the panel failed to appropriately identify what constituted a payment in the sense of Article 1 of the SCM Agreement (WTO, 1999). The appellate body held that the appropriate benchmark to determine whether a payment had been rendered was the cost of production (COP) and not domestic price. If sales occurred below the COP production, then those units were deemed to have received a payment.

Canada argued that individual producer's information should be used rather than industry figures, arguing that the use of industry figure could result in the observance of export sales below COP, while in reality only low cost producers engage in exportation at the world price. Furthermore, there was a debate regarding what should be included in the calculation of COP. Canada argued that quota rights constituted intangible assets and could not be accurately incorporated into the COP calculation and therefore should not be included in the calculation. Ultimately the panel determined that quota rights could be amortized using Generally Accepted Accounting Principles (GAAP).

The appellate body was unable to determine whether payments were made in accordance with Article 9.1(c). Therefore, the appellate body was unable to determine whether the special class scheme was inconsistent with the Article 3 or Article 9 of the AOA.

New Zealand and the US requested that second dispute settlement panel be assembled, since they believed that actions taken by Canada to come into compliance remained in violation of the AOA. The argument utilized in the second Canadian dairy case mimicked the arguments used in the first case. However, one additional argument was added; the argument of cross-subsidization or export subsidies resulting from the domestic production quota.

The term cross-subsidization appeared for the first time in the Canadian dairy dispute as a footnote in the Final Panel Report 1999. The footnote highlights the fact that cross-subsidizes have never been formally addressed in any of the numerous WTO legal texts and the definition has never been formally agreed upon by the members of the WTO. It also states that cross-subsidization results from either over-quota production sold at world market prices operating under a production quota or from revenue pooling. The Canadian dairy industry had both a production quota with above-quota output sold at world market prices and price pooling arrangements. Tangermann (1997) proposed that cross-subsidies resulting from either a production quota or revenue pooling fall under existing regulations pursuant to the Article 10 of the AOA and that such policies constitute circumvention, particularly if the policy was introduced after the Uruguay Round.

The panel held that the cross-subsidies, resulting from the sale of domestic milk at high prices with exports being sold at world prices, were inconsistent with the Article 9.1(c) of the AOA. In addition, they deemed the resulting export subsidy to be contingent on export performance and therefore a violation of Article 9.1(a) of the AOA. Furthermore, the panel found the subsidy structure to be a violation of Article 10 and 9 of the AOA.

Canada appealed the decision for a second time, arguing that the term cross-subsidization was "foreign" and an "open ended notion". The appellate body upheld the panel's decision that

the special milk classes and the cross-subsidies resulting from the production quota were inconsistent with Article 3, 8 and 9 of the AOA, citing cross-subsidization as the reason. They declined to rule on Article 10.1 or circumvention.

The appellate body's ruling provided validity to the utilization of cross-subsidization as a viable legal argument in WTO disputes. The EU sugar case soon followed.

EU Sugar Case

In September of 2002, Brazil and Australia brought charges before the WTO dispute settlement body against the EU sugar regime. Many of the legal arguments were the same as those utilized in the second Canadian dairy case, with cross-subsidization as the central argument.

The complainants asked the panel to consider four payments which they believed to be in violation of the EU reduction agreements: (1) payments in the form of below cost C beet sales to C sugar producer/exporters, (2) payments in the form of cross-subsidization resulting from the profits made on the sale of A and B quota sugar used to cover fixed costs of the production/exportation of C sugar, (3) payments in the form of C sugar below the total COP, and (4) payments in the form of high prices by consumers. The panel chose to only consider payments of the type (1) and (2). [2]

The dispute settlement panel clearly outlined its interpretation of Article 9.1(a) of the AOA. The panel interpreted these provisions to require three distinct elements: (1) "payments" to be made, (2) those payments to be made on exports, and (3) those payments to be "financed by virtue of governmental action". Like the appellate body in the first Canadian dairy dispute, the panel concluded that average total cost of production should be used as the benchmark for determining whether a "payment" had been made.

