Trade effects of dairy pricing arrangements

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Abstract: Milk producers in virtually every OECD country, and in many non-OECD countries as well, benefit from government interventions. Indeed, government support and protection for milk producers is more widespread than for any of the other commodities for which the OECD calculates producer subsidy equivalents. The purpose of the analysis reported in this paper was to investigate the relative market effects of these two varieties of government intervention in milk pricing: 1) interventions through trade measures applied to dairy products and 2) discriminatory pricing arrangements. Which kind of policy creates 'dollar-for-dollar' the greater effects? This paper shows the answer to that question is – it depends. Neither economic theory by itself, nor economic theory combined with 'plausible' ranges of numerical values for key parameters is enough to say definitely one way or another. In some plausibly real-life situations domestic milk pricing arrangements can be, at the margin, more distorting than explicit trade measures. The key determining parameters include the usual suspects – the relative elasticities of fluid and manufacturing milk demand, as well as initial price gap between fluid and manufacturing milk provided by various measures and the proportion of domestic milk production used to manufacture tradable dairy products.

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Introduction

Milk producers in virtually every OECD country, and in many non-OECD countries as well, benefit from government interventions that boost the prices they receive for their raw milk production. Certainly, government support and protection for milk producers is more widespread than for any of the other commodities for which the OECD calculates producer subsidy equivalents. The OECD-wide average percent PSE for milk in 2001 was 45%, over 90 percent of which was market price support. (OECD, 2002)

In general, milk price support at the farm level is achieved either through trade measures (import tariffs, tariff rate quotas and/or export subsidies) applied to dairy products or through a combination of trade measures and discriminatory pricing arrangements. Trade intervention results in domestic prices for manufactured dairy products higher than world prices. This drives up the prices dairy plants are willing to pay for the raw milk used to make those products which, through competitive domestic market price determination, then leads to higher prices paid for milk for all end uses. Discriminatory pricing arrangements, administered by or sanctioned by the government, lead to prices paid for raw milk for some end uses (typically fresh milk products) that are higher than those paid by other consumers (typically manufactured milk products). The additional revenue generated is then transferred back to farmers through a pooled or average price scheme.

Currently, market price support afforded milk producers in OECD countries appears to be mostly the consequence of trade measures applied to manufactured dairy products. Discriminatory pricing arrangements do not feature at all in the policy package used to provide milk price support

in some important producing countries and regions - the European Union for example. In those countries where it does feature, e.g. the United States, Japan, Canada, no more than 15 to 25 percent of total market price support could be attributed to such measures – i.e., even in those countries 75 to 85 percent of total milk market price support is due to trade measures. [1]

However, whether the higher prices for raw milk are the consequence of government intervention in the form of explicit trade measures or from discriminatory pricing arrangements, domestic raw milk production is increased, consumption reduced. That is, both kinds of intervention create trade distortions in the world dairy market. The purpose of the analysis reported in this paper was to investigate the *relative* market effects of these two varieties of government intervention. Using a simple model of raw milk supply and demand we compare the trade effects of hypothetical marginal changes in producer price support accomplished by changing alternately one of two generic dairy price support measures. One is trade measures, which can be thought of as a tariff uniformly applied to tradable dairy products and resulting in a given change in the level of milk price support. The other is a price premium charged consumers of fluid milk products, which results in exactly the same marginal change in milk market price support as that obtained with the trade measure. The analysis assumes the country in question is 'small enough' relative to the world market for dairy products to assume that neither of the policy options will lead to changes in world market prices.

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[1] These figures are approximate. The OECD does not actually calculate how much milk market price support is due to trade measures versus discriminatory pricing. A rough estimate can be obtained, as was done here, using data measuring world and domestic prices for manufacturing milk, the domestic producer price for milk and quantities of raw milk used in fluid versus manufacturing end-uses.

