

CONSUMER FINANCED EXPORT SUBSIDIES AND THE AGREEMENT ON AGRICULTURE

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Abstract:

Current agricultural trade negotiations under the auspices of the World Trade Organization (WTO) call for an elimination of export subsidies. However, the current language in the Uruguay Round Agreement on Agriculture omits an important implicit export subsidy in the form of price discrimination with or without revenue pooling. We develop a general theoretical framework that identifies these implicit exports subsidies and the associated production and consumption distortions. Using the U.S. dairy sector, which has elements of both infra-marginal support and price discrimination with revenue pooling, as an empirical example, we show the distortions resulting from such policies are significant.

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1. Introduction

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 their scheduled commitments outlined in the Agreement on Agriculture (AOA). The WTO rulings were based on cross-subsidization as defined by Tangermann (1997) where price supports received on within quota production has the effect of covering fixed costs thus allowing above-quota production to be sold at a lower price even if the lower price covers only the 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 resulting from price discrimination with or without revenue pooling. In cases where 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 obtained by expanding production offset losses on the margin at world prices. Infra-marginal support also distorts output by deterring exit as some high cost firms remain in business due to the infra-marginal support. Additionally, price discrimination with revenue pooling is shown not only to be an export

subsidy but the resulting export subsidy can be 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 where 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 (Sumner 1996; 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 the 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 regarding Canadian dairy involved both price discrimination and revenue pooling while the EU sugar case involved cross-subsidization resulting from infra-marginal support only. The current 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, namely when a portion of domestic consumption occurs at the world price; and (2) includes infra-marginal support which can be less trade distorting 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 leads to 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 in the GATT, 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 policies and cases. Section 3 outlines the economics of cross-subsidization and revenue pooling with consumer financed transfers. Section 4 provides some empirical evidence pertaining to the magnitude of the trade distortions of consumer financed export subsidies 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 (Canadian Dairy Commission 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 within 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 United Kingdom's accession. At that time, the Common Market Organization (CMO) acquired the UK's commitments to certain African, Caribbean and Pacific (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 Subsidies and Countervailing Measures (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 neither 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 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.² 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 country’s

² The first Canadian dairy case also involved payments-in-kind to processors in the form of lower prices.

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 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 these 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 awarded 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 determine 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 Vd and Class Ve 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 that the export subsidy was actually consumer only financed in the form of higher domestic consumer prices. In addition, we will show that 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).³

The dispute settlement panel clearly outlined its interpretation of Article 9.1(a) of the AOA. The panel interpreted this provision to require three distinct elements: (1)

³ 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.

“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. Any sales below the average total cost of production were deemed to have 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 deemed 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. It has since been shown that cross-subsidization is driven by declining average costs and can be measured empirically (de Gorter, Just and Kropp 2008).

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, except 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 without revenue pooling constitutes export subsidies. The next sections explain how price discrimination with or without revenue pooling lead to trade distortions and shows the distortions resulting from price discrimination with revenue pooling are significantly larger than the distortions associated with price discrimination without revenue pooling.

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). However, these studies fail to address the possible effects of infra-marginal payments on industry exit and the effects of cross-subsidization, thus they underestimated the output response and level of trade distortion. Chau and de Gorter (2005) showed that cross-subsidization can affect exit decisions and thus distort trade. Furthermore, de Gorter, Just and Kropp (2008) showed that infra-marginal support cross-subsidizes lower priced output by deterring exit and by expanding output beyond the infra-marginal level receiving support.

Potential producers can be divided into two categories: 1) producers whose exit/entry decision is unaffected by the infra-marginal payment and 2) producers whose exit/entry decision is affected by the infra-marginal payment. In some instances, the cost structure of the firm can be such that infra-marginal subsidies and the resulting cross-subsidies do not influence exit/entry or production level decisions in both the short and long run.