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[2] The panel found the subsidies given to processors in the form of low prices and export refunds given to ACP/India equivalent sugar to be a violation of the AOA since they exceed reduction commitments.

Any sales below the average total cost of production were deemed to have a received a payment. Since these sales consisted of exports, it was ruled that the payment was made on exports and was therefore a violation of Article 9.1(a) of the AOA. Again, although the production quota did not involve a charge to the public account it was deem to in violation of Article 9 of the AOA.

The EU claims that it did not know at the time of scheduling that C sugar and ACP equivalent sugar received a subsidy. Therefore, it was not included in their schedule of concessions. They argued that had they known that subsidies awarded to C and ACP equivalent sugar should have been included in the reduction schedule at the time of scheduling, then their reduction figures would have taken on different values. The EU argued that they should be allowed to change their reduction schedule in light of this information (WTO, 2004).

The defendants in both the second Canadian dairy and the EU sugar disputes argued that cross-subsidization was an open-ended notion and foreign concept. Both countries argued that the definition of cross-subsidization had not been agreed upon by WTO members. The lawyers for the EU sugar case asserted that cross-subsidization could not be explained using economic theory (McNelis, 2005). Moreover, they argued that the effects of cross-subsidization could not be measured using econometrics or empirical analysis. We have shown that cross-subsidization is driven by declining average costs and can be measured empirically (de Gorter, Just and Kropp 2007).

The panel ruled pursuant to Article 10.1 of the AOA that the EU did not prove that class C sugar was not subsidized (WTO, 2004). Furthermore, the panel ruled that C sugar received an export subsidy, citing cross-subsidization as the source. The panel found that exported C sugar was cross-subsidized by the high guaranteed prices paid for A and B sugar. The panel did not

rule on the claims that the export subsidy was prohibited under the SCM Agreement under judicial economy; if it could be established that an export subsidy occurred in violation of one agreement, it was unnecessary to prove it in violation of the second agreement.

The ruling ordered the EU to bring its sugar policy in compliance with its obligations under the AOA immediately. In addition, the panel ruled that it did not have the jurisdiction to allow the EU to reschedule its reduction commitments (WTO, 2004). Any rescheduling negotiations must occur in multilateral forum, perhaps the upcoming Doha Round. The panel urged the EU to honor commitments to ACP developing countries and India.

The EU sugar case was also appealed. The appellate body upheld all of the rulings of panel, expect for the panel's use of judicial economy (WTO, 2005). The appellate body ruled that the panel had an obligation under the Dispute Settlement Understanding to investigate all claims submitted by the complaining party. The appellate body was not in a position to conduct the necessary legal analysis; therefore, they declined to rule on claims pursuant to the SCM Agreement.

Thus, WTO has ruled price discrimination with or without revenue pooling constitutes export subsidies. The next sections explain how these two forms of cross-subsidization lead to trade distortion.

3.   The essential economics of consumer financed export subsidies

There are two types of consumer financed export subsidies: price discrimination only with higher prices for infra-marginal output; and price discrimination with revenue pooling. We will show that either case can be more distorting than a taxpayer financed export subsidy.

Infra-marginal support

In the traditional literature, infra-marginal support is deemed to have no effect on the level of output because it does not influence production decisions on the margin (e.g., Borges and Thurman, 1994; Rucker, Thurman, and Sumner, 1995; and Sumner and Wolf, 1996). Chau and de Gorter (2005) showed that cross-subsidization can effect exit decisions and thus distort trade. Here, we show how infra-marginal support cross-subsidizes lower priced output by deterring exit and by expanding output beyond the infra-marginal level receiving support (de Gorter, Just and Kropp 2007).

Suppose the infra-marginal subsidy is already in place, and there are $i = 1,...,n$ farms in the industry. Farms receive a target price (T) on a limited amount of output (B_i), with T being greater than the prevailing market price. The target price is achieved through a transfer from consumers (e.g., a production quota). We define Q_i^* as the "natural" level of output where price equals marginal costs. It is assumed that B_i is always less than Q_i^*.

