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The policy and trade challenges of managing price risk in the EU dairy industry.

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Abstract

The EU dairy industry faces an unprecedented level of change. The anticipated removal of milk quotas and the move to a less restricted global trade environment will provide the industry with both opportunities and challenges. The primary challenge will be the need for the industry to deal with much more volatile prices. Active management of the risks associated with these more volatile prices will help to place the industry in a more competitive position. However this will require the industry and policy makers to embrace a new set of tools. For example the US dairy industry has been much more active in the management of risk and lessons from their experience provide a valuable insight into which tools may be more appropriate in an EU context. Such lessons are most pertinent in relation to the proposed launch of EU based futures markets.

Keywords: Dairy, Price Risk Management, Futures Markets, EU, US.

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Introduction

To date the policy instruments employed by the EU have very successfully isolated internal EU dairy prices from the greater volatility associated with world prices. Intervention purchasing has placed a floor on prices while other measures such as production quotas, export refunds, import tariffs and subsidized consumption measures have helped to ensure higher and much less volatile prices than those pertaining in world markets. As a consequence dairy industry participants in the EU have had little incentive to develop and use price risk management tools. However the policy environment facing the EU dairy industry continues to undergo considerable change under WTO and CAP reform. Movement towards lower levels of CAP support prices, reduced intervention and a more liberal global agricultural trading system will involve greater price volatility for dairy commodities as prices align more closely with World prices. The greater volatility observed in the world dairy commodity prices may in part be explained by the fact that these global markets are considered thin, with only 7% of output traded and four major countries accounting for more than 80% of supply. Hence relatively small changes to supply or demand often lead to relatively large price fluctuations. As this scenario is likely to continue as trade liberates, this poses a serious concern for the EU industry which accounts for approximately 14 % of agricultural output and is worth about EUR 120 billion per annum at processing level.

This increase in volatility will translate into an increase in risk for dairy industry participants. Furthermore the expected abolition of the milk quotas and the envisaged increase in production at farm level will require that farmers and manufacturers place greater emphasis on risk management if they are to survive and compete in this new environment. In the past it was possible in part to manage risk by diversification both within and outside of agriculture. In the future such strategies may be curtailed by the need for expansion to achieve the economies of scale required to survive in an increasingly competitive environment. Diversification is just one of the many tools used to manage risk in agricultural markets. Contracting, insurance, risk pooling and the use of private financial markets are some of the many examples of other tools employed to

mange risk. In some parts of the world, particularly the USA, the use of risk management tools is already significantly developed (e.g. private financial markets for managing market risk including futures contracts are now available for Grade AA Butter, Cheddar Cheese, Fluid Milk, Nonfat Dry Milk, Whey and BFP Milk on the Chicago Mercantile Exchange (CME)). At policy level the 2008 US farm bill specifically incorporates a number of risk management policy instruments which will be discussed below.

While there has been some development of these markets and alternative tools for a number of commodities in the EU (cereals, livestock and energy crops), the dairy sector to date has been largely ignored until very recently with the announcement of a number of potential dairy futures markets as discussed later. The changing dairy policy environment suggests that this sector may reap large benefits from the future development of such markets. However the successful development of these new markets and tools will require that the users will have access to information on the role and function of these instruments. This paper aims to provide part of this information requirement. The role of current EU policy in reducing price volatility in the dairy sector is initially presented and the implications of future policy changes highlighted. This is followed by a section providing details of how price risk is currently managed in the US dairy industry. Recent developments in both the EU and New Zealand in relation to the development of dairy futures markets are then discussed. The suitability of these tools and strategies in relation to the EU is then outlined. Finally a number of conclusions and recommendations are presented.

The Regulatory Framework of the EU Dairy Industry

The EU dairy sector is subject to the Common agricultural Policy (CAP). The Treaty of Rome which was signed in 1958 by the six founding members of the European Economic Community (EEC) established a common market which included agriculture. Amongst the stated objectives for agriculture in Article 39 of this treaty was “to stabilise markets”. The Commission’s proposals for milk and milk products were incorporated into Regulation (EEC) No 804/68 which set out the common organisation of the market in milk and milk products. In this and subsequent regulations the EU has sought to regulate

its dairy market by intervening primarily in its butter and SMP markets[4]. In order to establish a common market with common prices, the CAP relied on a system of market interventions. Foremost amongst these market interventions are intervention buying[5], market protection (import levies) and market development (export subsidies). The more salient features of these policy interventions as they relate to market stability are now outlined

Intervention Purchasing: At the intervention price the national intervention agencies are obliged to purchase all produce which meets the required quality standards, unless buying-in has been suspended[6]. As milk is perishable, intervention applies to butter and SMP as these are the most basic derivatives of milk which may be stored long term. While in practice sales to intervention are restricted, as the produce must conform to quality, age, packaging and quantity requirements, nevertheless the intervention system when available places an effective floor price to the market and thus eliminates the more extreme negative price fluctuations.