Specifically, there are two groups of producers not affected by the payment: 1a) those firms who remain in the market regardless of the current infra-marginal payment, and 1b) those firms who remain out of the market given the current level of infra-marginal support. Firms remaining in the market regardless of the infra-marginal payment find it profitable to produce

even without the infra-marginal payment. These firms will produce at Q^* defined as the “natural” level of output where price equals marginal costs both with the infra-marginal support and without it. Conversely, firms remaining out of the market regardless of the infra-marginal payment find it unprofitable to produce even with the infra-marginal payment and hence these firms will produce nothing. For the set of producers whose exit/entry decision is unaffected by the infra-marginal payment, the traditional analysis of infra-marginal support holds as production decisions are not influenced on the margin.

However, there is another group of firms that find it profitable to produce in the presence of the infra-marginal payment and unprofitable to produce absent the payment. Thus the infra-marginal support policy leads to a change in aggregate production. Furthermore, de Gorter, Just and Kropp (2008) show that all producers that find it profitable to produce will produce at Q^* or the “natural” level of output where price equals marginal costs. For this set of producers, traditional analysis of infra-marginal support does not hold.

Suppose the infra-marginal subsidy is already in place, and there are $i = 1, \dots, n$ 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:

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

$\Psi = i \mid$ farm i 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,

$$\text{defined by: } Q^\Psi = \sum_{i \in \Psi_1} Q_i^* + \sum_{i \in \Psi_2} B_i .$$

It follows that $Q = Q^\Phi + Q^\Psi$. 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 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^{Ψ^+} , 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^{Ψ^+} 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^{Ψ^-} 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^{Ψ^+} , 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^{Ψ^-} 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 total costs of production, as variable costs were considered

explicitly to be covered. However, cross-subsidization can also occur if world prices are below the average variable 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 P_w (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 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 because of the exit deterrence effect of the infra-marginal support.

Revenue Pooling

The case of revenue pooling is well known (Sumner 1996; Alston and Gray 1998; Schlupe and de Gorter 2001). Price discrimination across markets reduces consumption compared to free trade, while firms facing only the pooled price expand production. The resulting trade distortion is greater than the distortion resulting from a taxpayer financed export subsidy that generates the same level of producer prices. But what if part of domestic consumption occurs at the world price as in Class Vabc in the Canadian dairy case where the WTO concluded there was no export

subsidy? We show that it can still 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.⁴ Hence, pooling acts as an export subsidy even if a portion of domestic consumption occurs at world prices.

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 $P_b - P_w$, consumer prices equal producer prices at P_b 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 P_d 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 P_b line to the right or left of X_1 . Trade distortion would decline and perhaps be less than the taxpayer financed

⁴ We ignore the production reducing effects of production quotas in Canada. The analysis here would be more applicable to the U.S. dairy policy.

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 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. We estimate cost functions by size and region to determine the effects of an infra-marginal subsidy and resulting cross-subsidization, revenue pooling, and an export subsidy on output and consumption, using a comparative static analysis.

The dairy sector was chosen for the analysis because U.S. dairy policy contains elements of both infra-marginal support and revenue pooling. The price that U.S. dairy farmers receive is the average of class prices weighted by market wide utilization. This blend price is calculated by pooling various classes of milk. Class I consists of fluid milk, Classes II, III, IV are product classifications. Furthermore, 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 and 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.

We obtained data from the United States Department of Agriculture (USDA) ARMS databank that underlies the USDA report “Characteristics and Production Costs of U.S. Dairy Operations” (Short 2004). This data reports the percentage of production and percentage of farms operating within narrow total cost bands by region (between 100 and 200 bands depending on the region).⁵ This data closely approximates continuous joint distributions of total cost per hundredweight, production and farm numbers. We will refer to each observation in the data as a cost band of farms. The ARMS dataset upon which these groupings are based represented ninety percent of U.S. dairy production for the year 2000.

