Modelling World Dairy Trade: The Potential Impact of Officially Supported Export Credits on the Australian Dairy Industry

Emayenesh Seyoum[*]**, Ellen Goddard** [**]**, Donald MacLaren**[***]**, Garry Griffith**[****]**.

46th Annual Conference of the Australian Agricultural and Resource Economics Society

13-15 Feb 2002, Canberra

Abstract

Rapidly increasing concentration in food manufacturing industries, particularly the merger and acquisition of big dairy companies, has heightened concerns about the exercise of market power in world markets, including dairy. Despite the significant concentration in the international dairy processing sector, previous trade liberalization analysis has all been done in the context of perfect competition and existing trade policy. With evolving trade rules, the impact of non-traditional intervention methods, such as export credit, may become of importance in international dairy markets. In this paper the significance of imperfect competition in analyzing world dairy trade is examined in the context of export subsidies and officially supported export credit.

*Phd student, University of Melbourne, e.seyoum-tegegn@pgrad.unimelb.edu.au

** Professor, University of Alberta, ellen.goddard@ualberta.ca

***Assoc.Professor University of Melbourne, d.maclaren@unimelb.edu.au

****Research Scientist, University of New England and NSW Dept of Agriculture-garry.grifith@agric.nsw.gov.au

1.   Introduction

Since the start of negotiations for the Uruguay Round (UR) of the General Agreement on Tariffs and Trade (GATT) the international dairy market has changed considerably. According to Blayney and Miller (2000) these changes were fuelled by three factors: first market forces have substantially changed dairy industries in major exporting and importing countries; second, a number of countries have made major changes in domestic dairy policy; and third, the UR Agreements themselves have affected the international dairy markets. The change in international dairy markets, particularly the growing involvement of multinational firms in international dairy trade are concerns for dairy markets. In addition, even if export subsidies were banned, the continued use of export credits would serve as remaining distortions in dairy. Despite the significant concentration of multinationals in the dairy processing sector, previous trade liberalisation analysis has all been done in the context of perfect competition and existing trade policies. With the frequency of the current acquisitions and mergers and resulting increasing concentration in processing industries, there may be a question about the market structure assumed in the previous studies and the modelling approach for world dairy trade. In this paper we discuss some of the current circumstances in the international dairy market and their implications for the Australian dairy industry. The outline of the paper is as follows. Section 1.1-1.4 provides the over all situation of the dairy industry. Section 2 shows the previous trade liberalisation studies. Section 3 discuss the export policies particularly the official export credits. In Section 4 a synthetic model is developed incorporating imperfect competition. Lastly, section 5 provides a summary and some thoughts for further research in this area.

1.1 Australia's dairy industry

Dairying is the fourth major Australian agricultural exporting industry, next to wheat, wool and cotton, so further trade liberalisation in this sector is important to the Australian economy. The Australian dairy industry currently produces around 10 billion litres of milk annually. Around 50 per cent of this production is sold in world markets as finished product. This strong export focus accounts for Australia's higher

share of world dairy trade of around 15 per cent (Australian Dairy Corporation, 2000). Having linked its future to its export competitiveness, the Australian dairy industry subsequently approached the multilateral trade negotiations with enthusiasm. The industry strongly advocated reform within WTO, it deregulated the domestic industry with the knowledge that world dairy markets remain heavily distorted by the surplus disposal programs and access restrictions imposed by other major producers. Australia was required to restructure its domestic market support for the dairy industry to comply with its export subsidy commitments. As Australia took these steps for reform, there is a concern about the policies followed by the other major players in the world dairy trade and the reform they have promised to undertake.

1.2 An overview of international dairy market

International trade in dairy products has traditionally been very limited, due to the perishable and bulky nature of fresh milk. International trade in fluid milk is rare and the trade is generally between neighbouring countries. International trade in dairy products is dominated by storable commodities, such as cheese, butter, and milk powder. The proportion of these storable products traded internationally is much higher than that of milk as a whole. For instance, 18 per cent of world butter and butter oils are traded internationally (excluding intra-EC trade) and more than 30 per cent of milk powder (skim, whole milk, and buttermilk) enters the world market. EU and Oceania are major exporters of dairy products in world markets. In 1999, the EU had 34 per cent followed by New Zealand 30 and Australia 15 per cent of the total world exports in milk equivalent.

In West European countries, most of which are EU members, dairy exports have been subsidised by governments as their farm support programs create a large surplus of dairy products, which in turn is dumped on world dairy markets. Western Europe also imports a considerable amount of dairy products, mainly from Oceania and Eastern Europe, to satisfy its demand for speciality dairy products and to smooth consumption patterns (in most cases, as part of commitments under GATT agreements and other special treaties). Australia and New Zealand, on the other hand, are natural producers of dairy products. About 50 per cent of the milk produced in this region is exported (for New Zealand, more than 80 per cent of production is exported). Eastern Europe

(including Soviet Union) has higher per capita milk production and consumption than North America. Compared to Western Europe and North America, producer prices are lower in Eastern European countries mainly due to lower farm income. The competitiveness of East European countries in world dairy markets has been influenced by the construction process of their dairy industries. Eastern Europe is also an important dairy importing region. Russia for example is the largest butter importing country in the world, absorbing about one quarter of the total world butter trade.

North America (USA and Canada) shares about 6 per cent of total dairy exports (USA shared about 4 per cent). Most of these exports are subsidised by government or go to countries under special trade agreements. The United States is one of the biggest cheese and casein importing countries, with most of the casein shipped from New Zealand. As a whole, however, North America is a net dairy exporter as a result of domestic price supports, export subsidies and food aid.

Import substitution policies and hardships in the development process in Central and South American countries in past decades have limited their participation in world agricultural markets, though they have a significant advantage in agricultural production. Recent years have seen South American countries participate increasingly in world and regional dairy trade. East Asia is the largest dairy-importing region. Japan is one of the biggest dairy-importing countries, mainly importing high value added products, such as cheese and casein. The demand for dairy products has been high in Japan because of growing incomes and a more Westernised diet. Domestic supply has been unable to satisfy the growing demands.

1. 3 Dairy Policies

The world dairy market is often used as an example of one of the most highly supported of all agricultural activities in a number of developed countries. Most developed countries used intervention measures to influence the domestic farm and consumer price for fluid milk and milk products to a level usually above that which would have been determined by the market in the absence of such intervention. Price support and production quotas affect production, while export subsidies, import levies

and similar trade measures influence the net trade of dairy products. As of 2001 the dairy policies by major producing and trading regions are presented in Table 2.1. These policy variables have been looked at in most of the dairy trade liberalisation studies.