The key to understanding cross-subsidization is to distinguish those farms that are in business regardless of the infra-marginal subsidy from those that are in business only because of it. We therefore adopt the following notation:

$$\Phi = \{i \mid \text{farm } i \text{ produces regardless of the infra-marginal subsidy}\}$$

$$\Psi = \{i \mid \text{farm } i \text{ produces only with the infra-marginal subsidy}\}$$

Farms in set Φ are in business regardless of the subsidy and always produce at Q_i^*. But farms in the set Ψ may produce at Q_i^* or B_i.[3] Therefore, define

$$\Psi_1 = \{i \mid \text{farm } i \text{ produces } Q_i^* \text{ only with the infra-marginal subsidy}\}$$

$$\Psi_2 = \{i \mid \text{farm } i \text{ produces } B_i \text{ only with the infra-marginal subsidy}\}$$

We can now define aggregate output of those farms in business regardless of the subsidy as:

$Q^{\Phi} = \sum_{i \in \Phi} Q_i^*$. This represents the free trade level of output (output that would be observed if

no subsidy was in place). But this level of production is not observable. Total observed output,

Q, includes output from those farms in business only because of the infra-marginal subsidy,

defined by: $Q^{\Psi} = \sum_{i \in \Psi_1} Q_i^* + \sum_{i \in \Psi_2} B_i$. It follows that $\boldsymbol{Q} = Q^{\Phi} + Q^{\Psi}$. The literature to date

assumes infra-marginal subsidies have no impact on output because marginal decisions are

unaffected when $B_i < Q_i^*$ for all *i* farms. Observed total output is assumed to be the free trade

output Q^{Φ}. However, the aggregate observed level of output $\boldsymbol{Q}$ is greater than the hypothetical

aggregate unobserved free trade level Q^{Φ} by the amount of output due to farms in business only

because of the subsidy, namely Q^{Ψ}.

To understand how infra-marginal support distorts output, consider Ψ, the set of all farms

that are in business only because of the infra-marginal subsidy. Assume for the moment that

production cannot exceed *B* (omitting the subscript *i* for now). We can delineate two subsets of

farms in Ψ: those with positive profits at *B* under the subsidy, Ψ^+, and those with negative profits

when output is at *B* under the subsidy, Ψ^- . Output distortion equals *B* for the subset Ψ^+ where

farms find it profitable to produce at *B* with the subsidy. Firms that are unprofitable at *B* (but

would be profitable at Q^* with the subsidy) would have zero production (and distortion) in this

case.

Now relax the restriction that output cannot exceed *B*. Two additional distortions can be

identified. First, all Ψ^+ farms with positive profits at *B* will *always* expand their output to $Q^{\Psi+}$,

the natural level of output where market price equals marginal costs, even though losses are

incurred on the extra-marginal output (proven mathematically in de Gorter, Just and Kropp

2007). This means it is always the case that the costs savings due to declining average costs

(increasing returns) of expanding output are greater than the increase in costs from the expanded output net of market revenues.[4] Therefore, the distance from B to $Q^{\psi+}$ is additional output distortion due to the infra-marginal subsidy for the subset of farms Ψ^+.

Second, the Ψ^- farms that are unprofitable with production at B now find it profitable to produce at the natural level of output, $Q^{\psi-}$ in this case, where price equals marginal costs, but only because of the infra-marginal subsidy. They enter the industry because the cost savings from declining average costs are large enough for these farms to generate a profit at the expanded level of output, even though price is below the average cost of production. The production of each of these farms increases the gap between observed aggregate production Q and the hypothetical, unobserved aggregate free trade output Q^Φ. Therefore, the literature heretofore incorrectly assumes the observed output Q equals the hypothetical unobserved free trade output Q^Φ when $B < Q^*$ for all farms.