The differentiation of milk into non-traded fluid (drinking) milk and "traded" manufacturing milk (milk used to manufacture dairy products) makes the dairy sector ideal for price discrimination. First, the fluid milk market is insulated from competition and second, demand for fluid milk is relatively price inelastic. This allows some market authority to set the price in the insulated inelastic market (fluid milk) above the price level of the competitive market (manufacturing milk). The prevailing prices on the fluid and manufacturing milk markets are then pooled into a weighted average producer price. Thus, under the price pooling system milk production decisions are not based directly on the manufacturing and fluid milk prices, but instead on a weighted average of the two, the so-called pool price.

Milk price discrimination systems have been adopted in a number of countries, either through classified pricing schemes or through fluid milk regulations. Today, Canada and the United States apply a government classified pricing system, whereas Japan relies on fluid milk regulations. A classified pricing system was also employed in the United Kingdom until the abolishment of the Milk Marketing Board in mid 1990's. The England, Wales and Scottish Milk Marketing Schemes terminated on 1/11/94 while the Northern Ireland Marketing Scheme was terminated on 28/2/95. Until recently fluid milk market regulations were also imposed in Australia and some vestiges of the former system will remain in place for some time yet.

The impact of price discrimination in domestic milk markets has been analysed in Buxton, Ippolito and Masson, Dahlgran, Helmberger and Chen, Lippert, Chavas and Cox and in Australian Competition and Consumer Commission, Sumner, Bouamra-Mechemache et al. The analytical and empirical studies illustrates that price discrimination, as expected, reduces fluid milk consumption and increases the amount of milk available for processing. Milk producers typically

gain from price discrimination as higher price fluid milk increases the producer price. However, this is conditional on the complexity of a particular market and regulatory framework. As price discrimination is usually accompanied by milk distribution restrictions the impact on producers is region specific. The restrictions negatively affect producers in efficient regions while opposite is true for producers in less-efficient regions. (See Helmberger and Chen, Chavas and Cox, Australian Competition and Consumer Commission.)

Sumner is one of the very few studies analysing the trade distorting impact of discriminatory milk pricing arrangements. His study, focusing on the U.S. Federal Milk Marketing Order system shows clearly that U.S. exports and imports of manufactured dairy products will vary directly with the size of the price premium charged to consumers of fresh milk products. Bouamra-Mechemache et al evaluated the options of developing a price discrimination policy in the EU dairy sector. Their analysis shows that the EU price discrimination without the EU quota system would significantly affect world prices and trade due to the increase in output resulting from higher producer price under price discrimination. With the quota in place the impact on trade is considerably less. The authors stipulate that as long as price discrimination does not involve price discrimination between domestic and export markets, it might be WTO-compatible and as such, the domestic price discrimination policy could be a partial substitute for more traditional trade policy measures.

A stylized model of dairy pricing and trade

Figure 1 contains raw milk supply and demand curves illustrating the quantity implications of delivering support to farmers either via a trade measure or via price discrimination system

accompanied by trade measures.[2] The analytical framework developed here, the algebraic version for which is presented in the next section, is drawn from the standard price discrimination literature. Similar applications to our own can be found in Ippolito and Masson and in Sumner. In this framework there are only two end-use milk classes, fluid milk and manufacturing milk. Fluid milk is considered as non-traded and its demand is supplied by the domestic production. Manufacturing milk is used entirely to manufacture tradable dairy products. In the absence of discriminatory pricing arrangements, competition in the raw milk market should equalise the price of milk across all end-uses. Given that a unit of raw milk produced is relatively homogeneous, it should be reallocated according to dairy processors' bids until the value of each unit of milk is equal to any other unit, regardless of final use. In other words, it is assumed that there are no factors other than policy, which would create a premium for milk for fluid use over that for manufacturing use given that the same quality of milk is used in either process.[3]

The line S in the diagram represents the total supply of raw milk and at the same time the marginal cost curve. There are two demand curves depicted in the diagram, D_f and $D_d{}^A$. The former is demand for fluid milk and the latter is combined demand for fluid and manufacturing milk. Demand for manufacturing milk is given by the difference between D_d and D_f. Note that the slopes of the demand curves differ, reflecting a demand for fluid milk that is relatively inelastic by comparison with that for manufacturing milk. Assume that two policy options target to support farmers at the same price level which is illustrated in the diagram as price P_d. The first achieves

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[2]   This is a realistic assumption as all countries currently operating price discrimination systems use it in conjunction with trade measures.