Table 2.1 Dairy Policies of Major Milk Producing and Trading Regions, 2001

Policy Instrument	New Zealand	Australia	US	Canada	EU
Supply Management			*	*	*
Administered Farm Price			*	*	*
Administered Product prices			*	*	*
State Trading		*		*	
Border Measures		*	*	*	*
Price Support			*	*	*
Promotion	*	*	*	*	*
Price Discrimination			*	*	*

1.4 Structural Changes in International Dairy Industry

To understand the world dairy market it is important to know the structure of the industry. Market structure usually refers to the industry concentration, the extent of product differentiation, and the ease with which new firms can enter an industry. Market structure determines firms' and industry conduct, notably pricing policy. Conduct in turn, determines economic performance, which typically is measured by profits or price-cost margins. The global food processing market is dominated by big companies in the US, Europe and Japan. According to Handy and Henderson (1994) most food manufacturing relies more on foreign investment than on export as their major strategy to access foreign markets. The distinguishing characteristics of an

international company, in contrast to a national or regional company, is the ability to maximise the operations of a total system that is dominant over any set of regional systems. The economic imperatives for multinational companies are the fundamental costs and benefits of doing business.

The benefits include:

1. Flexibility in the exploitation of economic resources;
2. Increasing oligopoly power by utilising scale (size), scope (product range), and experience effects beyond the limits of national; and
3. Flexibility in the exploitation of different government policies e.g. tax rate and subsidies.

The costs include:

1. Difficulties in managing and controlling far flung operations; and
2. Necessity to control for additional, uniquely international variables, e.g. exchange rates fluctuations

Besides these, there are also political and social constraints faced by the corporation. The dairy industry is characterised by the formation of an active role in international trade by big dairy companies, multinationals corporations. Recently it has been observed that there are rapid structural changes in the dairy industry, the industry is moving from being strictly local to becoming a nationwide business.

Manchester and Blayney (1997) reviewed the market structure of the US dairy market and concluded that a major means of growth of companies in the dairy industry has been merger or acquisition. Additional capacity and volume were usually available at lower cost by acquisition than by building new capacity and competing for sales. Tozanli (1998) indicated that, as the result of merger and acquisition, the number of European dairy firms are getting smaller and this high concentration process is ubiquitous in the European dairy industry where the major tendency is toward an undeniable oligopolistic market structure.

Many of the world's key dairy businesses have been involved in major mergers and acquisitions in the past decades. Between May 2000 and June 2001 there have been

150 mergers and acquisitions throughout the world in big dairy companies Rabobank (2001). These mergers have included companies such as Dairy Farmers of America in US, Friesland Coberco in the Netherlands, Humnan Milchunion and the new Nordmilch in Germany, Swiss Dairy Food in Switzerland, Glanbia in Ireland, Arla Foods in Scandinavia, and the New Zealand Dairy Group and Kiwi business merged and formed Fonterra Cooperative Group (the new name for Global Dairy Co.) in New Zealand. Consolidation has been also present in the international dairy market. Jackson (2001) indicated that as local dairy industries become national, other regional companies consolidated globally. Italy's Parmalat has made more than 25 acquisitions outside Europe in the last five years, Danone has moved aggressively into both Asia and South America with acquisitions in countries such as China, India and Argentina. In some product categories globalisation has already taken place, Nestle and Unilever dominate ice cream, Danone, Yoplait and Nestle dominate yoghurt, and Kraft focuses primarily on cheese. Table 2. 2 summarise the top 20 dairy companies in the world.

Table 2.2 Top 20 dairy companies' turnover in the world 2000

Company	Sales USD billion	Company	Sales USD billion
Nestle	13	Arla Foods	4.4
Dean Food	9	Friesland Coberco Dairy Foods	4.2
Dairy Farmers of America	6.7	Campina Melkunie	3.6
Phillip Morris(Kraft)	6.1	Bongrain	3.6
Danone	6.0	Land O'Lakes	3.5
Parmalat	5.7	Meiji Milk products	3.2
Snow Brand Milk Product	5.5	Morinaga Milk industry	2.9
Lactallis	5.1	Sodiaal	2.8
Fonterra	5.0	Dairy Crest	2.5
Unilever	5.0	Nordmilch	2.4

Source: Rabobank International, 2001

2. Trade liberalisation models

In recent years there has been a substantial amount of literature on the effect that trade liberalisation would have on the agricultural market. Liberalisation of agricultural trade has been studied using both partial and general equilibrium models. Many partial equilibrium studies focus on single commodities, others are multi-product. General equilibrium analyses are usually conducted at a high level of aggregation with a small number of broadly defined commodity groups. Buckwell and Medland (1991) reviewed many of these models and discussed the problems in those studies of modelling of the effects of liberalising agricultural trade and the difficulties of using them as guides for policy action. They argued that the difficulties on interpretation of the output from such analyses arise from three sources: "technical problems of economic analysis, data and statistical problems and problems of policy relevance". In most trade liberalisation studies farmers are invariably modelled as perfectly competitive profit maximisers and the oligopolistic structure of upstream input suppliers and/or downstream food processors and distributors is not acknowledged. Furthermore, none of the models incorporate dynamic behaviour. The agricultural sector produces such a large number of individual products within a large number of individual firms there are immense data problems when large-scale sector models are constructed.

The dairy industry has been the focus of attention in several liberalisation studies, and it has been attempted to show with different scenarios the significant impact dairy liberalisation would have on the world dairy market. There are a large number of studies of the dairy industry exploring the competitiveness of the dairy sector in the international market and on types of modelling approach (see Table 2.3). The most commonly used model in the dairy industry is a partial equilibrium model; this is because it may be that the dairy sector does not have such a strong link with the rest of the economy. Examples of world models include the AGLINK model at OECD, the FAPRI model FAPRI (1998) and CARD and the dairy model from the University of Wisconsin (Zhu et al. (1998)). Griffith et al. (1993) constructed a model of the EU, US, New Zealand, Australia and the rest of the world's dairy industry and they concluded that more liberalized dairy policies in US and EU cause only small

increases in Australian and New Zealand production. However, those models fail to take account of certain imperfections due to large numbers of traders and investors. The industry is represented by a vertical structure that includes the supply of raw milk, a transformation stage and the demand for the processed commodities. Any dairy modelling has to take into consideration the industry structure.

