THE IMPLICATIONS OF NAFTA FOR MILK MARKETING ORDERS

by
Phillip M. Bishop and Andrew M. Novakovic

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INTRODUCTION

Milk Marketing Orders (MMOs) have been a central component of U.S. dairy policy for almost 60 years. Their dependence on such underlying tenets as regulated minimum prices and revenue pooling directly influences both producer prices and the price that certain processors must pay to procure milk. As the U.S. joins in the move towards a more liberal trading environment, especially with respect to agriculture, some serious questions arise concerning the ability of MMOs to perform as intended. NAFTA is the primary source of such concerns. In a world with freer movement of milk across national borders, the most fundamental regulatory tool of MMOs, the ability to regulate processors, is at risk. Freer trade provides processors of fluid (beverage) milk an incentive to avoid regulation simply by locating their plants outside the U.S. while continuing to supply packaged milk to U.S. markets. It is the purpose of this paper to examine how MMOs will fare in this new trading environment.

Milk marketing orders regulate the terms and conditions under which handlers of grade A milk purchase that milk from farmers. Their establishment and indeed their longevity can, in large part, be attributed to the poor bargaining position of farmers that stems from the inability to store milk for prolonged periods; an asymmetry explicitly addressed by marketing orders. Currently there are 32 federal milk marketing orders regulating the purchase of approximately 80 percent of all grade A milk marketed in the U.S. This equates to roughly 72 percent of all milk marketings. In addition, there are a number of state-administered MMOs which function similarly to their federal counterparts; the California state order being the most significant of these. In all, over 99 percent of the U.S. grade A milk supply is priced under some type of federal or state regulation.

MMOs seek to address the basic problem of maintaining orderly marketing arrangements for a good that is inherently predisposed to disorderly marketing while at the same time ensuring an equitable pricing system. Consumer demand for fluid milk, while relatively stable from year-to-year, is quite variable within a year and even from day-to-day. Production of milk, on the other hand, is a biological process with a pronounced seasonal pattern. It varies from one year to the next depending on weather, feed conditions, and a host of other factors. Thus there is a need for the industry to maintain a reserve supply of milk that is of a suitable quality for meeting the day-to-day consumer demand for fluid milk. The problem is that milk for fluid use commands a higher price than milk used for manufacturing purposes yet it is to manufacturing that the reserve milk must be channeled when not needed to meet fluid needs. In the absence of some type of moderating force, this then leads to price disparities for milk of equal quality and location and/or continual pressures to "rearrange" market organization as individual producers seek access to the higher value markets. Moreover, it leaves farmers in the unenviable position of having to negotiate a price for their output in an oligopsonistic market (Boynton and Novakovic, 1984). The situation is made even worse because buyers (handlers) understand that the farm product is perishable. Milk marketing orders, by virtue of their classified pricing arrangements, are able to price the reserve milk at the lower manufacturing value while equitably sharing the cost of doing so among all producers.

Central to MMOs are the notions of classified pricing and pooling of returns. The price that a handler must pay for grade A milk is determined by the use to which the milk is put. Uses of milk are divided into classes with class I, or fluid, products being the most valued. Most orders employ three main product classifications. The price of class III milk is identical in all (federal) orders and is set equal to the so-called Basic Formula Price (BFP) which is calculated monthly and is somewhat akin to a competitively determined market price. Class III milk, often referred to as manufacturing milk, is deemed to be of low value relative to milk destined for fluid uses. Milk used in products such as yogurt and ice-cream is generally referred to as class II milk. Class I differentials, which vary by order and by marketing zones within orders, and which generally increase with distance from the Upper Midwest, are added to the BFP to arrive at the price of class I milk. Within each order, the revenues arising from the sale of producer milk to regulated handlers are pooled. Producers are then paid the “blend” price, a class-weighted average price. Thus, all producers selling grade A milk to handlers who are regulated by a particular order receive the same basic minimum price for their milk regardless of the use to which it is put by the particular handler they happen to sell to. It follows then that class I handlers contribute to the pool while processors of manufactured products draw from it. It also follows that insofar as class I utilization increases and/or class I differentials are greater, the blend price will be higher.

A particular order’s provisions apply to all regulated handlers who sell their products in a designated marketing area. Such an area may encompass just a few counties or several entire states and is designed to include all of the area where the same handlers compete with each other for sales of milk. Over time, the area of milk procurement has also become important in defining a marketing area. A key point regarding marketing areas is that a regulated processing facility need not be located within the geographic confines of the order under which it is regulated. A plant operator, of any type, who wishes to procure milk clearly needs to offer producers at least the blend price. While handlers selling class I products are, by intent, regulated, there is an obvious incentive for non-class I handlers to arrange their affairs in such a way that they are regulated too. However, there may be effective minimum performance standards to be satisfied in order to maintain a certain pool status.

It is perhaps useful to mention a few things that MMOs do not do. They do not control the amount of milk a farmer may produce, or in any other way determine milk marketings. They do not control from whom a handler shall buy or to whom a handler must sell. Nor do they fix farm or retail prices, set sanitary or quality standards, nor guarantee farmers a buyer for their milk. Finally, they do not in any way restrict or prohibit the interstate trade of raw milk and milk products.