[3]   In reality, the presence of transportation costs and seasonal payments might generate "market-driven" fluid milk premium on the national level. Nevertheless, in this case the demand schedules and administered prices should be viewed as depicted net of transportation cost and seasonality payments (for further discussion see Ippolito and Masson). The analytical framework remains valid.

the price support by using only trade measures.[4] Figure 1 shows the assumed gap between the world (reference) price P_w and the higher domestic price P_d. When only the trade policy measure is used the value of raw milk is equated across uses, so the price for fluid and manufacturing milk are both equal to P_d. The intersection of P_d and S (the marginal cost of producers) determines the level of total milk production, Q_s^{AB}. The price Pd implies fluid milk consumption and production of Q_f^A. Manufacturing milk processors buy the rest of milk produced ($Q_s^{AB} - Q_f^A$) also at the price P_d. Part of the manufacturing milk production will be consumed domestically ($Q_d^A - Q_f^A$) and part will be exported ($Q_s^{AB} - Q_d^A$). If we assume that the quantity purchased will have to be exported at the prevailing world price Pw, then the per unit export subsidy will equal to (P_d - P_w) and total expenditure on export subsidies would amount to the area 'l' + 'j' + 'g' + 'h'. Thus, the financial transfer to producers from taxpayers is equal to the area 'l' + 'j' + 'g' + 'h' while the financial transfer to producers from consumers is represented by an area 'b' + 'd' + 'c' + 'e' + 'i' + 'f'.

Under the second policy option, in addition to trade measures, the government operates a discriminatory pricing arrangement based on an administratively determined fluid milk premium represented in the diagram by the difference between P_f^B and P_m^B. The pool price is depicted in the diagram by the curved line tracing the weighted average of $P_f{}^B$ and $P_m{}^B$ where the weights are the quantities of milk going to each of the two uses. In this example, the manufacturing milk price and administered fluid milk premium are set up such that producers receive the "target" support price P_d at the level of output Q_s^{AB}. Thus, as farmers face the same incentive price the level of total milk production, is identical in both cases. It is important to note that with discriminatory pricing the government authority needs to support dairy products (implicitly manufacturing milk)

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[4]   Note that applying trade measures (import tariffs, tariff rate quotas (TRQs) and export subsidies) is analytically equivalent to supporting price by intervention buying.

at a lower level $(P_m{}^B)$ as compared to policy relying only on trade measures to maintain the same desired "target" price P_d. This is because producers under a policy of price discrimination get a part of their price support in consequence of higher prices charged consumers of fluid milk.

The diagram illustrates that in response to increase in the fluid milk price caused by the introduction of the fluid milk premium the fluid milk consumption will be at level $Q_f{}^B$, i.e. a decreases of $(Q_f{}^A - Q_f{}^B)$. As a result of the higher fluid milk price and the shift in the starting point the combined demand curve $D_d{}^A$ moves leftward to $D_d{}^B$. It follows that by lowering fluid milk consumption, more milk is left for manufacturing purposes $(Q_s{}^{AB} - Q_f{}^B)$. At the same time, following the introduction of the fluid milk premium, domestic consumers of manufacturing products will face lower price $(P_m{}^B)$. Accordingly, the domestic consumption of manufactured products is higher, by an amount equal to $(Q_d{}^B - Q_f{}^B)$. The difference $(Q_s{}^{AB} - Q_d{}^B)$ will be exported with per unit export subsidy equal to $(P_m{}^B - P_w)$ and the total expenditure on export subsidies reduces to the amount shown by area 'h'.