ABARE (2001) used the AGLINK model to estimate the impact of market access and export subsidy and concluded that increasing market access and reducing export subsidies are seen as complementary, in that the increase in world demand that would result from improved market access may absorb some of the dairy exports that were subsidised. Zhu et al. (1998) argued that despite AGLINK being a typical sectoral model, when it comes to modelling the world dairy market it lacks commodities and regional details about the world dairy sector, and some of the dairy products are left out of the model. The consequence of this omission could be significant due to the disparities of resource endowment and consumption patterns across countries. Zhu et al. (1998) used the UW-Madison spatial equilibrium world dairy model with twenty-one regions and eight dairy product markets and analysed the market equilibrium impact of the full WTO Agreement on Agriculture. The authors concluded that the implementation of the Uruguay Round Agreement on Agriculture to 2000 would provide only a small step toward free trade in dairy markets. The conclusion and implications drawn from world dairy models indicate the prospect of little or no price gain for US dairy farmers from freer trade in dairy products; this partially explains the lack of strong interest on the part of most US dairy industries in dairy trade liberalization. Again, in a similar scenario, given the price reduction in store for EU milk producers, it is not surprising that many EU dairy farmers show little eagerness for additional dairy trade liberalization. Meilke et al. (2001) quoted the speech by the EU representative in the 2000 Ontario dairy farmers annual meeting: "most countries in the world are happy supplying their domestic markets with dairy products and have no interest in trade; there was no reason to change this generally happy state of affairs just to appease New Zealand". This would summarise the lack of interest in the US and the EU, who each have a large domestic market to open for the rest of the world.

Perfectly competitive markets have been assumed in a number of models of global dairy trade but the appropriateness of the assumption has been questioned by some

researchers so the finding of this study may be of interest to those involved in the world modelling of the dairy sector.

3. Export policies

Governments often encourage or directly support exports as well as impeding entry of imports. Export subsidies are special incentives, such as payments, extended by governments to encourage increased foreign sales; often used when a nation's domestic prices for goods are artificially raised above world market prices. Hence, the quantity delivered to foreign markets does not depend upon the price of the exporter and the prices of competitors in these markets, but rather on the government's decision of how much quantity to remove from the domestic market. In addition, countries can use export subsidies to limit internal market fluctuations by forcing more into export markets during years of high production and fewer exports during years of low production. Employing export subsides to stabilise internal markets increases world market volatility as trade flows depend less upon world market conditions and more upon the subsidizing country's internal policies. As a result, export subsidies were addressed seriously under the Uruguay Round Agreement on Agriculture (URAA), they are capped and subject to annual reduction commitments throughout the implementation period (1995-2000).

One of the most contentious and currently unconstrained forms of government support for exports, however, lies in the area of export financing. Here, governments of both developed and developing nations have directly entered the financial markets in an attempt to give their respective firms an edge by offering liberal credit terms to potential foreign customers. Certain practices adopted by a number of governments have led to a series of charges and counter charges about the degree to which such support constitutes unfair trading.

Most developed countries have always recognised the sales opportunity in the developing world, but they have also recognised the risks. While commercial risks exist as well for firms doing business in developed countries, the risks are more acute for firms attempting to sell in countries where the entire economy is in crisis, as is the

case in many developing countries. These create strong pressures in favor of government supported finance to ensure firms engaged in export to risky markets.

3.1 Officially Supported Export Credit

In most developed countries the government has played an active role in managing its country's foreign trade by restricting imports and directly encouraging exports. The successive agreements concluded under the auspices of the General Agreements on Tariff and Trade (GATT) which later became the World Trade Organisation (WTO) disciplined some types of government intervention and a variety of other multilateral and bilateral agreements have further limited their use. Besides, having agreed to reduce some of the import barriers, many governments in developed countries have resorted to a variety of other trade measures, ranging from safety and health standards to the use of export financing. Some of these barriers are on the negotiating table in the current WTO round and in the OECD. Others, however, will undoubtedly survive prolonged negotiations before they can be eliminated.

Export credit is one of the current hot issues in trade in agricultural products. The prime vehicle for government support of exports is establishment in various countries of an Export Credit Agency (ECA). Rienstra and Turvey (2000) have summarised the history of ECAs, noting the establishments of ECAs as early as 1919 by the British government and within a few decades followed by countries such as France, Spain, Italy and Japan. In 1934, the United States established the Export-Import Bank. The main objectives of these ECAs were to support exporting industries to enable them to increase their export sales in risky foreign markets and to help domestic exporters to be competitive relative to other foreign exporters. At the moment most developed countries have one or two ECAs. ECAs generally offer three broad types of services for exporters:

i.   Loan-related programs, involving either direct loans to foreign buyers or guarantees to financial institutions that in turn make the loans;

ii. Export insurance programs, where exporters obtain coverage against the risk of non-payment for sales made on credit terms; and

iii.   Miscellaneous services, including foreign investments insurance, foreign exchange loss insurance, and the blending of commercial financing with the foreign aid funds.

All three types of services provided by ECAs offer the opportunity for governments to subsidise their respective exporters.

i. Loan –Related Programs

All ECAs offer financing to foreign buyers in one of two forms. A "buyer credit" involves either a direct loan from the ECA to the buyer or a guarantee issued by the ECA to a bank which has made a loan to the foreign buyer. Under a "supplier credit" the exporter grants extended payment terms to the buyer, and discounts the resulting promissory notes received from the buyer with a bank. The bank agrees to purchase the note on the condition that it can obtain a guarantee from the ECA. Focusing on buyer credits, governments can attempt to give their respective exporters an advantage by offering financing that includes either below market interest rates or repayment periods longer than justified by the useful life the goods being bought. The possibilities for subsidisation become more apparent when one considers that those ECAs' debt instruments carry the full faith and credit of their respective governments and they can borrow funds in the capital markets at favorable rates and then pass these rates on to prospective foreign buyers.

ii. Export Insurance Programs

ECAs offer insurance against non-payments by a foreign buyer due to the occurrence of any of the commercial and/or political risks discussed earlier. This insurance is typically to cover sales made on short credit terms (up to 180 days) or medium terms (181 days to five years). Most ECA insurance programs are based on a number of common practices. As loan related services, most programs have a stipulated national content requirement in order for any export to be eligible for coverage. Insurance will generally require the exporter to carry some of the risk, though some ECAs offer 100% coverage for losses arising due to political risks. Insurance will not be available in all countries. Each ECA can refuse coverage in countries it feels are high risk or in countries where, for political reasons, the government has ordered the ECA not to operate.

Exporters pay a premium as a percentage of the value of shipments, with monthly declarations made to the insurer setting out the volume and destination of shipments. Premiums can vary, depending on the destination and terms offered. Difference in the perceived risk of a market in terms of political and/or commercial risks will result in higher premium for shipments made to higher risk countries. The longer the credit terms will have the more expensive the premiums.