We use the cumulative distributions of farm production and the corresponding total costs for five regions: the Heartland, the Northern Crescent East, the Northern Crescent West, the Eastern Uplands, and the Fruitful Rim. This information is combined with the cumulative distribution data on the percent of farms in each cost band for the five regions. State level data on production, farm numbers, and cow numbers were obtained from other sources;⁶ we compute regional figures using the state level data. The regional production and farm numbers are used to compute the number of farms and the level of production associated with each cost band. The average yields per milking cow are computed on a regional basis. The production corresponding to a cost band is then divided by the average regional yield to determine the number of cows

⁵ We use data aggregated by cost bands which were determined based on a ranking of costs. By using aggregates, we understate the heterogeneity (or variance) in cost faced by farms (see Just and Weninger, 1999). A representative sample of individual farm level data would be ideal for our exercise. However, with the fine groupings by both region and costs (with 100 to 200 groupings in each region) this bias is kept to a minimum.

⁶ Production and cow numbers obtained from USDA NASS (2001). Farm numbers were obtained from the USDA Dairy Yearbook (2005).

corresponding to that particular cost band. The average farm size (represented by the number of milking cows) is then computed by cost band and region.

Within each region, we classify farms into three size categories. Small farms, size group 1, are farms producing less than 2.4 million pounds of production per year. Thus, the upper bound of the first size group varies by region and corresponds to the number of cows yielding 2.4 million pounds of production and is calculated by dividing 2.4 million pounds of production by the regional average yield per cow. Size group 2 consists of medium-sized farms. The lower bound for this size group is the point at which the payment becomes infra-marginal and the upper bound is 299 milking cows. The third size group represents large farms with 300 or more milking cows.

Regressions

The cumulative distributions are employed in the estimation of total costs per cwt as a quadratic function of output for three size groups in each of the five regions. The dependent variable, total costs per farm, is regressed on output per farm, and interacts with dummy variables representing the five regions and three farm sizes. Thus, our regression equation is given by

$$TC/farm_{ij} = a_{1i}q_{ij}^2 + a_{2ij}q_{ij} + FC_{ij}$$

where $TC/farm$ is the total cost per farm, q represents the per farm output, FC is the fixed cost, and the subscripts i and j are indices representing size group and region, respectively. We allow the first order parameter of the variable cost curves and fixed costs to vary by both size group and region. We allow the second order parameter of cost to vary by farm size, but not region.⁷

Each farm that maximizes profits must have marginal cost equal to the price of output.

Thus, to improve efficiency, we restrict the marginal cost of production at the mean value of

⁷ Allowing the second order parameter of the cost curve to vary by both size and region creates identification problems. We chose to allow costs to increase marginally at differing rates across size groups rather than by regions.

production for each group (region/size combination) to be equal the regional blend price, supposing that the slope of the marginal cost curve varies by farm-size group.⁸ Hence, we impose the linear restriction

$$a_{1i} = P_j - a_{2i} / 2q_{ij}$$

where P_j is the corresponding regional blend price. Estimation absent this restriction results in estimated marginal costs that were in fact very close to regional blend prices. Additionally, this procedure simplifies subsequent simulations by reducing the number of parameters, and eliminates two cases where marginal costs were insignificantly negative. Standard errors were calculated using a weighted least squares approach, with the square root of the number of farms in the cost grouping serving as the weight.

Since the infra-marginal payment for those farms producing less than the base can be analyzed using standard per unit subsidy analysis, these farms will be excluded from the remainder of the analysis. Only the relevant regression results for size groups 2 and 3 are reported in table 1. The total cost functions were then used to derive the average total cost functions, average variable cost functions and marginal cost/supply functions for farm populations.

In order to determine and compare the consumption, production and trade distorting effects of an infra-marginal policy, revenue pooling and an export subsidy, we use the estimated cost curve parameters to calculate the level of profitable production under each of these policies. First, the cost curve parameters, blend prices, and production data are utilized to calculate both the number of profitable farms and the total quantity of profitable production with price blending in place.

⁸ The regional blend prices are obtained from USDA ERS U.S. milk production costs and returns.