The total transfer to producers from consumers that follows the introduction of the fluid milk premium can be decomposed into two parts, one is a transfer due to the discriminatory pricing arrangements and the other is that due to trade measures. As shown in Figure 1, the former is represented as area 'a' + 'b', and the latter is represented as areas 'd' + 'e' + 'f' + 'g'. At the same time, the financial transfer from taxpayers to producers is represented as area 'h'. Note that since Pd is the weighted average of $P_f{}^B$ and $P_m{}^B$, the area 'a' is equal to the area 'c' + 'i' + 'l' + 'j'. The unit of market price support created by discriminatory pricing arrangements is then equal to the price gap between P_d and $P_m{}^B$. The unit market price support attributable to trade measures, on the other hand, is equal to the gap between $P_m{}^B$ and P_w.

The diagram while only a stylized representation of the market nevertheless illustrates the different outcomes of these policies. When price support is achieved using only trade measures, fluid milk consumers enjoy greater consumer surplus by area 'a' + 'k' as compared to when the same amount of price support is achieved under discriminatory pricing. Conversely, consumers of manufactured products under discriminatory pricing benefit from greater consumer surplus as compared to the outcome obtained using trade measures alone (a result that is difficult to represent in the graph due to the shift of the demand curve[5]).

The implications of these policy alternatives for trade are not as straightforward. Here the analytical diagram is drawn in such a way that less quantity has to be exported under discriminatory pricing arrangements, as compared to quantity exported under trade measures. The difference in exports $(Q_d^B - Q_d^A)$ is due to the fact that in our diagram the increase in fluid milk price reduces the fluid consumption by less than the decrease in manufacturing milk price boosts the manufacturing milk consumption. However, in general terms, the outcome is ambiguous and variables such as the relative fluid and manufacturing demand elasticities, the volume of individual milk markets, the magnitude of fluid milk premium, and subsequently domestic fluid and manufacturing milk prices have be taken into the consideration. We focus more specifically on these issues in the following section.

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[5]   Given $(P_m^B < P_d)$, the first term is bigger than the second term which implies that consumers of manufactured products under the discriminatory pricing arrangements increase their consumer surplus by:

$$\Delta CS_B = \left[\int_{Q_f^B}^{Q_d^B} D_d^B(x)dx - \left(Q_d^B - Q_f^B \right) P_m^{\ B} \right] - \left[\int_{Q_f^A}^{Q_d^A} D_d^A(x)dx - \left(Q_d^A - Q_f^A \right) P_D \right]$$

Figure 1 – Market effects of alternative milk price support measures
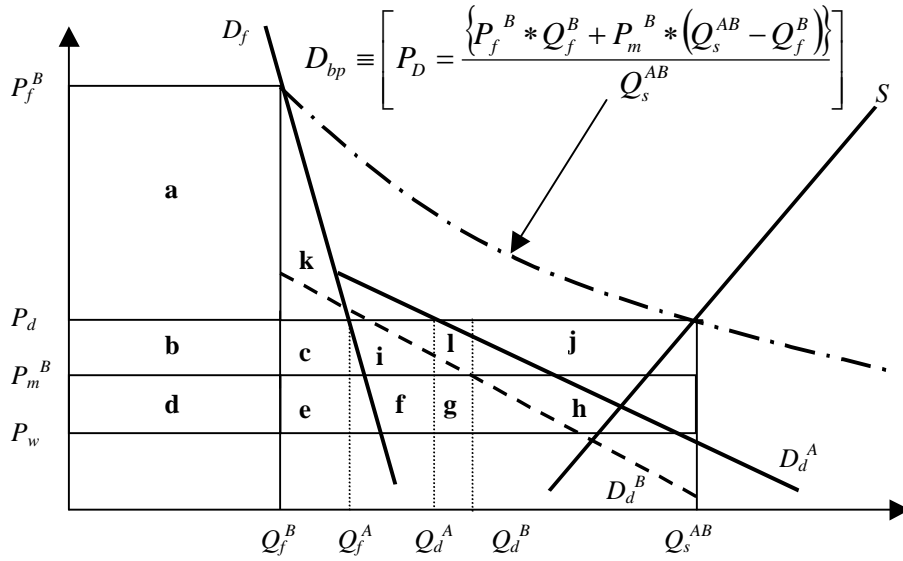
Quantitative differences in policy effects