Governments can use ECA insurance programs to give competitive advantage to their respective exporter in one of two ways. They could charge premiums lower than those offered by competing agencies for the same risks or lower than what would be sufficient to cover overhead and claim payments; or they could continue to offer coverage in markets which would not warrant it if normal commercial underwriting criteria were applied. The result of an ECA engaging in these practices would be increasing losses due either to insufficient premium income in the former case, or excessive claim payments in the latter Rienstra and Turvey (2000).

iii. Mixed Credit and Tied-Aid

Ever anxious to support their respective exporters, various developed governments have sought other ways to give their firms a competitive edge in financing. Mixed credit, involving offering a buyer in a less developed countries a financing package consisting partly of funds from an ECA at a concessional rate, blended with funds from the exporting country's foreign aid program at low or even no interest. The result is a reduced weighted average cost of funds for the total financing package. A variant of this practice is the offering of official development assistance as a loan rather than the more typical grant, with the loan terms being hardly distinguishable from regular ECA credit. This later practice is referred to as 'tied-aid'. In fact it is often difficult to distinguish between a tied-aid offer and mixed credit so the practices tend to be lumped together and referred to as mixed credit/tied-aid.

It was with the intention of prohibiting predatory financing that the members of the OECD adopted an agreement in July 1976 regarding such practices. The agreement, formally called "The Arrangement on Guidelines for Officially Supported Export Credits", has come to be known simply as the "Arrangement". It sets maximum repayment terms and minimum interest rates and cash payments for officially

supported export credits OECD (1999). Both repayment terms and interest terms vary, depending on the buyer's country. The Arrangement established three categories of buyer countries: "Relatively Rich"; "Intermediate"; and "Relatively Poor" with minimum rates decreasing and permissible repayments periods increasing as one moved from wealthier to poorer buyer country categories. The main purpose of the Arrangement is to encourage competition among exporters based on the price and quality of the goods and services being exported rather than on the most favorable official supported terms. Unlike the WTO agreements, the Arrangement has no formal procedures for settling disputes.

There have been numerous rounds of negotiation of the "Arrangement"; in 1992 the new rules on tied-aid credits were announced in the so-called "Helsinki Package" aimed at limiting trade and aid distortion. The most recent agreement of the Arrangement is the 1997 Knaepen Package which set out to prohibit export subsidies in the form of export credit guarantees or insurance for most manufactured goods and which came into effect on April 1st, 1999. However, pressure from the member countries of the World Trade Organisation (WTO) is aiming to eliminate any form of export credit subsidy on all manufactured goods as well as agricultural products (Rude (2000)).

3.2 Implications for Exporters

The export finance support depends on the importance the government attaches to the export sector. This means that some countries' exporters will receive more support in the financing area than others. Exporters from countries where support from an ECA is relatively weak must confront the reality that they face a competitive disadvantage. Strategically, these firms must attempt to improve other areas of their marketing mix to neutralise the advantage in financing terms held by rival suppliers. This may mean offering a better product that is more tailored to the buyer's needs.

Multinational firms attempting to compete against foreign rivals who are being aggressively supported by their respective ECAs have another option. If the multinational has a subsidiary in a country offering superior export financing support, then it could arrange to have that subsidiary bid for the business in question and

request the backing of the host country's ECA. Therefore, multinationals could consider the availability of export financing support as one more variable in their global sourcing decision processes.

3.3 Major Export Credit Programs and the Role of ECAs

The governments of most developed countries have enthusiastically entered the export finance arena to extend their global market place. ECAs invariably have a strong component of government participation, though the form of this involvement varies from case to case. The major services offered by ECAs include loans to both buyers and suppliers, insurance against non-payments, concessional financing, credit guarantees, etc.

There are many different types of ECAs: They can be government owned (as with the Export Credit Guarantee Department (ECGD) in the United Kingdom, which is a government department). Or they can be privately owned institutions which administer an account, separate from their commercial business, on behalf of and with the full backing of the state (as with the Compagnie Francaise d'Assurance pour le Commerec Exterieur (COFACE) in France). Similarly, they can be guarantors of repayment (like the ECGD), insurers (like COFACE) or direct lenders such as Japan's Export Import Bank or the Export Development Corporation (EDC) in Canada. See Table 2.4 for some of the Export Credit Agencies of OECD members.

Since the main objective of the research is to determine the potential impact of export credit on the trade of dairy products, some of the major agricultural export credit programs will be discussed next.

The United States has several programs operated by the US Department of Agriculture's Commodity Credit Corporation (CCC) that provide export credit guarantees for agricultural products. Those administered by the CCC's General Sales Manager are referred to by the prefix GSM. The export credit guarantee program (GSM-102) is used to guarantee repayments of short-term credits (90 days to 3 years) from US banks at commercial rates for the purchase of US farm products. The

intermediate export credit guarantee program (GSM-103) is used to guarantee repayments between three and ten years at commercial interest rates.

The GSM programs guarantee commercial banks that the US governments will pay 98% of principal and interest due if the borrower defaults. The interest rates charged under these programs are London Interbank Offered Rate (LIBOR), the interest rate at which London banks lend funds to other prime banks in London. These interest rates are lower than those that would be charged without the credit guarantee. The US also provides the Supplier Credit Guarantee Program (SCGP). This program is designed to encourage US exporters to expand, maintain, and develop markets for US agricultural products in areas where commercial financing may not be available without a CCC payments guarantee. The program can help US exporters who wish to provide short-term credit (180 days or less) directly to their foreign buyers. The Public Law 83-480 Title I also authorises the US government to provide concessional credit to potential importers, who lack the ability to pay in cash, and to accept the local unconvertible currency of importing countries which lack sufficient convertible currency balances.

Canada also provides guaranteed credit through the Department of Finance and the Export Development Corporation (EDC). Under the EDC programs, exporters may assign their foreign receivables to a Canadian bank so that cash is paid when the sale is made. The Canadian bank is then responsible for collecting the payment. The EDC provides short-term (typically less than 180 days) guarantees for both agricultural and non-agricultural exports. Coverage under the EDC programs varies from 90 to 95 per cent of the principal and interest rate.

While the discussion related to the Arrangements is for OECD participants, there are also a set players emerging on the scene. Newly Industrialised Countries (NIC) have also set up their own export financing agencies. Since they do not adhere to the Arrangement guidelines, it may mean difficult decisions for OECD members in terms of an increased commitment to export financing.