To determine the distortions resulting from revenue pooling we calculate the number of profitable farms and the total quantity of profitable production using the cost curve parameters and estimated elasticities at the world price.⁹ We then compare profitable production and farm numbers at the world price to profitable production and farm numbers at the blend price.¹⁰

In order to compare the magnitude of the distortions resulting from revenue pooling to those resulting from infra-marginal support, we determine the per unit infra-marginal subsidy such that the aggregate producer surplus of profitable farms with the infra-marginal subsidy in place is equivalent to the level of producer surplus with pooling in place. This was done on a regional basis since the blend price varied by region. We allow the per unit infra-marginal subsidy to vary rather than the base since a change in the base would cause the number of cows corresponding to the point at which the payment becomes infra-marginal to change and hence no longer correspond with our farm size classifications. We then calculate the number of profitable farms and production with the infra-marginal payment assuming the extra-marginal output is sold at the world price.

Finally, to determine the consumption and production effects of an export subsidy with the same level of producer surplus (same producer price level) as pooling we assume that all consumption takes place at the blend price rather than the class prices.

⁹ The world price used in the analysis is \$7.14. It was computed as the average regional blend price weight by production divided by NPC, a measure of producer protection, of 1.70. The computed weighted average blend price was similar to the U.S. blend price reported by the USDA for the year 2000.

¹⁰ The estimated elasticities for farms with more than 300 cows, range from 2.6 to 8.6, while reasonable, are large enough that when combined with a large price decrease, such as the decrease from the regional blend price to the world price, these farms produce a negative quantity. This was true for all five regions. Therefore, these elasticities are replaced with the average elasticity of size groups 1 and 2 weighted by production of 1.37 in the calculations. This has a downward bias on the level of trade distortions for all three policies since the free-trade level of production is higher.

All changes in consumption, production and exports are relative to free-trade in which producers receive the world price for all units produced. In the short run, farms are profitable if revenue exceeds variable costs, while in the long run both variable and fixed costs must be met.

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

The first column of table 2 shows that the infra-marginal subsidy increases the level of profitable production by 230.4 percent and the number of farms by 58.8 percent in the short run. In the long run, the increases in both production and farm numbers are greater than in the short run. The baseline for the short run differs from that of the long run; for each the baseline is the production (farms) that are profitable absent 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. Therefore, the infra-marginal subsidy increases exports above free-trade levels by 33.6 percent in the short run and 37.1 percent in the long run.

Impact of Revenue Pooling on Aggregate Output and Farm Numbers

The last two columns of table 2 indicate that while revenue pooling leads to higher production distortions, the increase in the number of farms is larger with the MILC program. Revenue pooling increases production by 624.5 percent and the number of profitable farms by 57.5 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 855.7 percent and the number of farms by 107.0 percent, in the long run. Thus, there is evidence that infra-marginal payments deter exit more than revenue pooling even though revenue pooling leads to a larger production distortion.

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 (USDA 2000). The revenue pooling policy not only distorts U.S. production, it also distorts U.S. consumption. Table 3 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.¹¹ We find that price blending leads to an 8.8 percent reduction in consumption of fluid milk, a 18.6 percent reduction in the consumption of dairy products and an overall reduction in consumption of 14.7 percent. This further distorts trade by widening the gap between domestic consumption and domestic production. Thus, indicating that the wedge between consumer prices and producer prices also has a trade distorting effect.

Combining the production and consumption distortions, the total increase in exports above the free-trade level in the short run is 949.9 million cwt. or a 105.5 percent increase. In the long run, exports increase by 107.6 percent.

Impact of Export Subsidy on Aggregate Consumption

The last two columns of table 3 show how consumption would change if all domestic consumption occurred at the blend price instead of at the world price. In this case, we find the consumption of fluid decreases by 6.6 percent, while the consumption of products declines by

¹¹ We assume the elasticity of demand for fluid milk is -0.2 and the elasticity of demand for dairy products is -0.6, well within the range of most empirical studies of U.S. dairy markets.