The supply-demand equations corresponding to the graphical version of the dairy pricing model shown in Figure 1 are as follows:

$$Q_s = S\,(P_s) \tag{1}$$

$$Q_f = D_f\,(P_f) \tag{2}$$

$$Q^m{}_d = D_m\,(P_m) \tag{3}$$

$$P_s = \frac{P_f Q_f + P_m\left(Q_s - Q_f\right)}{Q_s} \tag{4}$$

$$X = Q_s - Q_f - Q^m{}_d \tag{5}$$

where Q_s is quantity produced, $S\,(P_s)$ is a milk supply function, P_s is a milk producer price, Q_f is the demand for fluid milk, $D_f\,(P_f)$ is a fluid milk demand function, P_f is a fluid milk demand price, $Q^m{}_d$ is the demand for manufacturing milk, $D_m(P_m)$ is the manufacturing milk demand function, P_m is a manufacturing milk demand price. Since P_s is the weighted average of P_f and P_m, P_s can be written as equation (4). X is the net exports of dairy products (milk equivalent term) and it can

have a negative value in the case that imports exceed exports. All quantities and prices are

considered in liquid units.

Writing out the total differentials of equations (1) through (5):

$$dQ_s = S'(P_s)dP_s = \frac{\varepsilon Q_s}{P_s} dP_s \tag{6}$$

$$dQ_f = D_f'(P_f)dP_f = \frac{\eta_f Q_f}{P_f} dP_f \tag{7}$$

$$dQ_d^m = D_m'(P_m)dP_m = \frac{\eta_m Q_d^m}{P_m} dP_m \tag{8}$$

$$dP_s = \frac{Q_f\left(1+\eta_f - \dfrac{P_m}{P_f}\eta_f\right)}{Q_s\left(1+\varepsilon - \dfrac{P_m}{P_s}\varepsilon\right)} dP_f + \frac{Q_s - Q_f}{Q_s\left(1+\varepsilon - \dfrac{P_m}{P_s}\varepsilon\right)} dP_m \tag{9}$$

$$dX = dQ_s - dQ_f - dQ^m{}_d \tag{10}$$

where ε, η_f and η_m are the elasticities of milk supply, fluid milk demand and manufacturing milk

demand respectively. Substituting equations (6), (7) and (8) in (10) and re-arranging, we have

$$\frac{dX}{dP_s} = \frac{\varepsilon Q_s}{P_s} - \frac{\eta_f Q_f dP_f}{P_f dP_s} - \frac{\eta_m Q_d^m dP_m}{P_m dP_s} \tag{11}$$

Equation (11) shows how a change in a milk producer price changes the volume of trade.

When a trade measure is used to achieve a given increase in Ps the price gap between fluid milk

and manufacturing milk (fluid milk premium) is assumed to remain at its initial level such that,

dP$_f$ = dP$_m$. This does not rule out the case examined in the previous section where the 'initial

level' of the fluid milk premium was zero. It does allow though illustrating, as is done

subsequently, the important dependence of trade effects on initial relative prices of fluid and

manufacturing milk prices. In this case, equation (11) becomes

$$
\frac{dX}{dP_s}\bigg|_{dP_f=dP_m} = \frac{dX}{dP_s}\bigg|_{trade} = \frac{\varepsilon Q_s}{P_s} - \left(\frac{dP_f}{dP_s}\bigg|_{dP_f=dP_m}\right)\left(\frac{\eta_f Q_f}{P_f} + \frac{\eta_m Q_d^m}{P_m}\right)
$$