Aid for the private storage (APS) for butter and cheese are market support measures that are available to the EU for introduction when there is a seasonal imbalance between supply and demand in the product market concerned. The aim of the schemes is to facilitate producers to store these products for a minimum of 90 days and a maximum of 210 days in the case of butter. The produce must be placed under control between March 1st and August 15th each year and withdrawn from August 16th. At the end of the storage period the storer receives aid at a rate which has been fixed in advance[7]. The schemes are an alternative to public intervention in that the products remain the property of the storers to sell at their unrestricted discretion at the end of the storage period.

[4] The choice of these commodities may be explained by the fact that these joint products provide a means of long term storage for milk fat and milk protein, the two more valuable components of raw milk. It should also be noted that casein, wholemilk powder, liquid milk and certain varieties of cheese have to a lesser degree also been regulated by the CAP.

[5] Intervention buying of produce by government agencies is generally referred to as intervention. The use of this term can confuse as it refers to only one form of government intervention. Henceforth intervention will refer specifically to intervention buying, while government intervention in the market will be referred to as policy intervention.

[6] From 2008 intervention purchases of butter are suspended above a limit of 30,000 tonnes. Above that limit, purchases may be carried out under a tender procedure. For SMP the limit is 109,000 tonnes.

[7] Due to the continued weakness in the butter market the scheme started on 1st January 2009 with butter produced in December 2008 also being eligible for aid.

Import levies are border taxes which are charged by the EU on imports from third countries. Their purpose is to protect local intervention agencies from cheap imports when the intervention price is above the world price. These levies help to insulate EU prices from the more volatile world prices. Restrictive **tariff-rate quotas (TRQs)** also serve to limit imports and isolate EU prices.

Export refunds are subsidies paid to those who export outside the community. Their main purpose is to enable agricultural products to be marketed in these countries by compensating exporters for the difference between EU internal market prices and the lower prices normally prevailing on the world market. Exporters with an approved license can pre-fix the export refund rate. This allows the trader to set the rate of refund up to five months in advance of the export of the butter or SMP. As the refund is fixed and guaranteed, the risk borne by the trader is reduced. In addition the exporter, with a letter of guarantee from an approved financial institution, may avail of an advance payment facility whereby they can apply for payment of the pre fixed refund prior to export. Again such measures reduce risk for the exporter.

There are also a number of **other subsidies** designed to promote internal consumption and thus reduce surpluses within the EU. These measures have included subsidised butter sales to non-profit making organisations, the bakery sector, ice-cream manufacturers and manufacturers of concentrated butter. SMP used in animal feed has also attracted subsidies, as well as skim milk used in the production of casein (casein aid).

A milk **supply quota** was introduced in the EU in 1984 as a response to the growing imbalance between production and internal EU consumption and an increasing demand on EU finances of operating the schemes just outlined. One effect of introducing this quota has been that dairying has been the subject of little policy reform until the Luxembourg agreement which was agreed in June 2003. This reform has seen the introduction of the single farm payment for dairy farming in April 2005. In return for lower intervention stocks and substantially reduced intervention prices, dairy farmers receive direct compensation by means of an annual payment from the Commission. This

payment has an obvious income stabilising effect for dairy farmers. Reform of the milk quota regime continued in the "Health check" where it was agreed that quotas will expire by April 2015. In order to ensure a 'soft landing' quotas will be increased by one percent every year between 2009/10 and 2013/14[8].

The main change for Europe's producers in the CAP reform of 2003 saw a switch to decoupled farm payments **(Single Payment Scheme)**, which issues payments based on historic production levels and enables producers to switch to the production of products demanded by the markets. As part of this reform a Dairy Premium was introduced in 2004. This premium is compensation for the reduction in the intervention prices (25% for butter and 15% for skimmed milk powder) and decoupled from the milk quota and added to the Single Payment from April 2005[9].

The success of the EU in attaining its goal of higher and less volatile prices may be seen in Figure 1 and Table 1. In Figure 1 the USDA North European FOB skim milk powder price is taken as a representative world SMP price, while the comparable EU price is a Dutch price series sourced from Agra Europe[10]. While the greater volatility of the world series is evident on close examination of Figure 1, the extent of this increased volatility is best captured by the much larger coefficient of variation[11] reported for the world SMP series in Table 1. This table also shows a similar pattern when comparable butter series are considered. Furthermore the latter parts of this table quantify the increased volatility in both World and EU prices in the recent past. When the data is split into two sub periods of the 1990's and the first nine years of the current decade the increased volatility is striking.

[8] For Italy, the 5 percent increase will be introduced immediately in 2009/10.

9 This premium is worth approximately 3.6 cent a litre for quota owned at 31th March 2004.

[10] The USDA publishes a monthly high and low quotation and the series considered in this analysis is the mid interval of these quotations.