The discussion now turns briefly to matters concerning trade liberalization. In recent years, the U.S. has ratified two trade agreements which may adversely affect the operation and performance of MMOs; NAFTA and the Uruguay Round GATT[1] treaty. When it comes to MMOs, NAFTA is by far the more threatening of the two. The GATT agreement imposes some disciplines on the use of export subsidies and requires increased market access for certain manufactured dairy products, primarily cheese. While these actions may well bring competitive price pressures to the U.S. dairy sector, the effect on the integrity and performance of MMOs will be irrelevant. NAFTA, on the other hand, already nearly three years into the implementation phase, is an entirely different proposition due to the close proximity of Canada and Mexico to major U.S. fluid milk markets. NAFTA's dairy provisions do not apply to Canada although the U.S. is seeking to change this. Most analysts expect that in due time the border between Canada and the U.S. will be open to significant dairy trade. Between the U.S. and Mexico, NAFTA will result in completely free trade by the year 2004 for all dairy products except NFDM (skim milk powder) which will take until 2009.

There exists two main mechanisms by which liberalized trade may lead to the avoidance of the regulations deriving from MMOs. One is for U.S. raw milk to be transported to a neighboring country where it is then processed into class I products and shipped straight back to markets in the U.S. The other is for neighboring countries to simply process their own raw milk supplies into class I products for shipment to U.S. markets. Both of these mechanisms assume an inability on the part of milk market administrators to regulate and audit fluid plants located outside the U.S., regardless of the nationality of the plant's owner. More significantly, both mechanisms lead to a diminution of the benefits obtained from pooling and classified pricing. Furthermore, they are both legitimate under the strict rules of origin clause contained in the NAFTA treaty. These rules state that the ingredients in products crossing the borders between NAFTA countries, and which are being traded under the terms of the NAFTA treaty, must originate in a NAFTA country. While unlikely, it remains to be seen if U.S. market administrators can regulate fluid plants located in Mexico or Canada that distribute packaged milk products to regulated U.S. markets.

The arbitraging of raw milk and/or dairy products between the U.S. and its neighboring countries leads directly to the avoidance of pooling obligations and therefore it effectively diminishes class I utilization. While such activity would originate in areas close to the U.S. border, it could have a ripple effect radiating throughout the U.S. milk marketing system. Class I handlers able to avoid regulation while still purchasing grade A milk could bid milk supplies away from regulated handlers by offering producers only marginally more than the blend price. If such handlers were regulated, they'd have to pay the applicable class I price. Thus, the size of the incentive to avoid regulation is equal to the difference between the class I price and the corresponding blend price. As milk is thereby effectively depooled, class I utilization decreases which leads to a lowering of the blend price paid to producers. This in turn increases the incentives available to those handlers seeking to avoid regulation, and thereby allows them to bid away yet more milk at an even lower price.

The possibility of a similar situation developing for processors of manufactured, or non-class I, products is of no concern to MMOs, nor is it likely. Manufacturers benefit from being pooled on marketing orders; hence they have no incentive to escape regulation. If other factors were to make manufacturing in Mexico or Canada desirable then this in and of itself would have

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[1] The General Agreement on Tariffs and Trade.

no consequence for the integrity of the order system, although it may have implications for the competitive position of U.S. dairy product manufacturers. This paper focuses only on the operation of milk marketing orders in the face of freer trade. Clearly then, attention must be paid to those countries sharing a border with the U.S. as it is simply not economical nor feasible to haul bulky, perishable milk over long distances or to transport it by sea. It is the differential value that MMOs place on milk destined for fluid uses versus manufacturing that provides the incentive to incur the additional transportation costs associated with avoiding having to pay the class I price. This incentive is directly influenced by the proximity of major U.S. fluid milk demand markets to the nearest border with a neighboring country.

METHODOLOGY

In this section of the paper, a brief description of the model used to conduct the analysis is provided. Additional material describing this model and its data requirements are available in Bishop (1996) and Pratt *et al*. (1996) and the references therein. The United States Dairy Sector Simulator (USDSS), a model constructed and maintained at the Cornell Program on Dairy Markets and Policy, was extended to cover Canada, Mexico, and an aggregate rest-of-the-world. These additions to USDSS were undertaken in a manner consistent with the existing model structure.

USDSS is a spatially detailed model of the U.S. dairy industry which is formulated as a capacitated, single-time period, multi-component transshipment model combining both a network flow and a facilities location model. Three market levels are embodied in USDSS; farm milk supply, dairy product processing, and dairy product consumption. Five product groups are distinguished at the processing and consumption levels. They are: fluid milk products; soft dairy products; hard cheeses; butter; and dry, condensed, and evaporated milk. USDSS employs a multi-component characterization of raw milk and dairy products (intermediate and final) whereby fat and solids-not-fat account for the supply and use of the valuable constituents in milk. Because the various processed and consumed products rarely use the components of milk in the same proportion as they are found in farm milk, processing plants must balance the use of milk components by moving intermediate products from one processing operation to another. The intermediate products used in this analysis include cream, skim milk, NFDM, and Anhydrous Milk Fat (AMF).

The model simultaneously analyzes the optimal location of processing facilities and raw milk assembly movements, interplant transfers of intermediate products, and dairy product distribution movements. In determining the market organization, USDSS considers the unit costs of milk assembly and interplant transfers, the costs of dairy product processing, and the costs of dairy product distribution among almost 4,000 economic entities. Milk supply is represented by 275 supply points. There are 430 potential locations for the processing of each type of product, and there are 278 consumption points each consuming some amount of each of the five dairy products. Given estimates of producer milk marketings, dairy product consumption, and assembly, interplant transfer, processing, and distribution costs, USDSS determines the least cost method of organizing the market. The fundamental structure of milk marketing orders was also added to the model in the form of class I differentials. The actual class I differentials applicable at each city included in the model were added to the cost that a plant must incur in serving any particular market.