21.1 percent relative to their respective free-trade levels of consumption. The overall change in consumption is a decline of 15.3 percent. Thus, in the presence of an export subsidy in which both producers and domestic consumers face the same price, namely the blend price, exports would exceed their free-trade level by 108.5 percent and 108.2 percent in the short and long runs, respectively.

Comparison of the Trade Distortions from the Three Policy Instruments

Empirically, the export subsidy leads to the highest level of trade distortion with exports exceeding their respective free-trade levels by 108.5 percent and 108.2 percent in the short and long runs. The trade distortion due to revenue pooling approaches the distortion resulting from an export subsidy which results in the same producer price level (and hence same level of producer surplus), namely the blend price. In fact, when the distortion associated with revenue pooling is compared to the distortion resulting from the export subsidy we find that the trade distortion from pooling is 99.4 percent of the export subsidy trade distortion for both the short and long run. On the other hand, the trade distortion due to the infra-marginal subsidy is only 30.9 percent and 34.3 percent of the distortion due to the export subsidy in the short run and long run, respectively.

5. Conclusion and Implications

The panels in two recent high profile trade disputes concluded that price discrimination without price pooling constituted an export subsidy. However, the panel in the Canadian dairy dispute failed to recognize the trade distortion effects of revenue pooling. We have shown that price discrimination with price pooling also constitutes an export subsidy. In fact, the trade distortions resulting from revenue pooling are greater than the distortion resulting from price discrimination without pooling for the same level of producer prices. At this time, the WTO legal texts do not

account for these two 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. This is ironic in that the two plaintiffs of the Canadian dairy cases, the United States and New Zealand, employed more trade distorting export subsidy programs in the form of revenue pooling on the same product than Canada did. Furthermore, 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. If the WTO had 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.