[11] A common statistic for measuring the variability of a data series is the coefficient of variation (CV), which expresses the dispersion of observed data values as a percent of the mean.

Figure 1 World and EU Wholesale SMP Prices

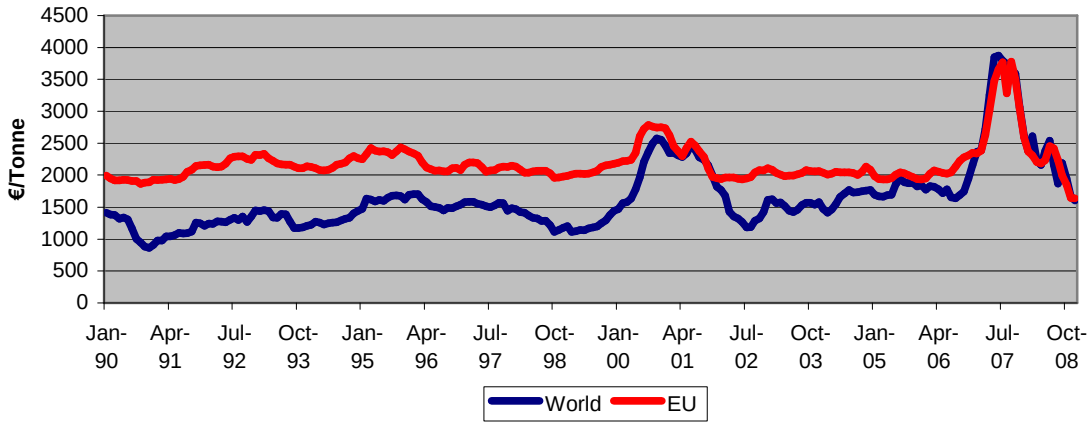

Table 1: A comparison of World and EU dairy prices 1990-2008

	World		EU	
Jan 1990- Dec 2008	SMP	BUTTER	SMP	BUTTER
Mean	1646.45	1513.65	2183.72	3096.66
Standard Deviation	536.36	538.41	310.84	301.72
Coefficient of Variation	32.58	35.57	14.23	9.74
Jan 1990- Dec 1999	SMP	BUTTER	SMP	BUTTER
Mean	1341.74	1324.34	2123.68	3211.78
Standard Deviation	196.06	241.29	136.46	151.47
Coefficient of Variation	14.61	18.22	6.43	4.72
Jan 2000- Dec 2008	SMP	BUTTER	SMP	BUTTER
Mean	1985.01	1724.01	2250.43	2968.75
Standard Deviation	589.69	682.19	419.22	369.10
Coefficient of Variation	29.71	39.57	18.63	12.43

Current policy in the EU

While credit may be attributed to the CAP for successfully isolating the EU dairy sector from the greater volatility associated with world markets to date, it is the future direction of this policy which now concerns EU dairy farmers. As stated the "Health Check" places a date of April 2015 for the abolition of milk quotas and allows for a one percent per annum increase in national quotas up to 2013/14. In the press release which accompanied this reform it is stated that policy reform should be one which "converts market intervention into a genuine safety net[12]". To this end for butter and SMP all sales to intervention will be by tender and optional above a limit of 30,000 tonnes for butter and 109,000 tonnes for SMP. Such a position implies that intervention would be used as a measure of last resort in times of crisis rather than creating a floor price as is the case at present. The private storage aid for cheese is now abolished along with the disposal aid for butter for pastry and ice cream and for direct consumption. While some market support is proposed to continue, such as the private storage aid for butter, the skimmed milk powder for animal feeding allowance and the aid for casein production is now optional and at the discretion of the Commission to decide if and when it should be applied. This aid may be fixed in advance or by means of tendering procedures.

In a speech delivered to the Agricultural Committee of the European Parliament in November 2007 the Commissioner clearly stated EU policy re export refunds *"I have already signalled clearly that export refunds are now entering their twilight years. Within the Doha Round of world trade talks, the European Union has offered to phase them out by 2013. But whatever happens to the Doha Round, export refunds don't have a place in the CAP toolbox of the future"* (Fischer-Boel, 2007). While export refunds have been reintroduced in January 2009 in response to the sharp deterioration of global dairy markets, this response is seen as a temporary measure. Likewise it is anticipated that any WTO agreement will signal substantial cuts on any import levies which currently apply to dairy products.

12 http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1749&format=HTML&aged=0&language=EN&guiLanguage=en

The reduction in supply control and a more liberal trading environment will mean a much closer alignment between EU and world prices and the greater volatility inherent in the latter prices. However, before one considers how the increased risk associated with these lower and more volatile prices may be managed, it is important to outline the current nature of the EU dairy sector and the impact of global markets on this sector.