SIMULATIONS

The intent in this section is to provide a sufficient description of the simulations such that they may be clearly understood. However, most discussion and a comparison of the various simulations is reserved for the following section. While the model provides comprehensive output representing activity in all 5 product sectors and for all of North America, the focus of the discussion is on the U.S. fluid milk sub-sector.

The Base Solution

In order to perform any analysis of a new policy or market environment, it is necessary to first establish a base from which to make comparisons. This section describes the base solution used for such comparisons in this study. The base solution is designed to simulate the economic activity and policy settings in the U.S. dairy sector, particularly as it relates to marketing orders. The base solution is obtained using annual data from 1993.

Immediately noticeable in the base run is that fluid processing plants tend to be located near the demand areas and further away from the raw milk supply areas. Indeed, the simple average length of raw milk shipments to fluid plants, originating in the U.S., is 76.3 miles while for packaged milk distribution movements terminating in the U.S. it is 25.3 miles. This phenomenon is consistent with both economic theory and other studies (Bressler, 1958; Francis, 1992), and general observation. There are 190 U.S. fluid milk processing locations receiving a total of almost 60.2 billion pounds of farm milk in the base solution. 55.9 billion pounds of packaged milk were distributed from these plants to U.S. demand areas. In addition, these fluid plants also shipped out significant quantities of cream for use by other types of plants.

Based upon actual North American interregional trade, the only permissible base case cross-border movements were between the U.S. and Mexico. While the model found an optimal solution without making any flows from the U.S. to Mexico of either raw milk or packaged milk, there were U.S. shipments of manufactured products to Mexico. Note that the model is constrained, for all simulations, such that any packaged milk that might flow from Mexico to the U.S. must be produced from farm milk. In other words, the model allows Mexican plants to ship reconstituted milk to Mexican markets but they can not do so to markets in the U.S. The base solution is entirely consistent with expectations. Based on the model's output, we estimate there to be about 140 billion pounds of regulated grade A milk received at plants; roughly 113 by federal orders and about 27 under state programs. Adding to this another billion or so pounds of unregulated grade A sales, approximately 2 billion pounds of direct sales by suppliers, and about 6 or 7 billion pounds of grade B milk, yields the 149.1 billion pounds of milk actually marketed in 1993.

Trade Liberalization Without Regulation of Foreign Plants

This simulation examines the impact on MMOs when trade policies are liberalized and fluid milk processors located outside the U.S. are not (legally) able to be regulated under the current terms and provisions of marketing orders. This is not to say that the products such processors might ship to the U.S. do not have to meet the necessary sanitary standards or conform to the identity standards of the particular product being shipped. It simply assumes that the market administrators have no jurisdiction to require plants located outside of the U.S. to abide by the rules of the order associated with the marketing area to which they plan to sell class I products. In particular, such plants do not have to pay producers the blend price, nor do they have to contribute to the order's producer settlement fund, or pool. To the extent that class I differentials more than cover the extra cost of transporting raw milk and/or final fluid milk additional distances, plants in Canada and Mexico will have an incentive to ship fluid milk to the U.S., using as an input either local raw milk or raw milk procured in the U.S.

The degree of trade liberalization included in this particular scenario is quite extensive. In fact, complete free trade among the NAFTA countries in raw milk, intermediate products, and final products, both fluid and manufactured, is permitted. The quantity of imports able to enter any of the NAFTA countries from the rest of the world was left at the base case levels. It has already been argued that such trade would not involve fluid products and would therefore have no bearing on the performance of MMOs. Local supplies of raw milk displaced by increased imports of manufactured products would, over time, diminish or continue to be utilized as a class III use. Either way, while there could well be competitive implications for the U.S. dairy sector, they are unrelated to the operation and performance of MMOs. The blend price in any particular order might well decrease as a result of increased imports of manufactured products but this does not in and of itself imply a problem with the functioning of milk marketing orders.

Before proceeding, it is helpful to briefly review some of the underlying factors upon which this and subsequent solutions are predicated. First, the focus of the analysis is on the potential first round impacts and what they suggest about the incentive to circumvent marketing orders' regulations under liberalized trade. Indeed, because the model employs fixed supplies and demands, it would be incorrect to interpret the results as being the long run equilibrium outcome. If the consequences of trade liberalization for marketing orders are severe, one would logically expect some kind of policy response to mitigate these affects. Secondly, although free trade with Canada is assumed, this, of course, is not the current policy. Along the Mexican border, restrictions on dairy trade are already being relaxed under the terms of the NAFTA agreement, and will continue to do so at an accelerating pace. Finally, all uses of milk other than class I are assumed to be priced at the class III price. The implications of such an approximation are minimal because such prices are similar to class III prices anyway and the quantity of milk they utilize is relatively small.

For much of the North American region the outcome of this simulation looks much like the base case. However, considerable differences are evident in the vicinity of the northern U.S. border east of Michigan and along the southern border with Mexico. Consistent with expectations, class I differentials provide a substantial arbitrage opportunity, the exploitation of which requires that both raw and packaged milk be hauled longer distances. An indication of this is the average distance that raw milk from U.S. supply points must be hauled which increases by 3 miles over the base case. More significant is the increase of almost 14 miles to 39.2 for the average distance that packaged milk destined for U.S. markets must be transported. This suggests two things; first, supplies of U.S. farm milk are being shipped across the border only if they're located close to the border, and second, Canada and Mexico are diverting significant quantities of their own raw milk supplies to fluid plants for use in the production of packaged milk destined for U.S. markets. Moreover, these shipments of packaged milk are moving a considerable distance into the interior of the U.S. There are 169 fluid processing locations in the U.S., down from 190 in the base solution.