3.4 Theoretical and Empirical Studies on Officially Supported Export Credit

Different programs have been used by exporters to enhance agricultural exports, including export subsidies, market promotion and export credits. Most of the programs have been the subject of analyses Paarlberg and Sharples (1987), Ackerman and Smith (1990), and Anania et al. (1995). However, few economic analyses of the role of export credit guarantees in agriculture have been conducted. This lack of scrutiny is surprising because currently it is the largest agricultural export program of both the United States and the EU. In 1993 the US Eximbank (Export and Import bank) financed about $15.1 billion of US exports. Of this, $5.7 billion went to agriculture. ECAs of five EU member states (France, Germany, Italy, Netherlands, and U.K.) collectively supported at least $74.8 billion of their total exports GAO (2000).

It is argued that officially supported export credits have a similar impact to that of targeted export subsidies Rude and Gervais (2001), Vercammen (1998), Dierson et al. (1997) and Skully (1992). While the users of the program have different opinions, their frequent justification for officially supported credit programs is that they may help developing countries overcome financial constraints in purchasing necessary food, which otherwise they would not be able to import. OECD (2000) refuted this by proving in its report that the bulk of officially supported export credits were provided for trade between OECD countries where financial constraints are unlikely.

Vercammen (1998) categorised export credit guarantees as implicit forms of export subsidies. He also identified export subsidies as either non-targeted or targeted (country-specific). Targeted export subsidies are believed to have an advantage over non-targeted subsidies because the former can facilitate price discrimination across the importing countries. Instead of using export price subsidies or in-kind subsidies to promote their exports, the exporting country can supply its exporters with an exporting loan guarantee.

Rude (2000) argues that government–sponsored credit arrangements typically result in loan conditions that are better than those offered by the market, thus reducing the importer's cost of financing (implicit interest rate subsidy) and possibly increasing

trade. Since the export credit guarantee targets specific countries that may not be able to purchase those exports without credit, the program plays an important role in international trade. The 1997 IMF (International Monetary Fund) report indicated that in 1995 the total export credit exposure for developing countries and economies in transition increased to almost half a trillion dollars while the share of exposure in the form of arrears and uncovered claims increased to about one-third. Skully (1992) suggests that although the perceived budgetary exposure of credit guarantees is typically less than that of direct price subsidies, this policy instrument also employs a strategy of price discrimination.

Some export creditors do have wide-ranging powers but there is little empirical evidence to support the notion that countries with export credit are more likely to disguise export subsidy programs or renege on their WTO obligations. Recently there was a request by WTO members to bring the export credit guarantee agenda to the table. However, the main users prefer the issue to be solved in the OECD forum, where a set of negotiations on arrangements covering export credits for agricultural products was initiated. Members fear the aims of countries like the US is to divert trade talk from the multilateral negotiations, making unfair trading practices survive prolonged negotiations before they can be eliminated.

Members believe that the use of export credit guarantees results in price discrimination. As a result they create trade barriers for other countries not using this program. Despite the fact that governments use different forms of trade protection, those affected argue successfully the benefit of free trade and pursue multilateral trade agreements between nations. Trade agreements have become an increasingly important part of the global trading system and also an area of opportunity to negotiate further liberalisation.

3.5 Estimating the Subsidy Value of Officially Supported Credit

To estimate the subsidy value of the officially supported export credits on world markets is difficult. This problem has been highlighted by Rude (2000). Hyberg et al. (1995) argued that the face value of credit guarantees as a measure of the extent of the program does not estimate the program's cost or its effects on trade. Recent research

has followed one of two methods for estimating the effect on markets: present value calculations or option-pricing.

The present value method discounts the future payments stream at higher discount rates. Computing the present value of the future payment stream of an officially supported credit program offers intuitive appeal. Whether the program provides a guarantee, insurance or a direct loan, the consequence may be a lower interest rate for the importer relative to the interest rate charged in the market. Therefore the program provides an implicit interest rate subsidy. The difference between the lower rate of the credit program and the full-risk alternative is calculated at the time of the purchase. A present value calculation using this difference over the life of the loan is computed and adjusted for any fees to provide a subsidy rate estimate, expressed as a per cent of the face value of the loan. Of course, the difference between guaranteed and market rates may be entirely offset by a large initial fee, in which case there would be no subsidy on the effective cost to the importer, so the calculation must take into account such up-front costs.

Although relying on different equations, present value calculations for agricultural commodities have been published by Skully (1992), Hyberg et al. (1995) and OECD (2000). One of the formulas used by these studies is a version of the Ohlin formula. It accounts for many of the potential policy parameters of an export credit program, such as the grace period and the payment schedule, by computing the payment stream of the guaranteed loan and discounting using the market interest rate as the discount rate. The formula simply approximates with a single equation the two steps process of first expanding the loan schedule into a stream of future payments and then discounting each payment into the present value. The Ohlin formula is expressed as follows

$$S = 100 * (1 - D) * (1 - \frac{g}{r}) * \left(1 - \frac{\frac{1}{(1+r/g)^{aG}} - \frac{1}{(1+r/a)^{aT}}}{r(T-G)} \right) - f \qquad \text{where,}$$

S = Subsidy rate   g = annual subsidised or guaranteed interest rate with the export credit

T = term of loan   r = annual discount rate (market rate without the export credit)

G = grace period   a = payments per year

D = down payment   f = fee rate, expressed a per cent of value

A more accessible present value calculation, however, is derived from Hyberg et al (1995). This is expressed as follows:

$$SubsidyRate = 100 * \left(1 - \frac{(1+g)^T}{(1+r)^T} \right)$$

T = term of loan

g = annual subsidised or guaranteed interest rate with export credit

r = annual discount rate (market rate without the export credit)