The EU Dairy Sector

Milk is the most important single product sector in terms of value at approximately 14 % of EU agricultural output. In recent years milk production was worth about EUR 45 billion at farm level and the turnover of the dairy processing sector was EUR 120 billion. While the number of dairy farmers in the EU-25 may have declined by almost half a million since 1995, there are at present in excess of 1.3 million dairy farmers still active milking more than 23.3 million cows. These farmers in turn produce just over 140 million tonnes of the global cows' milk production of 543 million tonnes (i.e. over 25%) (IDF 2007).

However dairy farm systems throughout the EU are not homogenous (Table 2). The difference for example in scale between Danish and Polish farmers is vast in terms of units and yield and in particular output per farm. The Polish average annual output per farm is less than 20,000 kg of milk compared to an average of more than 860,000 kg in the Danish sector. The low EU average, of just over 105,000 kg of milk, shows that the output in Poland is typical of a large number of EU countries and not an exception. What is perhaps more striking is the comparison of EU farms with the USA and New Zealand (1,097,466 kg and 1,211,749 kg annual output per farm respectively). As discussed below these three combined account for the greater part of global dairy exports. Table 2 shows that output per farm in Denmark, which is large by EU standards, is considerably smaller than in either of its major international competitors. This suggests that in a less regulated global trading environment EU dairy farms will be required to increase scale in a dramatic manner if they wish to compete on global markets. In the past many farmers would have used farm enterprise diversification along with investment beyond the farm

gate to reduce risk and generate a more even income flow. However these options may no longer be available in many cases if scale is to be achieved and production increased as quotas are expanded. Furthermore the diverse nature of milk production in the member states will pose many challenges to those wishing to provide risk management tools to the sector.

Table 2: A comparison of dairy structures.

	Denmark	Ireland	Poland	EU-25	New Zealand	USA
Number of dairy cows per farm	103.7	48.3	4.4	16.7	322	121.3
Average milk yield per cow (kg)	8,330	4,760	4,425	7,349	3,763	9,050
Average cows milk production per farm (kg)	864,140	229,925	19,399	105,660	1,211,749	1,097,466

Source: Productschap Zuivel 2007

Global Dairy Trade

Global trade in dairy produce was estimated at 40.2 million tonnes of milk equivalent in 2006 if intra EU trade is ignored. This represents just over 7% of global cows milk production. This trade is dominated by 4 exporters (New Zealand, EU, Australia and USA) who account for over 82% of exports. While its market share continues to decline, the EU still accounts for almost one third of this trade (12.9 million tonnes) (IDF 2007). While the buyer side of the market is far less concentrated, the quantities purchased are often subject to very large fluctuations from year to year. This may in part be explained by the fact that many of these countries are developing and imports are linked to export earnings and exchange rates, both of which are subject to large fluctuations. For example Russian purchases of butter doubled to 109,000 tonnes from 2000 to 2001 while Brazilian purchases of whole milk powder more than halved to 43,000 tonnes in the same period (IDF 2007).

With only 7% of milk traded globally, as little as a 1% change in global production or consumption can have very large effects on world prices. The thin nature of these markets helps explain the high levels of volatility recorded on world dairy markets. It needs to be further noted that within the EU a small number of member states account for the greater part of this trade and a number of these states are highly dependent on exports (e.g. Ireland exports more than three quarters of its dairy output).

The EU and Risk Management

The inclusion of specific references to risk management in the "Health check" is significant and signals the realisation by the European Commission that as the EU withdraws from supply side management, market risks will increase and should be managed. Specifically Article 70 states Member States may grant financial contributions to premiums for crop, animal and plant insurance against economic losses caused by adverse climatic events and animal or plant diseases or pest infestation while Article 71 states that Member States may provide for financial compensation to be paid to farmers for economic losses caused by the outbreak of an animal or plant disease or an environmental incident by way of financial contributions to mutual funds. A portion of the modulation savings may be used by member states to part fund these schemes.

While this development is significant it should be noted that risk management has been on the EU agenda for some time (Directorate-General Agriculture (2001) and Commission of the European Communities (2005))[13] and may thus be considered long overdue. Furthermore the Commission acknowledges that the nature and extent of the risks faced vary throughout the EU and "an EU-wide solution (based on a "one-size fits-all" approach) would not be appropriate" (EU 2007). Indeed the narrow focus of these measures which are focused to a greater extent on livestock and cereal production and the provision of insurance to these sectors suggests that dairy farmers may be offered little protection and may be forced to look elsewhere for price risk management solutions.

[13] The topic of crisis risk management has received a much greater degree of attention as discussed in Commission of the European Communities (2005).

These Commission documents along with for example Hardaker et al (2004) and Tomek and Peterson (2001) provide a number of examples and solutions to managing risk in agricultural markets and, as a fellow dairy exporter, the policies and instruments adopted in the US should be of particular interest from an EU perspective. A number of these policies and instruments are now presented.

Managing Risk in the US Dairy Sector.