Class I Credit

The motivation for this experiment stems from the concerns of regulators in markets near the Mexican border who, already, are proposing policy responses to the difficulties faced by marketing orders when trade is liberalized. In a nutshell, this simulation allows fluid plants in a predefined zone along the border to procure milk at less than the class I price. In fact, such plants would be able to purchase farm milk at the blend price and thereby remain competitive with unregulated plants located across the border. The mechanism by which a scheme such as this allows eligible plants to purchase grade A milk for class I use at less than the class I price would be to award a monthly credit equal to the difference between that month's class I and blend prices. While the benefit of such an arrangement is that the processing activity remains based in the U.S. and the milk continues to be pooled, the cost manifests itself as a lower price for producers. There is clearly some flexibility available in defining the class I credit zone; a more inclusive zone is better able to prevent arbitraging of the class I differentials but this must be weighed against the resulting diminution of the blend price.

It is envisioned by advocates of this type of arrangement that the zone of plants eligible to receive the class I credit would be defined geographically. For example, all counties contiguous to the border, or a 50 mile wide district along the border, would encompass all eligible plants. While the model used in this study is very disaggregated, it does not include every single plant location in the country. Thus, the class I credit simulation was implemented as follows. First, all marketing areas receiving shipments of class I products from outside the U.S. under the previous free trade simulation were identified. They were then assigned a class I differential of zero and the free trade simulation was run again. In other words, any U.S.-based fluid plant opting to serve those markets can procure the necessary raw milk to do so on an equal footing with foreign plants. The consumption area represented in the model by the city of Portland, ME was also assigned a zero class I differential even though that market was not served by Canadian-based processors in the free trade case. However, the demand markets surrounding Portland were all served by Canadian plants in the free trade case.

As expected, the solution to this scenario looks much like the base case as far as the class I sector is concerned. In the north, only one shipment of raw milk from the U.S. to a fluid plant in Canada occurred; from Newport VT to Sherbrooke in Quebec. However, unlike in the free trade case, no shipments of packaged milk came into the U.S. from Canada. Along the Mexican border, there were small volumes of raw milk crossing the border in both directions, destined for plants of all types, while a small amount of packaged fluid milk was shipped from Mexico to the U.S. All of these shipments were between points very close to the border.

Once again, the average distance that raw milk is assembled and packaged milk is distributed conforms with both expectations and theory when compared with the previous two simulations. Removing trade barriers and offering the credit to preclude the hauling of milk long distances solely to avoid class I differentials has the aggregate effect of allowing fluid processing plants to be located even closer to the markets they serve. Compared with the base case, the average distance that packaged milk is transported to U.S. markets falls slightly from 25.3 to 24.9 miles. Concomitant with this the average distance that U.S. farm milk gets hauled to fluid plants increases from 76.3 to 78.3 miles. Note that in the case of both assembly and distribution, these distances are less than for the previous free trade scenario where the incentive to avoid class I differentials existed.

Liberalized Trade With Regulation of Foreign Plants

Under this scenario, the presumption was made that all the necessary legal mechanisms were in place to allow administrators of MMOs to regulate plants located outside the U.S. in cases where such plants ship class I products to U.S. markets. In essence, the simulation was set up to be identical to the earlier trade liberalization scenario except that now, handlers shipping packaged milk from plants in Canada and Mexico to markets in the U.S. must pay the applicable class price on all raw milk procured for this purpose. In other words, those plants are pooled under the orders in which they sell class I products.

Improbably, this simulation implies that raw milk procured from outside the U.S., as well as that procured from within the U.S., is subject to regulation if the plant in question ships any fluid milk products to regulated U.S. markets. There is no compelling reason to believe that MMOs would be at all concerned with the price at which foreign plants procure raw milk from local producers, even though such milk might be used to produce class I products for U.S. markets. However, there is no way in the model to discriminate between milk from different sources being assembled at an arbitrary plant when that plant is also able to ship to both foreign and U.S. markets. This point illustrates the difficulty that market administrators would face under this type of scenario. When a single facility comprising a multi-product plant located outside the U.S. is procuring milk from multiple sources, and that milk is commingled before being used to produce a variety of product types, it would be practically impossible for U.S. auditors to determine whether or not raw milk from the U.S. was used in the production of fluid milk destined for the U.S., or if it was instead used to produce products for the foreign market in which the plant operates. Recall too that the rules of origin clauses in the NAFTA treaty do not deem this to be illegal. Those rules only require that the raw materials used in the production of goods being imported into the U.S. under the favorable terms granted to NAFTA member countries be procured from a NAFTA country, and not from within the specific country doing the exporting.

Despite conceptual difficulties, the simulation was performed and results were obtained that differed only slightly from the base case. In other words, the ability to regulate foreign plants almost entirely mitigates the impact trade liberalization would have in the absence of such regulatory capability. In the Northeast, there were no shipments of fluid milk from Canadian plants to U.S. markets as there were in the earlier free trade scenario. In the South there were a few such shipments from Mexico to the U.S. representing, respectively, 3.3, 1.7, and 8.5 percent of the total fluid milk distributed to the Central Arizona, Texas, and New Mexico-West Texas marketing orders. Given the conceptual difficulty of formulating this simulation, such quantities represent a very conservative lower bound under such a scenario. That is, if auditors could accurately track all sources and uses of milk at multi-product plants, and milk procured from outside the U.S. was to be left unregulated, then one would expect that the amount of packaged milk so entering the U.S. would, in fact, be much greater than the amount suggested here.