The WTO panel rulings only addressed one aspect of cross-subsidization, or more specifically, the move from B to $Q^{\psi+}$, the natural output level for only those farms profitable at B, and failed to analyze the output distortions due to exit deterrence: the distance 0 to B for the set of farms Ψ^+ that are profitable at B; and the distance 0 to $Q^{\psi-}$ for the set of farms Ψ^- that have negative profits at the base level B. In addition to all of this, the WTO panel only evaluated cases where prices are below average <u>total</u> costs of production, as variable costs were considered explicitly to be covered. We show that cross-subsidization can also occur if world prices are below the average <u>variable</u> costs of production.

Figure 1 depicts the logic where we assume B is less than Q* for all firms. Exit deterrence occurs when average costs curves for firms fall between T and Pw (these firms would not otherwise be in business). Infra-marginal support deters exit and so this implies that the

observed industry output at world prices is greater than the natural level of output at world prices

depicted as Q* in figure 1. Furthermore, firms who find it profitable at B (and would not produce

if no infra-marginal support is forthcoming) will automatically expand to Q*. This is extra-

marginal output due to "cross-subsidization". Finally, some firms would not find it profitable to

produce at B (average costs are higher than T) but would find it profitable to produce a higher

amount at the margin only because of the infra-marginal support. This represents a move from 0

to Q* in figure 1 and reflects simultaneous exit deterrence and cross-subsidization.

Now consider an equivalent fully coupled production subsidy generating a price T'

(where are *a* equals areas *b* + *c*). If there are many firms with average cost curves between T and

T', it is possible that the infra-marginal support can be more output distorting than the coupled

subsidy.

Revenue Pooling

The case of revenue pooling is well known (Sumner, 1996; Alston and Gray, 1998; Schluep and

de Gorter, 2001). Price discrimination across markets reduces consumption compared to free

trade, while farmers facing only the pooled price expand production. Trade distortion is greater

than a taxpayer financed export subsidy that generates the same level of producer prices. The

issue is what happens if part of domestic consumption occurs at the world price. This is the case

for Class Vabc in the Canadian dairy case where the WTO concluded there was no export

subsidy. However, we show that it can be even more distorting than a taxpayer financed export

subsidy that achieves the same level of producer price. This is because domestic consumption of

higher priced products is reduced and with revenues pooled to farmers (from both world and

high domestic prices) production increases above free trade levels.[3] This acts as an export subsidy.

Consider the case in figure 2. Assume there is only one demand curve given by D_1. If no price discrimination exists and there was a taxpayer financed per unit export subsidy of Pb - Pw, consumer prices equal producer prices at Pb and exports would be X_1 (instead of X_0 with free trade). The trade distortion of $X_1 - X_0$ is made up of reduced consumption $(C_1 - C_2)$ and increased production $(Q_2 - Q_1)$.

If there is price discrimination with a fixed price Pd resulting in consumption of C'_1, and the rest of production is exported at world prices, then the new excess supply curve would be given by ES_2. Producers receive the blend price and production is given by Q_2 where average revenues equal marginal costs. Exports at X_2 imply that the consumer financed export subsidy is more trade distorting than a taxpayer financed export subsidy because consumption has been reduced further by $C_2 - C'_1$.

Now consider the possibility of domestic consumption at world prices as well. The demand curve D_2 becomes operational and exports decline by C_3. The resulting exports are less than X_2, greater than X_0 but can be greater than or less than X_1. The consumer financed export subsidy in this case can be less or more distorting than a taxpayer financed export subsidy generating the same producer price. In terms of figure 2, ES_2 would shift left and intersect the Pb line to the right or left of X_1. Trade distortion would decline and perhaps be less than the taxpayer financed equivalent export subsidy. The extent of the trade distortion would depend on the relative demand elasticities. For example, the more elastic D_2, the greater the trade distortion with the taxpayer financed export subsidy. It would also depend on the proportion of total production

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[3] We ignore the production reducing effects of production quotas in Canada. The analysis here would be more applicable to the U.S. dairy policy.

consumed domestically of D_2. The higher the proportion of production consumed domestically of the good at world prices, the less likely the consumer financed export subsidy is more trade distorting. The outcome also depends on the elasticity of supply, the level of farm price desired, and the price gap.