The dairy industry in the US is highly regulated with federal and state programs providing price support and product storage, import protection and marketing regulations that set minimum prices by use and pool revenues for producers, export subsidies and direct producer payments. The broad suite of tools mentioned fulfil many policy objectives, however for the current analysis only those programs intended to provide price and income stability and will be considered.

Central to any analysis of US dairy policy is the role played by the federal milk marketing orders (**FMMOs**)[14]. These orders set the minimum milk price paid to dairy farmers in many parts of the country, and the few areas of the country not under FMMO regulation often have similar state milk price regulations. These orders use price formulas to assign values to the different components of farm milk. These values vary depending on which dairy products are made from farm milk. According to the USDA (2004) the major objective of FMMOs is to equalize competition between proprietary handlers and producers and promote a greater degree of stability in marketing relationships. Two concepts are at the core of Federal milk marketing orders: classified pricing and market-wide revenue pooling. Classified pricing means that milk is priced based on its end use or "class."[15] Under revenue pooling, all producers that sell milk in a particular milk

[14] FMMO's are detailed and somewhat complex to explain so the interested reader who requires further detail is referred to USDA 2004 "Economic Effects of U.S. Dairy Policy and Alternative Approaches To Milk pricing" http://www.milkprocon.org/2004congressreport.pdf or Jesse and Cropp "How the Milk Pricing System Works" http://future.aae.wisc.edu/collection/tutorial/risk_team/risk_team_1.htm

[15] There are at present 4 classes in the US system. Class I: Beverage milk, Class II: Fluid cream products, yogurt, perishable manufactured products (ice cream, cottage cheese, and others), Class III: Cream cheese and hard manufactured cheese, and Class IV: Butter and dry milks.

marketing order area receive the same minimum "uniform" or "blend" price. This ensures that even though the producers sell their milk to different types of plants (fluid, cheese, powder etc) they will each receive the same (minimum) price for their milk. This "blend" price ensures that the high level of volatility associated with individual commodities is transmitted directly to the farmers but is mitigated by less volatile and often contrary volatility in other commodity prices. Farmers may also manage price risk through forward contracting as a previous restriction which affected roughly one third of US dairy farmers was removed in the 2008 Farm Bill.

Under the dairy products price support program the **Commodity Credit Corporation (CCC)** will buy, at support purchase prices, any butter, cheddar cheese or nonfat dry milk that is offered to it and meets the required specifications. Initially these support prices will be set at $1.13/lb for 40-pound cheddar blocks, $1.10/lb for cheddar barrels, $1.05/lb for butter and $0.80/lb for nonfat dry milk. Provisions of the 2008 Farm Bill state that the Secretary *may* reduce the purchase price of cheddar cheese, butter or nonfat dry milk, if CCC net removals for a period of 12 consecutive months exceed certain trigger volumes. However, as Jesse et al (2008) point out, the likelihood of exceeding these volumes is small based on historical analysis.

The **Dairy Export Incentive Program (DEIP)** pays cash bonuses that allow dairy product exporters to buy U.S. products (milk powders, butter and butterfat, and several cheese varieties) and sell them abroad when international prices are below domestic prices. As well as removing dairy products from the domestic market, DEIP helps develop export markets, and plays an important role in milk price support.

The 2002 Farm Act established a national **milk income loss contract (MILC)** program to provide income stabilization for dairy producers. Under this scheme a monthly direct payment is made to dairy farm operators if the monthly Class I price in Boston (Federal Order 1) is less than a target price per cwt. The 2008 bill sees the adoption of a feed cost adjuster to the target Class I price. This adjuster is based on the estimated cost per hundredweight of a 16 percent protein dairy ration that USDA uses to calculate the Milk-

Feed Price Ratio. So in effect at the end of each month the feed cost adjuster is calculated and compared to the base value of $7.35. If the cost is less than or equal to $7.35, then the MILC Class I (Boston Class) target price of $16.94 remains. If the feed cost amount is higher, then the percentage difference between the current ration cost and $7.35 is multiplied by 45% (MILC payout rate established) and this resulting percentage is then added to the $16.94 target for the previous month[16]. These countercyclical payments serve as a further safety net for dairy farmers.

From January 2009 the **Livestock Gross Margin for Dairy Cattle Insurance Policy** (LGM-Dairy) provides protection against the loss of gross margin (market value of milk minus feed costs) on the milk produced from dairy cows. The indemnity at the end of the eleven-month insurance period is the difference, if positive, between the gross margin guarantee and the actual gross margin. The Livestock Gross Margin for Dairy Cattle Insurance Policy uses futures prices and state specific basis[17] for corn, soybean meal and milk to determine the expected gross margin and the actual gross margin. The price the producer receives at the local market is not used in these calculations.