Federal Orders Under Liberalized Trade With Import Substitution in Mexico

One particular idiosyncracy of the NAFTA treaty is that it permits Mexico to satisfy its own demand for fluid milk through the reconstitution of imported ingredients while using local supplies of raw milk in the production of dairy products for export to the U.S. The existence of MMOs makes this kind of activity even more attractive if the order's pooling obligations can be avoided. This particular scenario takes the earlier simulation of trade liberalization without regulation of foreign plants and exogenously increases Mexican imports. The purpose is to examine the extent to which Mexico has an incentive to substitute imports for local milk supplies and thereby increase fluid milk exports to the U.S. through the use of local raw milk supplies for export purposes.

The limit on the potential for Mexico to engage in this type of import substituting activity is the level of Mexico's domestic milk supply. However, in a practical sense, the limit would be much lower as it would obviously not be feasible to transport bulky milk the entire length of Mexico just to export it to the U.S. One could also imagine political objections to this even if the economics made it feasible. Applying the same simulation with respect to Canada was not undertaken for two reasons: a) it is difficult to imagine Canadians giving up fresh milk for reconstituted milk to the extent that the Mexicans are used to doing, and b) Canada would be unable to significantly increase imports under its current dairy import policy arrangements.

This simulation revealed that practically no opportunity exists for Mexico to exploit import substitution as a means of increasing fluid milk exports to the U.S. over and above those already attained under the earlier trade liberalization scenario. Apparently there is just insufficient milk available in the northern part of Mexico. Only one Mexican fluid milk plant increased exports to the U.S., shipping an additional 177 million pounds when compared with the earlier simulation.

Trade Liberalization and Class I Differential Sensitivity Analysis

Following the results obtained thus far, one might wonder to what extent the incentive to avoid class I differentials is influenced by the level of those differentials. The simulation undertaken to examine this question involved running the initial trade liberalization scenario thrice over, each time with all differentials arbitrarily scaled by 0.75, 0.50, and 0.25, respectively. Of course, if differentials were reduced to zero, then marketing orders would effectively be eliminated. In general, the results from this experiment suggested that even at very low levels of class I differentials, the incentive to avoid regulation remains tangible provided the foreign plant is located less than about eighty miles from the U.S. market it intends to serve. In other words, the differential level alone does not determine the resulting pattern of assembly and distribution movements. Proximity to the border of both milksheds and major demand markets is also important. Notably, in the Northeast, 35.4 percent of the depooled milk shipped to the U.S. when differentials are at their actual levels continues to be shipped when differentials are cut by 75 percent. The same proportion in the South is 24.1 percent. This can be explained by the fact that in the South, a much greater share of the unregulated fluid milk shipped from Mexican plants to the U.S. originates in the U.S.

RESULTS AND DISCUSSION

The preceding section indicates that a freer trading environment will cause the performance of marketing orders along the Mexican border and east of Michigan along the

Canadian border to be adversely affected. In this section, the discussion focuses on those affected areas and explores in greater detail the consequences for class utilization and producer prices on an order-by-order basis.

Free trade combined with class I differentials for U.S. handlers leads to much less milk being shipped to fluid plants and more to manufacturing plants while in Canada and Mexico the reverse is true. In fact, compared to the base case, the U.S. ships an incredible 17.8 percent less milk to its own fluid plants. The class I credit scenario results in an aggregate volume of raw milk assembled at U.S. fluid plants similar to that evident in the base case. Concentrating on the free trade results for a moment, the raw milk diverted away from U.S. fluid plants is sent either to fluid plants in Canada and Mexico, or to manufacturing plants located in the U.S., Canada, or Mexico. Notably, the increased volume of milk procured by fluid plants in Canada and Mexico is drawn not only from the U.S. but from local areas as well. In fact, Canada increases deliveries of its own raw milk to fluid plants by a staggering 42.8 percent while Mexico does the same to the tune of 7.7 percent. The proportion of milk diverted from fluid plants in the U.S. to fluid plants in Canada equates to almost 3 percent of the quantity assembled at U.S. fluid plants in the base solution while for Mexico, the same proportion is 8.2 percent. Taking total deliveries to both fluid and manufacturing plants, the U.S. suffers an overall loss of almost 5.2 percent in the level of activity at the processing sector. A detailed examination of changes to the pattern of interplant movements becomes mind numbing very quickly so is therefore not attempted. However, the ability of the model to move intermediate products between plants of different types and at different locations should be kept in mind when trying to reconcile changes in the volume of milk assembled at fluid plants with that at manufacturing plants.

Turning now to the distribution side of the ledger, the story here is consistent with what has just been described for raw milk assembly. Notably, under free trade, fluid plants in the U.S. distribute 18 percent less packaged milk with the shortfall arriving from Canada and Mexico. In this case, Canada now supplies 8.3 percent of the U.S. fluid milk requirement while Mexico supplies over 9.6 percent. Of the packaged milk that Canada ships to the U.S. under free trade, a much lower proportion is produced from raw milk procured in the U.S. than is the case for Mexico. In fact, strictly on a volume basis, raw milk procured from the U.S. was 91.6 percent of the packaged milk that Mexico distributed to the U.S. whereas the same proportion in the case of Canada was only 38.5 percent. This disparity has producer price implications in the U.S. which will be discussed shortly.