4. Empirical Example of U.S. Dairy Policies

This section gives an empirical example of the relative trade distortions arising from revenue pooling versus infra-marginal support using U.S. dairy industry data. This sector was chosen for the analysis because U.S. dairy policy contains elements of both infra-marginal support and revenue pooling. We estimate cost functions by size and region to determine the effects of infra-marginal subsidies, cross-subsidization, revenue pooling, and an export subsidy on output and consumption distortions, using a comparative static analysis.

The price that U.S. dairy farmers receive is the average of class prices weighted by market wide utilization. The blend price is calculated by pooling various classes of milk. Class I consists of fluid milk, Classes II, III, IV are product classifications. The 2002 U.S. Farm Bill introduced the Milk Income Loss Contract (MILC) Program which financially compensates dairy producers when domestic milk prices fall below a specified level (USDA, 2002). These counter-cyclical payments limit the amount of production eligible to receive the payment to 2.4 million pounds per farm per year. Farms are required to produce in order to receive the payment. Therefore, the MILC program is a classic example of a taxpayer financed infra-marginal support program. Although the MILC program is taxpayer financed, the production effects of the infra-marginal payment would be the same if the program was consumer financed.

Impact of Infra-marginal Subsidies on Aggregate Output and Farm Numbers

The first column of table 1 shows that the infra-marginal subsidy increases production by 5.9 percent and the number of farms by 4.2 percent in the short run. In the long run, production increases less, but farm numbers increase more than in the short run. The baseline for the short run differs from that of the long run; the baseline is the farms that would be in business without the support. While more farms produce absent the payment in the short run than in the long run, the infra-marginal payments deters exit for more farms in the long run. But the latter need not be the case; the outcome depends on cost structures and size distribution of farms, as well as the size of the infra-marginal payment relative to the market price and the level of infra-marginal output receiving support. Since the infra-marginal policy is taxpayer financed, it does not lead to an additional consumption distortion. Thus, all additional output associated with the policy will be exported at the world price, leading to an increase in exports equal to the increase in output.

Impact of Revenue Pooling on Aggregate Output and Farm Numbers

The last two columns of table 1 indicate that revenue pooling leads to higher production distortions and a larger increase in the number of farms than the MILC program. Revenue pooling increases production by 8.0 percent and the number of farms by 8.7 percent in the short run. In the long run, the difference in the effects of the two policies is even more apparent. Revenue pooling increases production by 20.6 percent and the number of farms by 30.9 percent, in the long run. One reason for the large difference in effects is that the transfer to farms under the revenue pooling scheme is approximately six times the transfer to the farms under the MILC program. In addition, the increases in production and farm numbers for the infra-marginal payment calculations uses the baseline of farms receiving the blend price for all production, where the blend price calculation uses world price as the baseline. The justification for using

different baselines is this is the manner in which the policies are actually applied. Farms receive the blend price and make production decisions by equating this price with marginal cost, which causes an increase in production above what would be observed if farms received the world price. In addition to the blend price, we observe additional distortions due to the infra-marginal policy.

Impact of Revenue Pooling on Aggregate Consumption

Domestic consumption of fluid milk, Class I, accounts for 39.3 percent of total production, while 53.3 percent of production is consumed domestically as dairy products and the remaining 7.4 percent is exported at the world price. The revenue pooling policy not only distorts U.S. production, it also distorts U.S. consumption. Table 2 shows consumption distortions associated with the price blending policy. The table shows how consumption would change if consumers were able to purchase fluid milk and products at the world price instead of class prices. We find that price blending leads to a 9.7 percent reduction in consumption of fluid milk, a 22.8 percent reduction in the consumption of dairy products and an overall reduction in consumption of 17.3 percent. This further distorts trade by widening the gap between domestic consumption and domestic production.