Import measures such as protective tariffs and restrictive tariff-rate quotas (TRQs) isolate the U.S. dairy sector from international markets, raise prices to producers, and prevent lower priced dairy products from compromising the price support program. In addition there are a number of dairy promotion programs that raise producer revenue by increasing demand for milk and dairy products.

As well as benefiting from the government programs outlined, US dairy farmers are also fortunate to be in a position whereby they can avail of a number of private market instruments to manage price risk. For example since 1996 the Chicago Mercantile Exchange (CME) has traded dairy futures and options and now offers six different futures and options: two on different types of milk (class III and class IV), two different butter

[16] A detailed account of the mechanics of this contract is provided by Jesse et al (2008) at http://future.aae.wisc.edu/publications/farm_bill/M&P_Dairy_6-1.pdf

[17] The difference between the cash price of commodity at a specific location and the price of a specific futures contract is known as basis.

contracts, a dry whey contract and a nonfat dry milk contract (SMP)[18]. As with any financial market instruments, these dairy futures and options may be used in combination with each other, or other instruments, to create new instruments which may be used to manage risk. An example is the fence, floor, and stabiliser products offered by Dairylea Cooperatives Risk Management Service to its members (see http://www.dairyriskmanagement.com/priceStabilizer.asp). While these instruments are provided by the private sector, US government funding has been used to support their introduction. For example through the Dairy Options Pilot Program (DOPP), transaction costs for dairy farmers using dairy options were subsidised in order to promote their use. Likewise a number of academic institutions have played a very significant role in disseminating information on the potential uses and benefits of these particular risk management tools[19].

The priority the US assigns to risk management may be gauged by the dedicated role played by the **Risk Management Agency (RMA)** which is part of the U.S. Department of Agriculture. The goal of the agency is to help producers manage their business risks through effective, market-based risk management solutions. RMA's mission is to promote, support, and regulate sound risk management solutions to preserve and strengthen the economic stability of US agricultural producers. RMA provides crop and livestock insurance to American producers and will for example administer the Livestock Gross Margin for Dairy Cattle Insurance Policy which was discussed above. In addition this agency sponsors educational and outreach programs and seminars on the general topic of risk management. Its promotion and administration of the Dairy Options Pilot Program can be seen as falling within this remit.

While it is beyond the scope of this paper to gauge the success of these measures in helping US dairy farmers manage price risk, it is interesting to note the growth in US milk production from 2000 to 2008 (Table 3). During this period production rose by almost 13.5% while in the EU a number of countries now fail to even fill their quota.

[18] Details of the specifications of these futures and options may be found at, http://www.cme.com/files/Options_on_CME_Dairy_Futures.pdf

[19] For example the University of Wisconsin Dairy Marketing and Risk Management Program.

Table 3: USA Milk Production (Million pounds) and Annual Growth Rate

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Production	167,393	165,332	170,063	170,394	170,934	176,929	181,789	185,602	189,992
Growth %	2.95	-1.23	2.86	0.19	0.32	3.51	2.75	2.10	2.37

Source USDA

Recent Private Market Developments in Dairy Price Risk Management.

In response to a growing awareness of increased price volatility in dairy commodity markets a number of private institutions have expressed an interest in developing markets which may be used to manage dairy price risk. In particular the launch of futures markets and commodity auctions in the New Zealand and the EU are now discussed.

New Zealand

New Zealand plays a pivotal role in global dairy trade as it accounts for approximately 40% of all such trade. Within New Zealand, Fonterrra Co-operative Group Limited (Fonterra) is the dominant processor and trader accounting for circa 95% of the industry with an annual turnover of NZ$14 billion. In recent months, as a first response to requests from many customers to provide a greater degree of price-risk management, it has developed globalDairyTrade, an internet-based electronic trading platform through which Fonterra will sell a portion of its commodity products[20]. Through monthly auctions it expects to sell approximately 200,000MT of WMP covering Regular, Instant and UHT during the first year of operation[21]. On its website globalDairyTrade claims that it offers Fonterra's customers and supply partners improved price transparency, forward price information, and enhanced price risk management. It offers three contract maturities with different delivery periods allowing traders to 'mix and match' these maturities to create a delivery profile that closely meets their needs. The three contract periods are:

Contract Period 1: A 'near-spot' contract that provides for product to be shipped during the third month after the trading event;

[20] For further details see http://www.globaldairytrade.info/DesktopDefault.aspx?tabid=427

[21] The first auction in July 2008 saw 5,000 tonnes transacted.

Contract Period 2: A contract where shipment begins in the fourth month following the trading event and continues in equal monthly deliveries for three months; and
Contract Period 3: A longer term contract where shipment begins six months after the trading event with the duration being three months.

Fonterra intends to make other commodity products available through *global*DairyTrade as soon as it is practical. Skim Milk Powder (SMP) and Anhydrous Milk Fat (AMF) are likely to be the next products added to the platform[22]. It is interesting to note that all prices are quoted in US dollars.