$$
= \frac{\varepsilon Q_s}{P_s} - \frac{Q_s\left(1+\varepsilon - \dfrac{P_m}{P_s}\varepsilon\right)}{Q_f\left(\dfrac{Q_s}{Q_f} + \eta_f - \dfrac{P_m}{P_f}\eta_f\right)}\left(\frac{\eta_f Q_f}{P_f} + \frac{\eta_m Q_d^m}{P_m}\right) \quad (12)
$$

Consider now the case where the supposed increase in P_s is achieved only through an increase in

the fluid milk premium without any change in the trade measures, i.e. $dP_m = 0$. In this case,

equation (11) becomes

$$
\frac{dX}{dP_s}\bigg|_{dP_m=0} = \frac{dX}{dP_s}\bigg|_{DPA} = \frac{\varepsilon Q_s}{P_s} - \left(\frac{dP_f}{dP_s}\bigg|_{dP_m=0}\right)\frac{\eta_f Q_f}{P_f}
$$

$$
= \frac{\varepsilon Q_s}{P_s} - \frac{\eta_f Q_s\left(1+\varepsilon - \dfrac{P_m}{P_s}\varepsilon\right)}{P_f\left(1+\eta_f - \dfrac{P_m}{P_f}\eta_f\right)} \quad (13)
$$

Subtracting equation (13) from (12) and re-arranging, we get the difference in trade impact due to

trade measures and that due to discriminatory pricing:

$$
\frac{dX}{dP_s}\bigg|_{trade} - \frac{dX}{dP_s}\bigg|_{DPA} = \theta \cdot \left[1 - \left(\frac{\eta_m}{\eta_f}\right)\left(\frac{P_f}{P_m}\right)\left(\frac{Q_d^m}{X+Q_d^m}\right)\left\{1+\eta_f\left(1-\frac{P_m}{P_f}\right)\right\}\right]
$$

$$
= \theta \cdot \left[1 - \left(\frac{\eta_m}{\eta_f}\right)\left\{\frac{P_f}{P_m}\left(1+\eta_f\right) - \eta_f\right\}\left(\frac{Q_d^m}{X+Q_d^m}\right)\right] \quad (14)
$$

where θ is defined as

$$\theta = \frac{\eta_f Q_s \left(1 + \varepsilon - \dfrac{P_m}{P_s}\varepsilon\right)\left(X + Q_d^m\right)}{P_f Q_f \left(1 + \eta_f - \dfrac{P_m}{P_f}\eta_f\right)\left(\dfrac{Q_s}{Q_f} + \eta_f - \dfrac{P_m}{P_f}\eta_f\right)}$$

It is easy to prove that: $\left.\begin{array}{c} 0 < P_m \leq P_f \\ \text{and} \\ -1 \leq \eta_f < 0 \end{array}\right\} \Rightarrow \theta < 0$. Therefore whether trade measures have greater or

smaller impact on the volume of trade than discriminatory pricing arrangements depends only on

the value in the square bracket in equation (14). That condition can be written as

$$\left.\frac{dX}{dP_s}\right|_{trade} \begin{array}{c}>\\=\\<\end{array} \left.\frac{dX}{dP_s}\right|_{DPA} \Leftrightarrow \frac{\left(\dfrac{\eta_f}{\eta_m}\right)}{\left(\dfrac{P_f}{P_m}\right)\left(1+\eta_f\right)-\eta_f} \begin{array}{c}<\\=\\>\end{array} \frac{Q_d^m}{X + Q_d^m}$$

(15)

The propositions in (15) are illustrated in Figure 2. The straight line $Q_d^m/(X+ Q_d^m)$ =

$(\eta f/\eta m)/\{(Pf/Pm)(1+\eta f)- \eta f\}$ is the border between two critical zones. Any points on the right-

hand side of that line correspond to situations where the trade effect of trade measures is greater

than the trade effect of discriminatory pricing. Any points on the left-hand side of that line

indicate the situations where the trade effect of discriminatory pricing arrangements is greater

than the trade effect of trade measures.