Once again, the class I credit results look very similar to those of the base solution. Only a small amount of packaged milk, 0.15 billion pounds, is shipped from Mexico to the U.S. while nothing is received from Canada. That received from Mexico is a result of lower marketing costs due to proximity to the market. Under the class I credit simulation, a U.S. plant close to the border can procure raw milk for class I use at the same price as a plant located across the border.

When barriers to trade with Canada and Mexico are removed, the model indicates that both raw and packaged milk will be moved considerable distances solely to avoid class I differentials. This immediately raises concerns about efficiency in the transportation sector. While not a concern for milk marketing orders, the burden of added transportation costs is borne by processors and producers, so inefficient transportation patterns are of interest. Both economic theory and intuition suggest that an environment containing fewer restrictions to trade would lead to lower transportation costs when the objective is to minimize such costs. However, the total cost of assembling raw milk, moving intermediate products between plants, and distributing final products increased by 21.6 percent, or 111 million dollars, under free trade when compared to the base case. This increase is directly attributable to the presence of class I differentials. In fact, it could be considered a measure of the incentive to avoid these differentials. A major contributor to the increased transportation costs is the cost of shipping packaged milk to U.S. markets. Clearly, the incentive to avoid class I differentials manifests itself in the shipping of packaged milk much longer distances rather than assembling raw milk over long distances. Interestingly, transportation costs decline by 4.7 percent under the class I credit scenario reflecting the removal of transportation inefficiencies caused by the combination of barriers to trade and class I differentials in a market where regulation is easily avoided. Offering the class I credit has eliminated the incentive to incur additional transportation costs as a means of avoiding class I differentials and this, of course, was precisely the intent of the credit

The discussion now turns to the principal findings of this study, that is, the implication for producer prices when trade is liberalized. Table 1 summarizes these findings. In total, eleven marketing orders are affected; eight federal and three state areas. The range of blend price decreases under the free trade scenario runs from a low of 9¢/cwt. in the Ohio Valley order to a high of 88¢/cwt. in Western New York. For the class I credit simulation, the decreases are smaller and are in the range of 3¢/cwt. to a high of 67¢/cwt. Before proceeding to explore the table, it is necessary to explain its construction.

The first column of Table 1 lists the eleven affected areas as well as some arbitrary regional groupings. These groupings consist of more orders than are presented in the table. In fact, they are defined as follows: the Northeast includes Maine, New England, New York-New Jersey, Western New York, Middle Atlantic, Virginia, Central Pennsylvania, Eastern Ohio-Western Pennsylvania, Ohio Valley, Indiana, and Southern Michigan; the Midwest includes Black Hills, Central Illinois, Chicago Regional, Eastern South Dakota, Greater Kansas City, Iowa, Michigan Upper Peninsula, Southern Illinois, and Upper Midwest; the Southwest includes Central Arizona, Eastern Colorado, New Mexico-West Texas, Southwest Plains, Texas, and Wyoming; and, finally, California includes the three marketing areas making up the state of California. “All Orders” is the entire United States.

Using the output from the model, it is a simple task to add up the quantity of class I milk pooled on each order. This is denoted QI. It is assumed that all milk used for class I uses in U.S. plants is regulated and, with the exception of such milk in the state of Wyoming, is subject to class I differentials, or something akin to differentials in the state-regulated areas. Using observed utilization data, it is possible to then use QI to infer the quantity of producer deliveries to handlers, or producer deliveries, which is denoted QPR. Moving across to the free trade columns, things get a little more complex.

Class I use now decreases relative to the base case and this can be seen from the figures in the column headed QI. However, there is now the possibility for raw milk to be shipped out of the U.S., as indicated by QX. Such milk may or may not be shipped to a fluid plant, it doesn’t really matter as it is no longer pooled. What is important is that any milk shipped to foreign handlers is assumed to have been sold at the prevailing blend price. This makes perfect sense; a producer would surely not sell to a foreign handler at a lower price than could be obtained by selling to local handlers, that is, the blend price. A consequence of raw milk shipments to foreign handlers is that producer deliveries, QPR, decrease. In other words, the quantity of all pooled milk, whether it be class I or III, decreases. In the orders listed in the table for which QX is zero, QPR remains the same as in the base case but class I utilization has declined because under free trade, markets in these orders are being served by foreign suppliers of packaged milk.

All of this is tantamount to saying that for the free trade columns, QPR plus QX is equal to the base case QPR figure. Milk that was pooled as class I under an order in the base case is, in the free trade case, pooled as either class I or III, or is exported to Canada or Mexico. In any event, if class I use declines, as it does for all of the orders listed in the table, the resulting blend price will decline also. Blend price changes are indicated in the column headed ΔBP. Obviously, the revenue from sales of raw milk to plants in Canada or Mexico is not pooled. The regional groupings report price changes as if the pooling was undertaken regionally. Likewise, “All Orders” assumes that pooling occurs nationally.