While still at an embryonic stage, sharemarket operator NZX plans to launch a derivatives trading platform in 2009, kick starting it with milk futures and energy options, among other instruments.[23]

EU

In recent months there have been reports of the possible development of EU dairy futures markets (Dairy Industry Newsletter 29/6/2008). To date three promoters have been mentioned (RMX, LIFFE and European Milk Exchange BV.) Each has made presentations to industry participants but no formal contract specification or launch date has been proposed. The considerable recent interest displayed in the establishment of these markets is reflected in the following articles in Dairy Industry Newsletter (DIN).

Rabobank plan dairy futures market

Even before NZ's Fonterra announced their new online auction, analysts and dairy interests in Europe have been speculating as to when someone would propose a similar market transparency operation in Europe. Industry lobbies such as Eucolait and the EDA have been mentioned, or even one of the giant co-ops. But now Dutch bank Rabobank have taken the initiative. They said last week that they are working on the details of introducing a futures market for milk products in Europe. It has not been decided if

[22] See http://www.globaldairytrade.info/DesktopDefault.aspx?tabid=427#sec1
[23] See http://www.businessday.co.nz/market/4689267

markets for butter and/or SMP would work best or whether it would be better to start with a market for standardised milk. (Dairy Industry Newsletter 3/6/2008)

RMX Hanover to launch milk futures

Germany's commodity trading market RMX Hanover are planning to launch a dairy product futures market. This follows the announcement earlier in the month of a 'European Milk Exchange' to be set up in the Netherlands on the initiative of Dutch markets innovator Albert De Haan, due to open in August. Both markets say they are responding to increasing market volatility and the likely demand for hedging instruments to narrow market risk. RMX executives said the new milk contracts will be launched "as soon as possible". They said the market was demanding more transparency. "We are considering what form the contracts should take. We want to attract the interest of the whole market chain from farms to users". (Dairy Industry Newsletter 1/7/2008)

Advantages and Limitations of Dairy Futures Markets

The benefits of using futures markets as a means of hedging are well documented (Kolb and Overdahl 2007). Clear expositions of the fundamentals of hedging are presented for example by Sartwelle (1998) and Kissler and Pozzi (2004). These markets bring a greater degree of price transparency to the supply chain and advocates of the efficient markets hypothesis would point to their role in aiding planning. It also should be noted that a major benefit of the creation of a futures market often lies in the derivatives which follow. For example options may be used to place a floor on returns while the futures prices may offer transparency for insurance products such as the Livestock Gross Margin for Dairy Cattle Insurance Policy which was recently introduced in the US. While the US futures markets provide opportunities to manage world price fluctuations, it should be noted that it is important to consider the role of futures markets in relation to intra EU trade in dairy commodities. In 2005 the figure for intra-EU trade in dairy products was 14.6 million tonnes, with a value of EUR 18.6 billion, much higher than for exports outside the EU which were valued at EUR 5.4 billion for 2.5 million tonnes of products European Commission (2006). Such data suggest that a futures market denominated in Euros is desirable.

While the benefits of futures markets to the supply chain are obvious, however their limitations, particularly in a dairy context, should also be considered. Emerging futures markets in many instances initially require an index price against which trades are settled. The designation or creation of such an index may be problematic as a number of reference prices are currently used and their integrity is sometimes questionable. In addition, while farmers may wish to hedge milk prices, the contracts may be for commodities such as butter and milk powder. Likewise the quantities specified in the contracts may be large relative to the scale of many participants. While greater price transparency in the farm gate price and a more active role by milk processors and buyers in providing risk management tools to their suppliers may alleviate such problems, it is by no means guaranteed that they will be forthcoming. Such actions will require processors/buyers to acquire a new skill set and a more personal relationship with their suppliers. It is also possible that the supply side concentration of EU dairy markets may lead to thin futures markets and the problems associated therewith. However it is the novelty of these instruments which might provide the largest obstacle to their adoption. As explained, the European Commission has successfully managed price risk in the EU dairy industry and as a result participants have not had great need for these instruments. Their successful introduction will require participants to embrace new skills which in many cases will highlight the need for education in these instruments and the management of price risk in general. The US experience suggests that Universities and extension services along with a dedicated risk management agency may be best placed to provide such services.

While the development of these or similar dairy futures markets may be seen as a positive development, it is necessary to acknowledge that they unlikely to manage price risk for all industry participants should they successfully launch. Indeed the extensive menu of instruments and services provided in the US confirms that the USDA sees management of price risk as participant specific and a process which continues to evolve with a role for public and private institutions. The EU, by stating its desire to substantially withdraw from market support and management, has encouraged the private market to begin to

provide price risk management services to the dairy industry. This reliance on the private market would appear in itself to be risky, however by providing support through education, promotion and incentives to avail of these private instruments, the EU could greatly help in the successful development of such instruments. However should these markets fail to launch, or launch unsuccessfully, and the European Commission proceeds with its withdrawal from its market management role, then the consequences for the future of the EU dairy industry could be very serious.