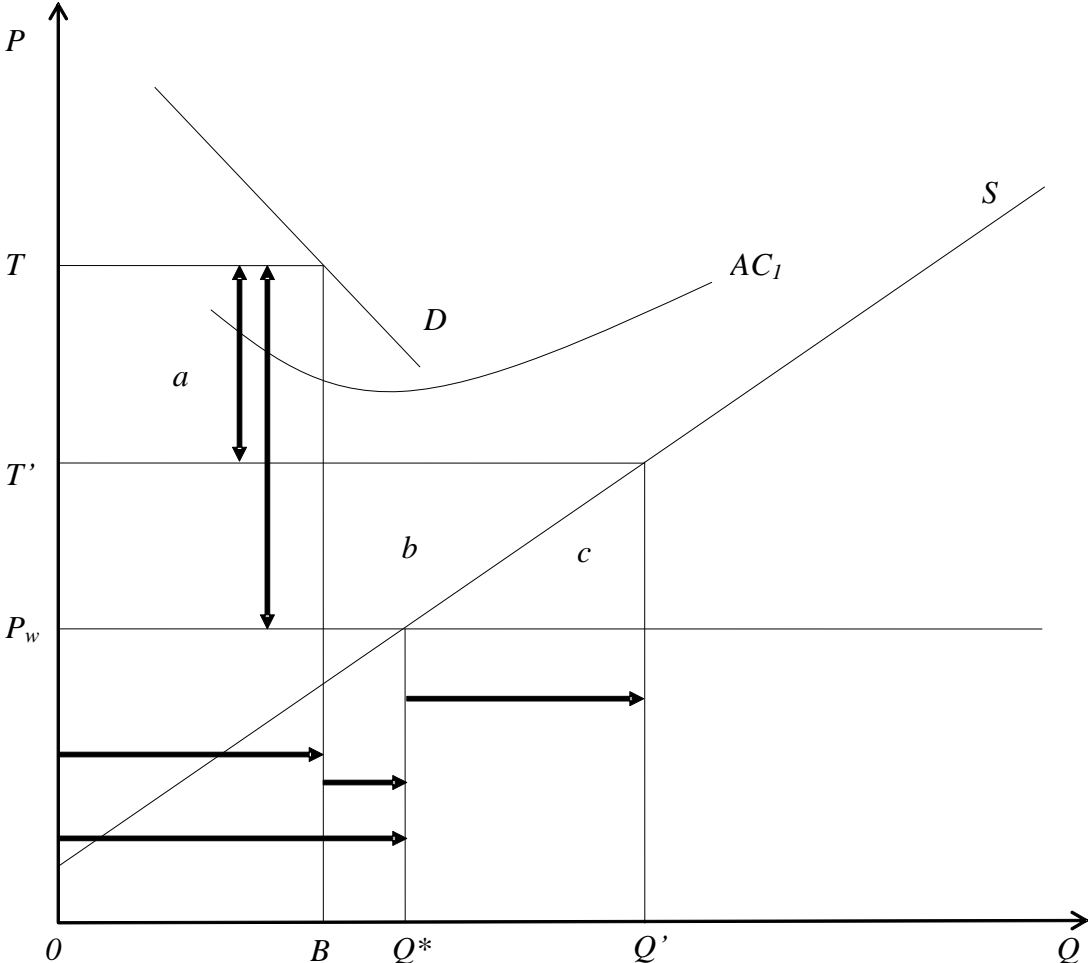


Figure 2. Export subsidy with revenue pooling but some domestic consumption at world prices.