Figure 2 – Relative trade effects of milk price support measures
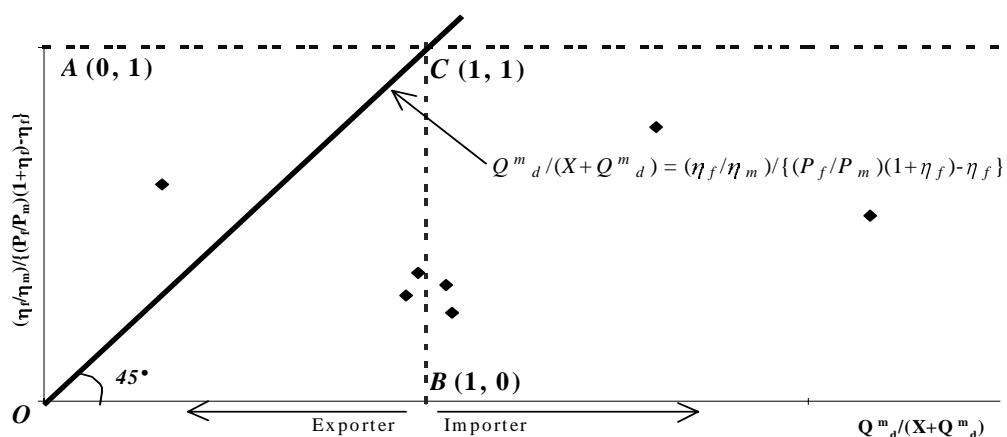
Since our assumptions include $(\eta_f/\eta_m)<1$, i.e. that the elasticity of demand for fluid milk is always less than the elasticity of demand for manufacturing milk, all points must range from zero to one vertically[6]. Horizontally, any points ranging from zero to one indicate net exporters; those exceeding one indicate net importers. Any points in Figure 2 may be divided into three cases based on the following criteria: the relative manufacturing and fluid milk prices; and the status of trade (importers and exporters).

Case 1**: $X<0$**
This is a case of net importers and the corresponding area in Figure 2 is the right-hand rectangle area of the vertical line BC. The rectangle area is located in the right-hand side area of the border, indicating that the trade effect of trade measures is always greater than the trade effect of discriminatory pricing in the case of net importers of dairy products (in milk equivalent totals).

Case 2**: $X>0$ and $P_f=P_m$**
This is a case of net exporters with no initial price gap between fluid and manufacturing milk (no initial fluid premium). In this case, it is clear that equation (15) can be simplified as

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6 .   This is the case for major milk producing countries among the OECD, as shown in Table 2.

$$\left. \frac{dX}{dP_S}\right|_{trade} \overset{>}{\underset{<}{=}} \left. \frac{dX}{dP_S}\right|_{DPA} \Leftrightarrow \left(\frac{\eta_f}{\eta_m}\right) \overset{<}{\underset{>}{=}} \frac{Q_d^m}{X + Q_d^m}$$

(15′)

This result means that the trade effect of a trade measure is greater than that for discriminatory pricing if the ratio (η_f/η_m) is less than the ratio $(Q_d^m/(X+ Q_d^m))$ and vice versa. The corresponding area for the former case in Figure 2 is the area AOC, and the area for the latter case is the area BCO.