From the equation the intuition is clear as the numerator reflects the payment stream under the export credit while the denominator is the discount rate to the importer. Once the interest rate subsidy has been put into terms of price subsidy, the economist's tools of excess supply and excess demand can be applied to determine the impact on prices and quantity traded. This depicted in Figure
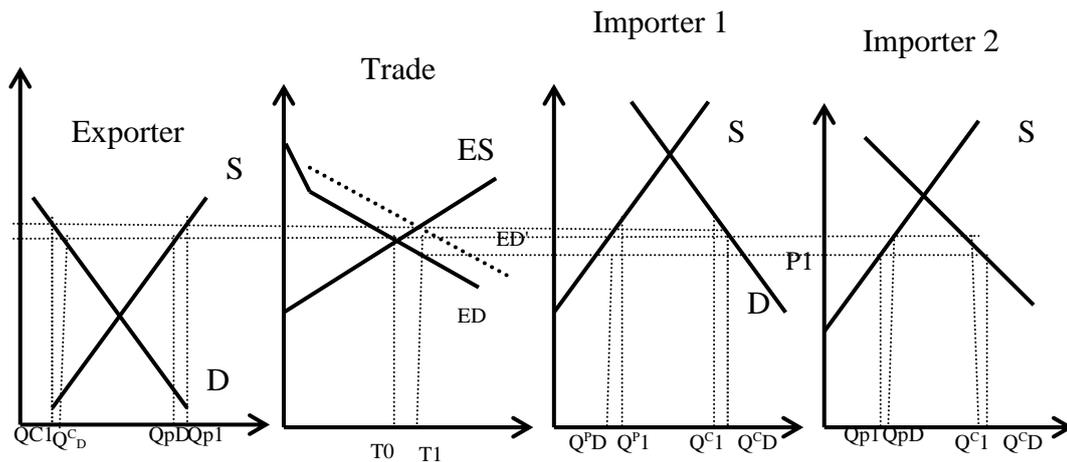
Figure 3.1 Trade Diagram: Targeted Export Subsidy (similar effect to that of export credit)

Source: Adapted from Rude (2000)

Targeted export subsidies, which are targeted at particular markets, will only depress prices in these markets. This is illustrated in the above figure. $P^e t$ is determined by the intersection of the new excess demand (ED') and ES, this is the price in non-targeted markets (importer 1 and the exporter market). P1 is the price in importer 2 market, which is equal $P^e t$ less the export subsidy. As the result of price change the quantity of production increases in the home markets of the exporter and importer 1. The quantity of domestic consumption decreases in these markets. As a consequence the exportable surplus increases, and imports by importer 1 decrease. The opposite effect occurs in importer 2's market, where consumption increases, production decreases and import increase.

Satyanarayana and Jonson (1998) investigated the impact of US credit guarantee programs on US market shares in selected wheat import markets. The result indicated that, although the marginal effect varies between countries overall, the export credits raised the US share in all import markets studied.

Koo and Karemera (1991) demonstrate the determinants of world wheat trade flows by using gravity model and the study reveals that all independent variables, including production capacity, income, and import and export unit value index and trade

policies used in wheat trade play an important role in determining trade flows. They used dummy variables for credit sales and the coefficient for credit sales was positive and statistically significant.

A recent study by OECD (2000) analysed the official supported export credits in agriculture. The study concluded that officially supported export credits do offer benefits to importers beyond what private arrangements can provide. The estimated subsidy equivalents overall are found to be relatively low. However, certain countries' programs distort trade. The USA export credits are calculated to distort almost twice as much on a per unit export basis as any other countries' programs. The study also mentioned that in countries used for this study the total export credit use rose over the survey period (1995-1998) by 44 per cent. This indicates that the use of export credits is increasing since (the year 1995) the WTO Agreement on Agriculture to restrict export subsidies has been implemented. This suggests that countries are using export credit to accommodate reductions in export subsidies.

4. Synthetic Model

Synthetic models (static) or Equilibrium Displacement Models (EDM) have been used frequently in agricultural economics studies. In a static model simultaneous systems of generalized functions are calibrated where endogenous variables are measured as proportionate changes and are a function of the proportionate changes in exogenous variables. A system of EDM structural equations is solved simultaneously for reduced form solutions where the reduced form parameters are a function of the structural parameters (elasticities). The EDM approach, therefore, exploits theoretical restrictions, equilibrium assumptions and assumptions on functional form to arrive at a point estimate. The wide appeal of EDMs in analytical work results in part from their flexibility in modelling a wide variety of market structures. For example, Gardner (1975) used the EDM to study the relationship between retail food prices and farm prices. Duffy and Wohlgenant (1991) used the EDM to study the effect of an export subsidy on the US cotton industry. Sumner et al. (1994) have also used the EDM framework to study issues in wheat trade. Holloway (1989) used the EDM to consider the distribution of research gains within a multistage production system. Similarly, Wohlgenant (1993) used the EDM to consider the gains to producers from

research versus promotion activities. The obvious criticism of the EDM is that the structural elasticities are assumed with certainty prior to analysis and, therefore, errors in estimating structural parameters are transferred to the EDM, biasing the central tendencies of the estimates. However, economists sometimes prefer them to time series analysis when there is a lack of critical information for the full range of time; one year's accurate information outweighs the dynamic analysis with missing information. Piggott (1992) suggested that the use of EDMs is particularly relevant in cases where (1) sufficient data for econometric modelling may be unavailable, (2) where data are unreliable, or (3) where "good" data and extensive prior research results and experience are available to develop large-scale models of complex relationships. Others question the potential bias in EDM due to the selection of structural parameters estimates and researchers generally conduct sensitivity analysis by varying the parameter estimates and generating alternative estimates of endogenous variables. However, recent research and criticisms indicate that such sensitivity analysis may be misleading with respect to central tendencies and an alternative method has been suggested by Davis and Espinoza (1998). Griffith and Zhao (1999) are critical of the unified approach suggested by Davis and Espinoza for doing the sensitivity analysis but still argue that the EDM is an important tool for agricultural economists.

A recent study by Hill et al. (1999) and Goddard et al. (2000) used EDM to develop and assess generic advertising by Australian dairy farmers. A model developed here takes a similar approach to Goddard et al and incorporates more countries. The specification of the model will be disaggregated by product type and will contain farm level processing and retail level markets and connected through price linkage to the world market.

The model structure can be identified as follows: For each of the following dairy commodities - milk, cheese, whole milk powder, skim milk powder:

Retail Demand = a-b (Retail Price)
Retail Supply = Conversion coefficient times amount of milk used to produce the
    product

Demand for milk to produce the product = d - e (Farm Price) + f (Retail Price)

Retail Supply = Retail Demand + Export - Import - Changes in Stocks

Retail Price = g + h (World Price) +j (Exports/World Trade)

Cow numbers = m + n (Farm Price)

Milk Production = Cow numbers times yield.

This model is specified for Australia, New Zealand, U.S., Canada, Japan, Rest of the World. Fluid milk retail prices are determined within each country without links to the rest of the world price. Prices for industrial milk products are linked to the world price unless the country has binding import restrictions. The model is calibrated in two ways; first under the assumption of perfectly competitive behaviour and second under the assumption of modest oligopsony market power on the part of processors. In that case the demand equations facing the farmer are specified as a function of a processor determined price (marginal outlay or expenditure if monopsony), higher than the farm price which is then derived from the farm supply equation. The oligopsony power is assumed to be the same across industrial milk products and the same across countries assuming it is generated from the behaviour of multinational processing companies.