Combining the production and consumption distortion, the total increase in exports is 87.2 million cwt. or a 129.3 percent increase in the short run. In the long run, exports increase by 493.8 percent.

Impact of Export Subsidy on Aggregate Consumption

The last two columns of table 2 show how consumption would change if all domestic consumption occurred at the blend price instead of at the respective class prices. In this case, we find the consumption of fluid would increase by 2.5 percent, while the consumption of products

would decline by 3.0 percent. The overall change in consumption would be a decline 0.7 percent. Thus, indicating that the wedge between consumer prices and producer prices also has a trade distorting effect. If both producers and domestic consumers faced the same price, namely the blend price, exports would exceed there free trade level by 66.8 million cwt.

5. Concluding remarks

The panels in two recent high profile trade disputes concluded that price discrimination with or without price pooling constituted an export subsidy. At this time, the WTO legal texts do not account for these types of consumer only financed export subsidies. We have shown that price discrimination without revenue pooling in the form of infra-marginal support can lead to substantial output distortions due to cross-subsidization and exit deterrence. Price discrimination with price pooling also leads to production and consumption distortions. These distortions exist even if a portion of domestic consumption occurs at the world price.

Given these results, the panel in the Canada dairy case should have ruled that Class Vabc was subsidized. The panel determined Class Vd and Class Ve to be subsidized but Class Vabc was not, because the latter could also be accessed by processors for the domestic market, and therefore was not "contingent upon export performance." Consequently, the current definition of an export subsidy which requires a benefit to be conferred, the benefit to be contingent upon exports and the benefit to be financed by the government is somewhat misleading. Future trade agreements and trade negotiations should use the modified definition of an export subsidy which includes the dual effect of contracting domestic consumption and escalating domestic production. Thus, the WTO could better recognize these more subtle forms of export subsidies.

Using the U.S. dairy industry as an empirical example, we find that the distortions in output and consumption due to revenue pooling are large. The combined production and

consumption effects lead to significant increases in exports. The production distortion due to revenue pooling is substantially larger than the distortion due to the infra-marginal subsidy. However, the transfer to farms under the revenue pooling policy is much larger than that under the infra-marginal subsidy. The combined effects of the two programs indicate that the effects of subtle export subsidies, not currently recognized in the GATT texts can be significant. In many cases, these export subsidies can be more distorting than traditional taxpayer financed export subsidies currently disciplined by the WTO and to be phased out according to recent developments in the Doha negotiations.

This paper shows, both in theory and empirically, consumer only financed export subsidies or other policies leading to cross-subsidization can cause significant trade distortions. Therefore, the results presented have implications for future trade disputes and trade negotiations. Modification of the WTO definition of an export subsidy is necessary to capture these subtle forms of export subsidies. Had the WTO recognized that export contingency is not a necessary condition for exports to be subsidies, the panel in the Canadian dairy case would have ruled that Class Vabc was also subsidized.