Case 3: $X>0$ and $P_f >P_m$

This is a case of net exporters that currently have fluid premium. In this case, since $(P_f/P_m)>1$, the denominator of the left-hand term in the equation in (15) is greater than one[7], resulting in the value of the left-hand term being less than (η_f/η_m). Like *Case 2*, the percentage of exportation and the ratio between the two demand elasticities are key to determine the relative magnitude between the trade effect of trade measures and the trade effect of an increase in the fluid milk premium. As noted earlier, there is one other important relationship for this case – the ratio of the initial price of fluid milk to manufacturing milk. The bigger is this ratio, the higher is the possibility that the trade effect of an incremental change in trade measures is greater than the trade effect of an incremental change in the fluid milk premium.

The black diamonds in Figure 2 correspond to data points constructed from the milk demand elasticities, milk quantity and price data that form part of OECD's Aglink and PEM models.[8] These particular results correspond to observed situations of seven major milk-producing countries in the OECD in 2001: Australia, Canada, European Union, Japan, Mexico, Switzerland

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7 .   Substituting 1 from the denominator yields: $\{(P_f/P_m)(1+\eta_f)-\eta_f\}-1=(1+\eta_f)(P_f/P_m-1)$. Our assumptions in this case make that $(1+\eta_f)(P_f/P_m-1)>0$.

8   The procedures used to obtain these data points are somewhat tedious and space does not allow their full documentation in this paper. The authors will be glad to share them with interested readers.

and the United States. Table 2 summarizes the ranges of key parameters observed across those

seven countries. The ratio of the demand elasticity for fluid milk to that for manufacturing milk

ranges in value between 0.30 to 0.78, indicating that, as expected, the demand for fluid milk is

relatively price inelastic. The ratios of the demand for manufacturing milk to the total

manufacturing milk production illustrate a wide variety in the trading status of dairy products

amongst those countries. The minimum value (0.31) corresponds to the situation of a significant

net exporter – Australia in this case while the maximum value (2.16) refers to the situation of a

major net importer – Japan in this case.

Results in Figure 2 reveal that, in general, a given marginal change in price support achieved

using a trade measure will be more trade distorting than if that increase in support were to be

achieved using a fluid milk premium. However, there is there is clearly the possibility of the

reverse happening. This situation may, as stated above, occur for a country where the share of

exportation is big; the elasticities of demand for fluid and manufacturing milk are close to each

other; and the initial fluid milk premium is small.

Table 2 – Ranges of values for key components of formulas determining relative trade effects

	η_f/η_m	$(P_f/P_m)(1+\eta_f)-\eta_f$	$(\eta_f/\eta_m)/\{(P_f/P_m)(1+\eta_f)-\eta_f\}$	$Q^m_d/(X+Q^m_d)$
minimum	0.30	1.00	0.25	0.31
maximum	0.78	1.29	0.78	2.16
average	0.49	1.10	0.45	1.16

Conclusions

Tariffs, tariff rate quotas and export subsidies are visible interventions leading to distortions in

world trade in dairy products. Discriminatory pricing arrangements create less obvious but

analogous effects. Which kind of policy creates 'dollar-for-dollar' the greater effects? This paper

shows the answer to that question is – it depends. Neither economic theory by itself, nor economic theory combined with 'plausible' ranges of numerical values for key parameters is enough to say definitely one way or another. In some plausibly real-life situations domestic milk pricing arrangements can be more distorting than explicit trade measures. The key determining parameters include the usual suspects – the relative elasticities of demand, as well as initial rates of support provided by various measures and the proportion of domestic milk production used to manufacture tradable dairy products.

Some firm conclusions are possible however. Under the plausible elasticity assumptions, trade measures applied by an importing country will, for a given amount of price support provided, always be more trade distorting than pricing arrangements that discriminate between domestic consumers of fresh milk versus manufactured milk products. Indeed, under those same assumptions a country would have to be a significant net exporter for the reverse to hold.

The reality of extant interventions in dairy pricing in OECD countries is such that the total amount of support provided via discriminatory pricing arrangements is relatively small compared to that resulting from trade measures. That is to say, whether 'at the margin' trade measures are equally or less distorting than discriminatory pricing arrangements must be viewed in light of the fact that most all trade distorting support is due to trade measures.

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