If the model is calibrated using both specifications and the same base year data (1998) then the implication of a straightforward export subsidy by one exporter on the other market participants will be the same, regardless of market power. As long as the market power is taken into consideration in the construction/specification of the base model, the model will produce the same results from an increase in one country's export subsidy. This is illustrated in the attached table for the case of the U.S. increasing its export subsidy for skim milk powder. The case is somewhat different if we examine a targeted export subsidy on the part of the U.S. For simplicity sake, in this example we will assume the U.S. targets Japan with an export subsidy (similar to a targeted export credit program). The impact of a targeted export subsidy (of the same per unit magnitude) is different than that of a general export subsidy (see percentage change in Table 4.1).

The one way in which market power could directly affect the outcome of policy analysis would be through the policy itself changing the market power relationships in a market. One of the reasons that firms undertake foreign direct investment in another

country is to benefit from the policy environment in that country. For example, it may be advantageous to set up a foreign based company if export subsidies exist in that country, to encourage exports to third countries. Profits could be higher for the company with a foreign supply than if the same country tried to increase exports from their home base. If that is the case then export subsidies could encourage foreign investment and may increase concentration in the foreign market. To illustrate whether this is an important factor in international dairy market analysis the following simulations are run.

The general export subsidy on skim milk powder in the U.S. is increased using the model specification with modest oligopsony power, with the added wrinkle that the market power increases slightly in that market (by a factor of 1%) for the butter/skim milk powder production process. The targeted export subsidy on skim milk powder in the U.S. is increased using the oligopsony model specification with the slight increase in market power in the U.S. associated with the butter/ skim milk powder production process. The results are presented in Table 4.2.

Table 4.1. Simulation Results From 1998 International Dairy Model: With No Link Between Policy and Market Power

Variable	Base	US Export Subsidy-global	% Δ	Us export subsidy targeted Japan	% Δ
Australian Profits	214081	212474	-.75	212256	-.85
World Exports SMP	869	1003.05	15	960.15	11
Milk Prod - Aust	9713	9686	-.3	9682	-.32
NZ	11622	11574	-.4	11568	-.5
US	71368	71225	-.2	71334	-.15
Canada	8200	8200	0	8200	0
Japan	8561	8539	-.26	8425	-1.6
RoW	258290	257826	-.2	257800	-.2

Table 4.2: Simulation Results From 1998 International Dairy Model: With Policy Affecting Market Power

Variable	Base	US Export Subsidy-global	% Δ	Us export subsidy targeted Japan	% Δ
Australian Profits	214081	212486	-.74	212268	-.85
World Exports SMP	869	1003.15	15.4	960.3	11
Milk Prod - Aust	9713	9686	-.28	9682	-.32
NZ	11622	11575	-.4	11568	-.46
US	71368	71147	-.3	71255	-.16
Canada	8200	8200	0	8200	0
Japan	8561	8539	-.26	8425	-1.6
RoW	258290	257826	-.18	257801	-.19

5. Conclusion

What information does this review provide for future dairy trade modelling where multinational dairy companies dominate and there is the potential increased use of officially supported export credit programs? Export credit programs have not been extensively used, in the past, for many traded commodities. However, their use is increasing and issues of how to model their impact on commodity markets are far from clear. Further work is essential to establish whether the potential use of these instruments is potentially threatening for the dairy market, particularly if export subsidies of the traditional kind are significantly reduced in the current round of trade talks.

With the frequency of the current acquisitions and mergers and increasing concentration in processing industries it is unlikely that the market can be assumed to be perfectly competitive. These companies may have some power to fix their purchase prices (and possibly output prices), with their reach through their subsidiaries in most dairy exporting and importing countries. Any basic model that is constructed with appropriate testing for, and specification of, the possible oligopsony/oligopoly market power in the market place will generate results that are not dissimilar from those generated with a model constructed under different assumptions about market structure. However, the real question is whether or not there is a link between policy and multinational firm behaviour (and vice versa). If policy changes can affect firm behaviour to the point that market structure is affected, then any policy analysis conducted under fixed market structure assumptions will be in error. It will be essential in modelling the dairy market that testing be conducted for links between policy changes and structure.

Table 2.3 Summary of Empirical Work on Dairy Trade

Author	Policy Variable	Assumptions	Model	Products	Countries
Griffith et.al. 1993	Domestic policies	Perfect competition Homogeneous product	Time series Econometric	Milk equivalents	EU,US New Zealand Australia ROW
MacAulay and Owen 1999	Australian deregulation	Perfect Competition Homogeneous product	Synthetic, Quadratic programming	All dairy products	Australia's states, ROW
Zhu et.al. 1998	Import quotas, tariff Export subsidies Price support	Perfect competition Perfect price transmission Homogeneous product	Synthetic, Spatial equilibrium	All dairy products	21 countries
Meilke et.al. 2001	Export Competition Market access Domestic support	Perfect competition Perfect price transmission Homogeneous product	Synthetic, econometric	Butter, cheese, skim milk powder	EU, Australia, New Zealand, US ROW
ABARE 2001	Market access Export subsidies	Perfect competition Perfect price transmission Homogeneous Product	Synthetic, econometric	Skim milk powder, full cream milk powder cheese, butter	Most countries

Table 2.4 Export Credit Agencies of OECD Members.

Country	Agency	
Australia	Export Finance and Insurance Corporation	EFIC
Austria	Oesterreichische Kontrollbank AG	OeKB
Belgium	Office National du Ducroire/Nationale Delcrederedienst	ONDD
Canada	Export Development Corporation	EDC
Czech Republic	Export Guarantees Development Corporation	EGAP
	Czech Export Bank	CEB
Denmark	Eksport Kredit Fonden	EKF
Finland	Finnvera Oyj	Finnvera
	FIDE Ltd	FIDE
France	Diretion des Relations Economiques Exterieures(Minsiterde lÉconomie)	DREE
	Compagnie francaise dAssurance pour lecommerce exterieur	COFACE
Germany	Hermes Kreditversicherungs-AG	HERMES
Greece	Export Credit Insurance Organization	ECIO
Hungary	Magyar Exporthitel Biztosito Rt	MEHIB
Italy	Sezione Special per lÁssicurazione del Credito all Esportazione	SACE
Japan	Export-Import Insurance Department	EID/MITI
	Japan Bank for International Cooperation	JBIC
Korea	Korea Export Insurance Corporation	KEIC
	The Export-Import Bank of Korea	Korea Eximbank
Netherlands	Nederlandsche Credietverzekering Maatschappij NV	NCM
New Zealand	EXGO	EXGO
Norway	The Norwegian Guarantee Institute for Export Credits	GIEK
Poland	Korporacja Ubezpieczen Kredytow	KUKU
Portugal	Companhia de Seguro de Creditos, SA	COSEC
Spain	Compania Espanola de Seguros de Credito a la Exportacion, SA	CESCE
	Secretaria de Estado de Comercio	SEC
	Compania Espanola de Seguros de Seguros y Reaseguros de credito y caucion, SA	CESCC
Sweden	EXportkreditnamnden	EKN
Switzerland	Export Risk Guarantee	ERG
United Kingdom	Export Credit Guarantee Department	ECGD
United States	Export-Import of the United State	EximBank