Turning now to the class I credit columns, the calculations take on yet another layer of complexity. Once again, QPR plus QX is equal to QPR in the base case although as can be seen from the table, the figures for QX are fewer and smaller than those for the free trade case. The key difference between the class I credit and free trade results is that the class I quantity is now divided into two categories. Some amount of class I milk, that which appears in the column headed QI, is priced at the regular class I price. However, there is some additional class I milk, amount QI(Cr), which is eligible to be purchased at what ultimately turns out to be the blend price. That is, it’s priced at the class I price but is subsequently awarded the class I credit, an amount equal to the difference between the class I price and the blend. Moreover, and more importantly, both of these categories of milk are pooled so the reduction in the blend price is not as great as in the free trade case. The one exception, which will be further explained below, is Maine.

A number of important points can be taken from Table 1. Immediately apparent is that the impact of liberalized trade varies from one order to the next. At one extreme, the Western New York order is effectively eliminated under the free trade case. In other words, once class I utilization has dropped to zero there is nothing left to pool and the order ceases to exist. If blend price changes are to be the measure of the impact of trade liberalization, then producers in the Western New York order are the most severely harmed; the blend price declines by 88¢/cwt. This compares with a decline of only 13 and 9 cents, respectively, in the neighboring New York-New Jersey and Ohio Valley orders. At the other end of the scale, those orders which don’t appear in the table are not affected at all.

It is useful to reiterate at this point that while milk sold by U.S. producers to plants in either Canada or Mexico is depooled, the particular producers making such sales are not necessarily any worse off, although in the long run they probably would be. For example, continuing with the discussion of the Western New York state marketing area, it can be seen from Table 1 that almost 56 million pounds of producer milk, which was pooled in the base case, was shipped to Canadian processors under free trade. As has already been explained, it is reasonable to assume that Canadian processors would have to offer at least the blend price to attract this milk. Yet, all other producers in the Western New York milkshed, who continue to supply milk to regulated plants, suffer an 88¢/cwt. price decline under free trade. This kind of price disparity would surely be a transitory phenomena and eventually, after the price dynamics had worked themselves out, a new equilibrium would be established. As the prevailing blend price declines because of milk being depooled, the price that unregulated handlers must offer in order to elicit a supply also gets lower. Inasmuch as this draws more unregulated handlers into the market, competitive pressures will begin to work against continued price declines until an equilibrium in the market is attained. The possibility for similar outcomes in other areas can be readily observed in Table 1.

Clearly, the class I credit leads to a dramatic decrease in exports of producer milk; such exports fall from 7,557 million pounds under free trade to just 287 million pounds. While this leads to a greater amount of milk being pooled, and is thus beneficial from the standpoint of marketing orders, it comes at a cost; namely a reduced blend price. With the exception of Maine, the blend price reductions under the class I credit scenario are roughly 40 to 60 percent of those in the free trade case.

Maine is a special case for two reasons. First, it is very close to Canada and is in fact partially surrounded by Canada, and second, the Maine marketing area, at 50 percent, has a relatively high class I utilization. Of the two demand nodes in the model representing all of the demand for fluid milk in the state of Maine, one was wholly supplied by Canadian-based processors in the free trade case. According to the rule described above, U.S. shipments to this node were then eligible for the credit under the class I credit scenario. However, under the class I credit simulation, the second and largest fluid milk demand point in Maine switched from demanding U.S. processed products, as it did in the free trade case, to demanding packaged milk from Canada. Moreover, one third of the packaged milk coming from Canada was actually procured in the U.S. Taken together, these actions drastically reduced the pooled revenue. In fact there was no milk pooled on the Maine order that was priced at the full class I price under the class I credit simulation. The result was a blend price decline for this scenario of $1.17/cwt. So, the decision was made to let U.S. shipments to both nodes be eligible to receive the credit. As can be seen from the table, this led to a reduction in the blend price of 67¢/cwt., still a greater price drop than is experienced under the free trade case but perfectly consistent with the relatively high class I utilization and the full class I price being applicable in the free trade case. QI is 308.48 million pounds in the base case and falls to 230.41 under free trade. While QI drops to zero in the class I credit simulation, 308.48 million pounds is pooled at the QI(Cr) price.

The model does not explicitly consider prices although relative prices are not at issue here. What matters is the cost of transportation relative to the level of class I differentials. Nevertheless, we know that producer prices in Canada are much higher than in the U.S. so it is reasonable to wonder how this might influence the analysis. U.S. producer prices in the border areas near Mexico are very similar to those observed in the north of Mexico. One would expect that higher prices in Canada *viz-a-viz* the U.S. would moderate the adverse affect of trade liberalization on MMOs. With freer trade, prices would tend to equalize across either side of the border. Thus, if Canadian processors were to offer producers a price which exceeded the blend price, then presumably U.S. producers would want to supply Canadian plants which would in turn cause U.S. processors to offer higher prices. In any event, the question is one of general competitiveness rather than a MMO issue.

Somewhat related to prices is the question of how a supply or demand response might change the analysis. Again, this issue speaks more to the broader question of the competitiveness of the sector than it does to MMOs. It would be reasonable to assume little response on the demand side to any changes in the consumer price of fluid milk as most analysts believe demand for fluid milk to be fairly inelastic. However, if producer prices were to decline, as this analysis has suggested would be the case for certain areas, then a corresponding decrease in the quantity of milk supplied would be expected. This would lead to a strengthening of the manufacturing price which, besides reducing the affects of trade liberalization on blend prices in the border areas, could well result in gains for producers outside of the areas directly impacted, particularly in areas with a relatively low class I utilization.

CONCLUDING REMARKS

This paper has analyzed the effect that liberalizing trade would have on U.S. milk marketing orders. The possibility of either raw milk or processed milk products moving freely across U.S. borders provides a simple means for fluid milk processors to avoid paying the class I price for the milk they use. Such behavior leads to diminished class I utilization and a decline in producer prices.