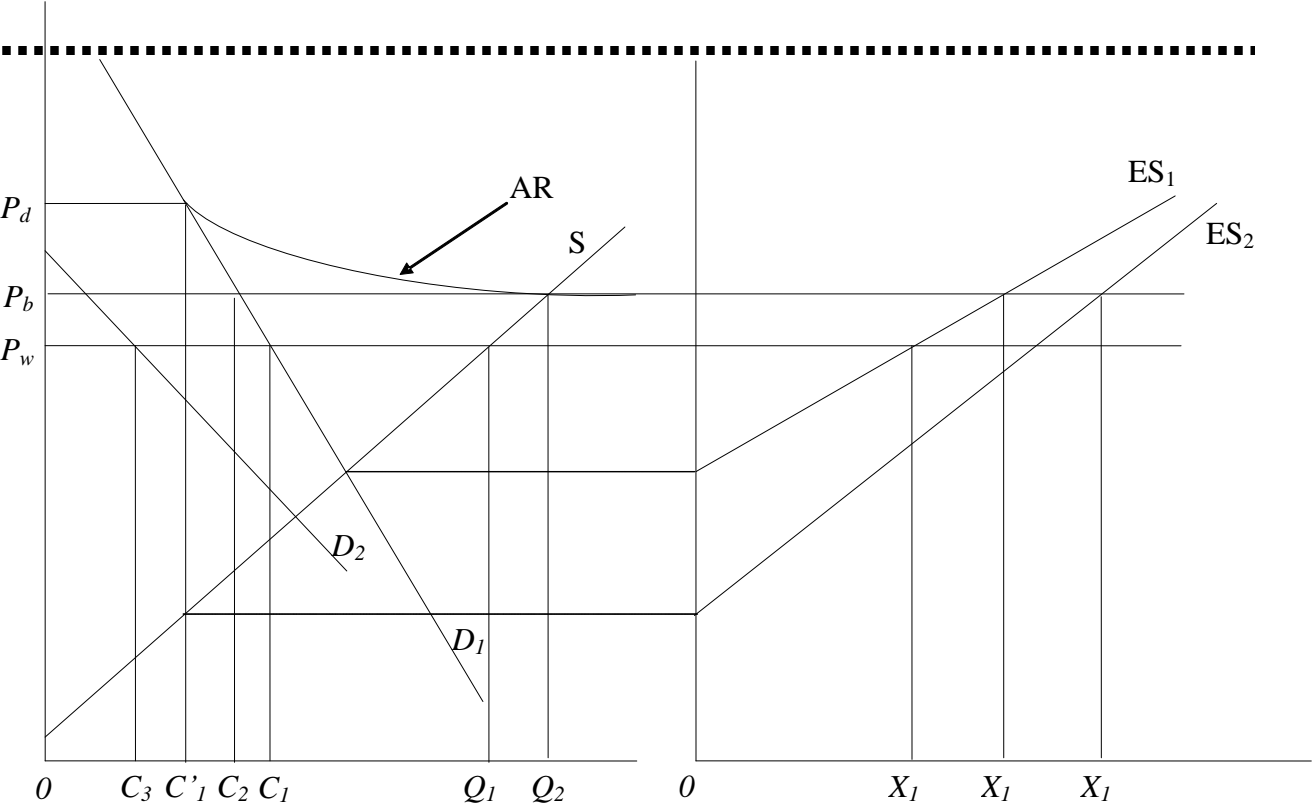


Table 1. Parameter Estimates of a Quadratic Cost Function for Dairy Production in the U.S.

| | Heartland | | Northern Crescent- East | | Northern Crescent- West | | Eastern Uplands | | Fruitful Rim | |
|--------------------------|------------------|--------------------|----------------------------|-------------------|----------------------------|-------------------|----------------------------|--------------------|-------------------|-------------------|
| <i>Size</i> ^a | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 |
| <i>a</i> ₁ | | | | | | | | | | |
| (1st order effect) | 2.02 | 12.15 | 4.15 | 10.19 | 1.85 | 11.40 | 3.45 | 11.66 | 2.23 | 7.43 |
| Fixed Cost | 28,304 (8768) | 111,105 (12446) | 29,417 (8506) | 136,333 (9394) | 27,141 (7194) | 109,482 (9193) | 28,631 (11871) | 144,968 (11672) | 30,596 (12036) | 141,995 (6436) |
| | | | <i>Size 2</i> | | | | <i>Size 3</i> | | | |
| <i>a</i> ₂ | | | 1.60 × 10 ⁻⁴ | | | | 1.04 × 10 ⁻⁶ | | | |
| (2nd order effect) | | | (4.36 × 10 ⁻⁵) | | | | (2.67 × 10 ⁻⁷) | | | |

Standard errors are in parentheses. The cost function calculates total cost per farm in dollars as a function of milk production measured per cwt. The coefficients *a*₁ were calculated through restrictions placed on *a*₁ and *a*₂. We report only the standard errors for *a*₂.

a. Size group 2 includes farms for which production subsidies are infra-marginal with less than 300 cows. Group 3 consists of farms with 300 or more milking cows.

Table 2. Effects of Infra-marginal Subsidies and Price Blending on Production Levels and Number of Farms.

| | Infra-marginal | | Price Blending | |
|---------------------------|-----------------------|-----------------|-----------------------|-----------------|
| | <i>Short Run</i> | <i>Long Run</i> | <i>Short Run</i> | <i>Long Run</i> |
| Increase in | | | | |
| Production (Million Cwt.) | 295.6 | 303.0 | 801.4 | 744.9 |
| Percent of Production | 230.4 | 348 | 624.5 | 855.7 |
| Number of Farms | 4,554 | 6,081 | 4,451 | 5,511 |
| Percent of Farms | 58.8 | 118.1 | 57.5 | 107.0 |

Table 3. Effects of Price Blending and Export Subsidies on Consumption Levels.

| | Price Blending | | Export Subsidy | |
|---------------------------------------|-----------------------|-----------------|-----------------------|-----------------|
| | <i>Short Run</i> | <i>Long Run</i> | <i>Short Run</i> | <i>Long Run</i> |
| Change in | | | | |
| Consumption of Fluid (Million Cwt.) | 35.4 | 31.7 | 26.3 | 23.5 |
| Percent of Fluid Consumption | 8.8 | 8.8 | 6.6 | 6.6 |
| Consumption of Product (Million Cwt.) | 113.1 | 101.2 | 128.3 | 114.8 |
| Percent of Product Consumption | 18.6 | 18.6 | 21.1 | 21.1 |
| Total Consumption (Million Cwt.) | 148.5 | 132.9 | 154.5 | 138.3 |
| Percent of Total Consumption | 14.7 | 14.7 | 15.3 | 15.3 |

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