Source: OECD Export Credit Division, 2000

References

ABARE (2001) The Australian Dairy Industry: Impact an Open Market in Fluid Milk Supply,

Ackerman, K. and Smith, M. (1990) Agricultural Export Programs: Background for the 1990 Farm Legislation,

Anania, G., Bohman, M. and Carter, C. (1995) 'US Export Subsidies in Wheat: Strategic Trade Policy or an Expensive Eegger-thy-Neghbour Tactic?', *American Journal of Agricultural Economics,* **74,** 534-545.

Blayney, D. and Miller, J. (2000) International Dairy Market and the WTO, ERS/USDA

Buckwell, A. and Medland, J. (1991) 'The Effect of Trade Liberalisation, Problems of modelling the effect of liberalising agricultural trade', *European Economic Review,* 552-561.

CARD, (1999) Analysis of the Berlin Accord reforms of the European Union's Common Agricultural Policy, Food and Agricultural Policy Research Institute

Davis, G. and Espinoza, M. C. (1998) 'A Unified Approach to Sensitivity Analysis in Equilibrium Displacement Models', *American Journal of Agricultural Economics,* **80,** 868.

Dierson, M., Wilson, W., B, D. and Satyanarayana, V. (1997) Additionality of credit guarantees for US wheat export, North Dakota State University

Duffy, P. A. and Wohlgenant, M. (1991) 'Effect of an Export Subsidies on the US Cotton Industry', *Southern Journal Agricultural Economics,* **3,** 1-7.

FAPRI, (1998) Analysis of European dairy policy option with additional focus on broader effect of Agenda 2000, Policy working paper 1-98., University of Missouri, Colombia

GAO (2000) Export promotion: Federal Agencies' Activities and Resources in Fiscal Years 1999,

Gardner, B. L. (1975) 'The Farm-retail price Spread in a Competitive Food Industry', *American Journal of Agricultural Economics,* **57,** 399-409.

Goddard, E., Seyoum, E. and Verspay, H. (2000) Generic dairy promotion in Australia: Dairy Vision 2010, The University of Melbourne

Griffith, G., Lattimore, R. and Robertson, J. (1993) 'Domestic Dairy Policy and International Market Adjustment in a Simplified Model of World dairy Product Trade', *Journal of Policy Modeling,* **15,** 141-156.

Griffith, W. and Zhao, X. (1999) A Unified Approach to Sensitivity Analysis in Equilibrium Displacement Model: Comment, Working Paper, University of New England

Handy, C. and Henderson, D. (1994) In *Competitiveness in International Food Markets.* (Eds, Bredhal, M., Abbott, P. and Reed, M.) Colorado: Westview Press.

Hill, D., Piggott, R. and Griffith, G. (1999) Profitability of Incremental Generic Promotion Expenditure by Australian Dairy Farmers, Working paper, No. 99-8, UNE

Holloway, J. G. (1989) 'Distribution of Research Gains in Multistage production Systems: Further Results.', *American Agricultural Economics,* **71,** 338-43.

Hyberg, B., Smith, M., Skully, D. and Davison, C. (1995) 'Export Credit Guarantees: the Commodity Credit Corporation and US Agricultural Export Policy', *Food Policy,* **20,** 27-39.

Jackson, A. (2001) Globalisation Makes Dairy Merger Essential, Fontera News

Koo, W. and Karemera, D. (1991) 'Determinants of World Wheat Trade Flows and Policy Analysis', *Canadian Journal of Agricultural Economics,* **39,** 439-455.

Manchester, C. A. and Blayney, P. D. (1997) Structure of Dairy Market: Past, Present, Future, Agricultural Economics Report, USDA

Meilke, K., Lariviere, S. and Martin, C. (2001) 'Trade liberalisation in the dairy sector: an overview', *International Law and Trade Policy,* **2,** 118-145.

OECD (1999) *Agricultural Policies in OECD Countries, Monitoring and Evaluation,* OECD Publications Service, Paris.

OECD (2000) An Analysis of Officially Supported Export Credits in Agriculture,

Paarlberg, P. and Sharples, J. (1987) 'Targeted agricultural export subsidies and social welfare', *American Journal of Economics,* **69,** 723-32.

Piggott, R. R. (1992) 'Some Old Truths Revisited', *Australian Journal of Agricultural Economics,* **36,** 117-140.

Rabobank International (2001) Consolidation in the Dairy Industry: A New Merger, Acquisition or Alliance Every 2.5 days,

Rienstra, P. and Turvey, C. (2000) Evaluating the Effectiveness of Export Promotion through Credit Guarantees,

Rude, J. (2000) 'Reform of Agricultural Export Credit programs', *International Law and Trade Policy,* **1,** 66-82.

Rude, J. and Gervais, J.-P. (2001) Export Credit and Direct Export Subsidies in Agriculture,

Satyanarayana, B. and Jonson, D. D. (1998) Credit Guarantee Programs and US Market Share in Selected Wheat Import Markets, North Dakota State University

Skully, D. (1992) 'Price Discrimination and State Trading: The case for US wheat', *European Review of Agricultural Economics,* **19,** 313-329.

Sumner, D. A., Alston, J. and Gray, R. (1994) 'The Wheat War of 1994', *Canadian Journal of Economics,* **42,** 231-51.

Tozanli, S. (1998) 'Capital concentration among the food multinational enterprises and development of the world's agro-food system', *International Journal of Technology Management,* **16,** 695-710.

Vercammen, J. (1998) 'Export credit as a mechanism for price discrimination', *Canadian Journal of Economics,* **31,** 279-94.

Wohlgenant, M. (1993) 'Distribution of Gains from Research and Promotion in Multi-Stage Production systems', *American Journal of Agricultural Economics,* **75,** 642-51.

Zhu, Y., Cox, T. and Chavas, J.-P. (1998) A Spatial Equilibrium Analysis of Trade Liberalisation and the US Dairy Sector,