The analysis made it abundantly clear that to the extent that liberalizing trade with Canada and Mexico places pressure on the ability to regulate the purchase price of grade A milk, U.S. dairy farmers in border areas could be significantly to severely harmed. In all, 18 percent less fluid milk was distributed from U.S. plants when compared with the base case and was replaced with shipments from Canada and Mexico. While the U.S. increases processing activity at manufacturing plants by 3.6 percent, all of this milk is procured at the lower manufacturing price so U.S. producers are made worse off. Reductions in class I utilization ranged from less than 14 percent in the New York-New Jersey order to 100 percent in the state order of Western New York and the Southern California marketing area. The resulting changes in blend prices were in the range of 9¢/cwt. in the least affected areas to 88¢/cwt. in Western New York. Producer price declines of this magnitude would be devastating for producers, many of whom are already struggling financially. Based on past experience, even 9¢/cwt. which does not sound dramatic, is a critical decline for many producers and the declines at the higher end are more than enough to cause difficulty for most producers.

Somewhat surprisingly, the direct impact in the areas near the border did not spillover into neighboring orders. Outside of the 11 affected marketing areas in the Northeast and Southwest, no change in the level of fluid milk processing activity in the U.S., and thus class I utilization, was observed following the introduction of free trade with Canada and Mexico.

This analysis has shown that MMOs, which have served the industry well for over sixty years, will be severely hampered as a result of trade liberalization. Moreover, the adverse affects will be concentrated in the Northeast and the Southwest. Both state and federal orders in these regions will be impacted. As milk is diverted from these areas to fluid processing plants in Canada and Mexico, the chaotic conditions that federal orders sought to, and indeed did, alleviate may well begin to reappear. For example, plants that locate beyond the scope of regulators and draw milk from previously regulated supplies will surely not continue to procure that milk at the times when variability in demand dictate that its not required. Consequently, that milk will be left to the manufacturing sector to utilize at a much lower price.

The issue for policy makers is clear although the best response is not so obvious.

Certainly, there will be no turning back of the trade reform clock which would conveniently make the issue go away. Merging of orders to create larger pools, or even national pooling, would share the burden around but would not address the underlying problem. Some difficult choices must be made soon as the implementation of NAFTA is well advanced and further liberalization seems inevitable. Congress has determined as recently as April of 1996 that MMOs are not to be abandoned. It is imperative, therefore, that measures be undertaken which would allow them to continue performing the function for which they were created.

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Table 1. Summary of Changes in Class I Quantity, Producer Receipts, Raw Milk Exports, and Blend Prices
Selected Milk Marketing Orders (million pounds)

Order/Region	Base		Free Trade				Class I Credit				
	QI	QPR	QI	QPR	ΔBP	QX	QI	QI(Cr)	QPR	ΔBP	QX
New England	2984.13	6040.75	1269.32	4605.21	-0.81	1435.54	1269.32	1714.81	5939.13	-0.41	101.62
NY-NJ	4719.71	11372.80	4070.54	11372.80	-0.13	0	4070.54	649.17	11372.80	-0.06	0
Ohio Valley	1873.68	3369.93	1605.46	3369.93	-0.09	0	1605.46	268.22	3369.93	-0.03	0
Sthn Michigan	2085.77	4794.87	760.91	3954.64	-0.30	840.23	760.91	1324.86	4794.87	-0.17	0
Maine	308.48	616.96	230.41	616.96	-0.34	0	0	308.48	616.96	-0.67	0
W. New York	595.24	1451.80	0	1395.88	-0.88	55.92	0	595.24	1451.80	-0.52	0
Northeast	*20247.67*	*42870.64*	*15617.30*	*40538.95*	*-0.22*	*2331.69*	*15386.89*	*4860.78*	*42769.02*	*-0.12*	*101.62*
Michigan U.P.	94.86	133.42	76.72	133.42	-0.11	0	76.72	18.14	133.42	-0.03	0
Midwest	*7810.17*	*33055.19*	*7792.03*	*33055.19*	*-0.00*	*0*	*7792.03*	*18.14*	*33055.19*	*-0.00*	*0*
Central Arizona	1075.72	2227.16	767.86	2108.43	-0.27	118.73	767.86	272.46	2190.58	-0.15	36.58
New Mex.-	634.94	1611.52	402.89	1130.07	-0.28	481.45	402.89	178.18	1565.42	-0.19	46.10
Texas	3258.67	6623.31	2276.53	5686.16	-0.44	937.15	2163.33	1038.60	6528.13	-0.26	95.18
Southwest	*7157.03*	*15880.85*	*5634.98*	*14343.52*	*-0.25*	*1537.33*	*5521.78*	*1489.24*	*15702.99*	*-0.15*	*177.86*
California	*6145.14*	*22104.82*	*2286.95*	*18416.59*	*-0.30*	*3688.23*	*2286.95*	*3858.19*	*22097.26*	*-0.23*	*7.56*
All Orders	*55861.11*	*139915.45*	*45832.35*	*132358.20*	*-0.14*	*7557.25*	*45488.75*	*10226.35*	*139628.41*	*-0.09*	*287.04*

Notes: QI denotes class I quantity, QPR denotes quantity of Producer Receipts, ΔBP denotes change in Blend Price ($/cwt.), QX denotes exports of
raw milk previously pooled in the base solution, and QI(Cr) denotes pooled class I milk subject to the class I credit.