Figure 1: Cross-subsidization and exit deterrence with infra-marginal support
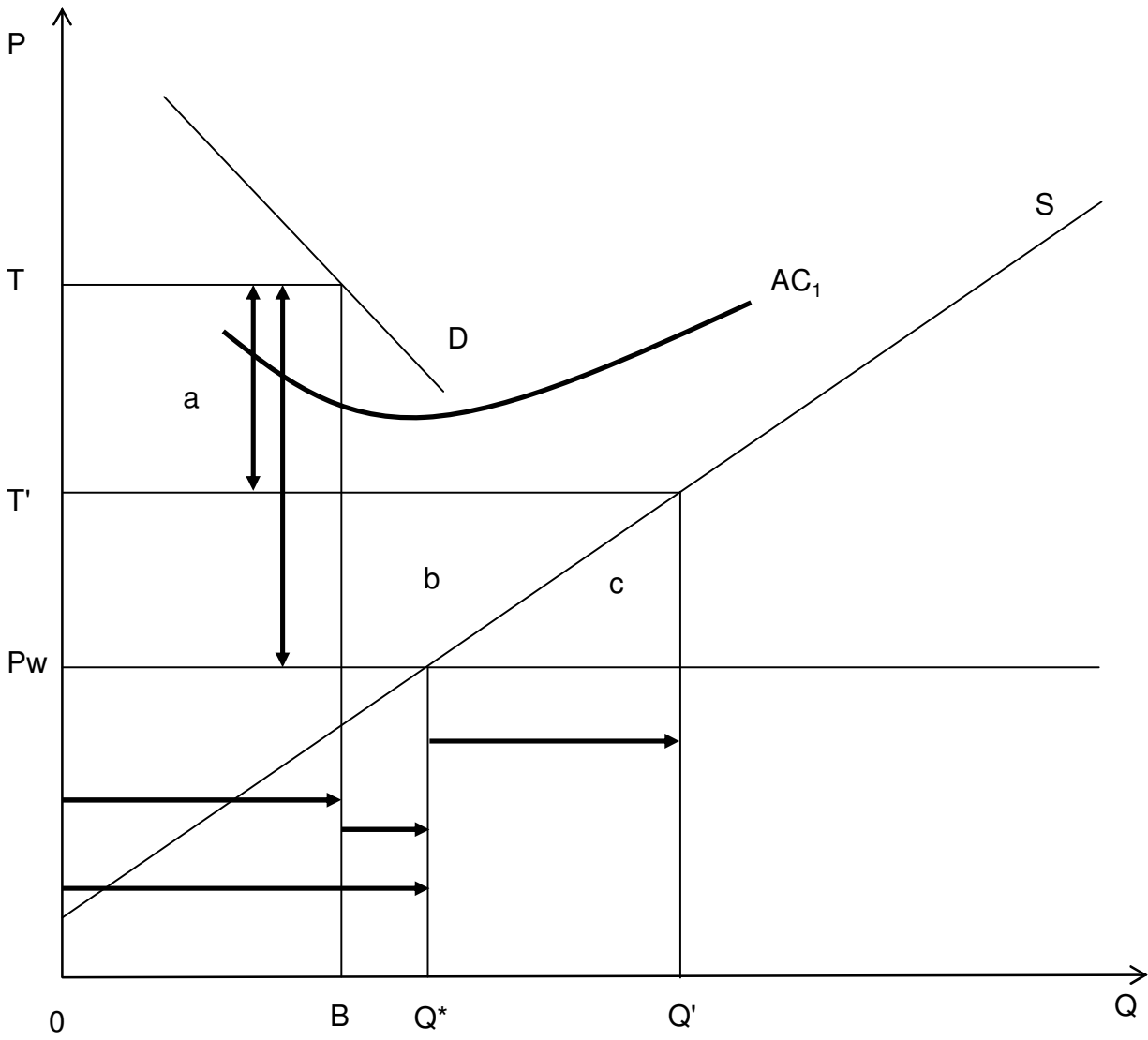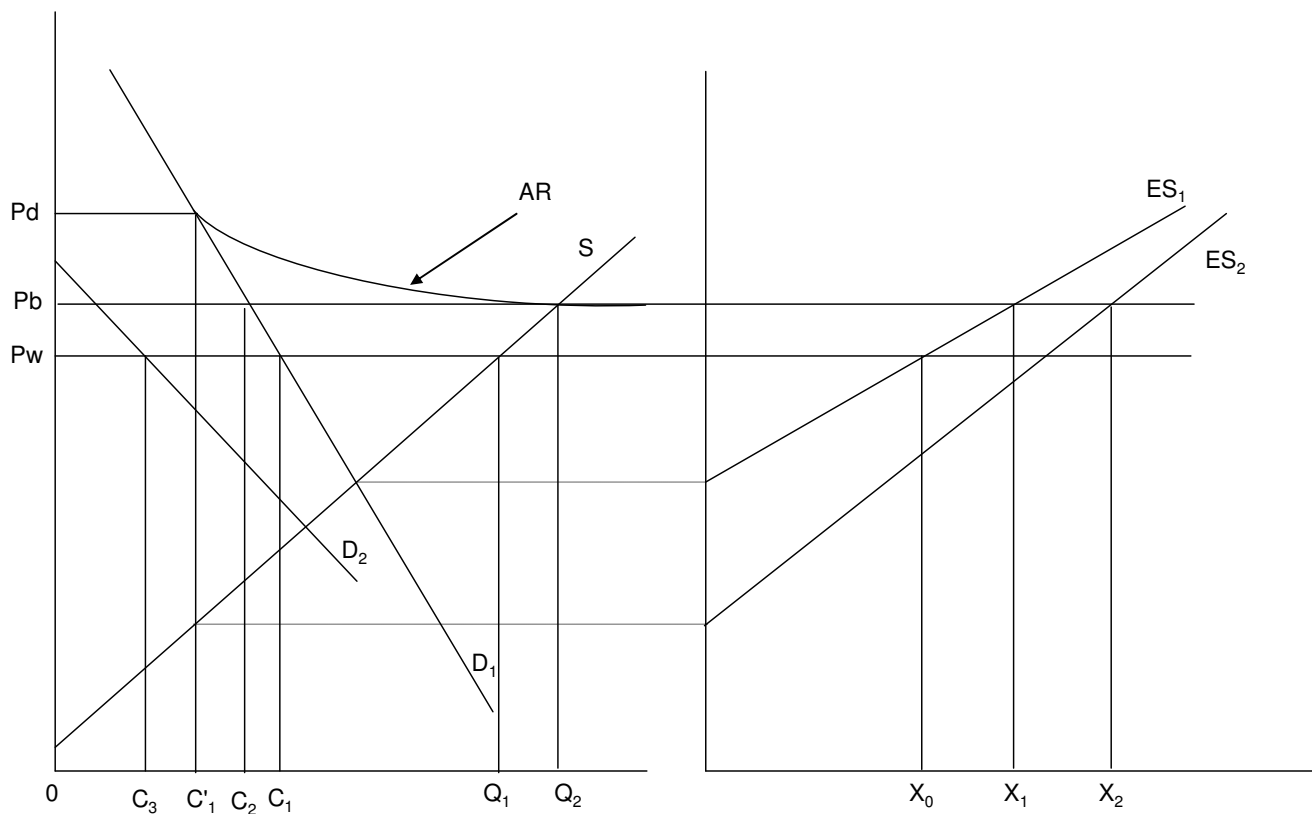
Figure 2: Export subsidy with revenue pooling but some domestic consumption at world prices

Table 1. Effects of Infra-marginal Subsidies and Price Blending on Production Levels and Number of Farms.

	Infra-marginal		Price Blending	
	Short Run	*Long Run*	*Short Run*	*Long Run*
Increase in				
Production (Million Cwt.)	54.2	34.3	72.7	175.4
Percent of Production	5.9	4.4	8.0	20.6
Number of Farms	531	586	1,108	3,480
Percent of Farms	4.2	5.6	8.7	30.9

Table 2. Effects of Price Blending and Export Subsidies on Consumption Levels.

	Price Blending		Export Subsidy	
	Short Run	*Long Run*	*Short Run*	*Long Run*
Change in				
Consumption of Fluid (Million Cwt.)	3.5	3.2	0.9	0.8
Percent of Fluid Consumption	9.7	9.7	2.5	2.5
Consumption of Product (Million Cwt.)	11.1	10.4	-1.5	-1.4
Percent of Product Consumption	22.8	22.8	-3.0	-3.0
Total Consumption (Million Cwt.)	14.5	13.6	-0.6	-0.6
Percent of Totat Consumption	17.3	17.3	-0.7	-0.7

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