Conclusions.

While the policy environment facing EU dairy farmers is uncertain at present, it appears reasonable to assume that the level of market support and management in particular will be significantly reduced. It is anticipated that in turn EU dairy prices will more closely align with world prices. World prices are both lower and more volatile than EU prices and it is further assumed that this increased volatility will also be transmitted to EU prices. Increased price volatility is a concern for a number of reasons as it adds major new challenges for farm business planning, debt repayment, and, in some cases, solvency. Lower prices will require dairy farmers to increase scale in order to maintain income. In many instances this increase in scale will need to be swift and dramatic thus creating the potential for increased risk as farm enterprises specialize. While it is currently possible for EU farmers to manage some of their input price risks through energy and feed price futures and options, they may be more inclined to hedge their output price risk[24]. The continued listing and expansion of these instruments in the US suggests that they perform an important role in that industry[25].

The potential for increased risk is acknowledged by the European Commission which now has an opportunity to put in place and facilitate instruments which will help ensure the long run competitiveness of this most important agricultural sector. The diverse

[24] While many farmers may not avail directly of these tools they can share in the benefits of others along the supply chain in hedging their risk. An example is the fence, floor, and stabiliser products offered by Dairylea Cooperatives Risk Management service mentioned earlier.

[25] The evidence at farm level shows that the use of these instruments in the US has been limited and their success in hedging risk has varied with marketing order and the end use of milk in that order. An explanation for the low usage is that the policy instruments employed in the US provide an effective means of managing volatility without the time and cost required to implement a hedging strategy (Maynard et al 2005).

nature of the EU dairy industry suggests that a range of instruments may be necessary if the industry is to successfully manage its price risk. While some of these instruments are currently used in other sectors of EU agriculture, the challenge of managing price risk will be a new one for the majority in the dairy sector. Both policy makers and private institutions will need to play important roles if this challenge is to be successfully met. In particular the potential use of insurance instruments and mutual funds in the EU dairy sector must be explored. This suggests that an in depth analysis of the insurance policies provided in the US, as discussed above, would be most informative.

The US provides an example of an industry where a large number of instruments are provided by both public and private institutions. This system, and a number of its instruments, are complex and may not suit the EU, however they do point to the role institutions in both regions can play in managing risk. While private institutions may be better placed to provide hedging instruments and some insurance products, the policy makers can raise awareness of the need for these instruments and provide certain safety nets. This role of educating potential users of these instruments and encouraging their usage is essential as thinly traded instruments tend to be of limited use and are often discontinued. This educational and enabling role would appear to fit within the EU's current position of providing risk management through rural development funding. Should the European Commission largely rely on private markets and these markets fail, the consequences for the EU dairy industry will be long term and of major consequence. The EU must act now as a matter of urgency as both its' own and global policy initiatives suggest that an era of freer trade in dairy products is imminent. In conclusion the authors believe that now is the time for the EU to investigate risk management tools for dairying, and to review, examine and possibly even pilot some schemes.

Bibliography

Commission of the European Communities (2009) "*Establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers, amending Regulations (EC) No 1290/2005, (EC) No 247/2006, (EC) No 378/2007 and repealing Regulation (EC) No 1782/2003*" COUNCIL REGULATION (EC) No 73/2009 of 19 January 2009

Commission of the European Communities (2005) "*Communication from the Commission to the Council on Risk and Crisis Management in Agriculture*" COM (2005) 74 Brussels, March 2005.

Commission of the European Communities (2008) "*Establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers"*COM (2008) 306 Brussels, May 2008

Ed Jesse, Bob Cropp and Brian W. Gould (2008) *"Dairy Subtitle : Food, Conservation, and Energy Act of 2008"* MARKETING AND POLICY BRIEFING PAPER Number 94 Department of Agricultural and Applied Economics, College of Agricultural and Life Sciences, University of Wisconsin-Madison Cooperative Extension, University of Wisconsin-Extension June 2008.
http://future.aae.wisc.edu/publications/farm_bill/M&P_Dairy_6-1.pdf

Directorate-General Agriculture, Commission of the European Communities (2001) *"Risk Management Tools for EU Agriculture: with a special focus on insurance"* Working Document January 2001

European Commission (2006) "*Milk and Milk Products in the European Union*" Office for Official Publications of the European Communities, Luxembourg August 2006
http://ec.europa.eu/agriculture/publi/fact/milk/2007_en.pdf

Fischer-Boel M., (2007) *"The Health Check of the Common Agricultural Policy: fit for new opportunities"* Speech delivered to The Agricultural Committee of the European Parliament Brussels, 20 November 2007 http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/07/727&format=HTML&aged=0&language=EN&guiLanguage=en

J. B. Hardaker, R. B. M. Huirne, J. R. Anderson and G. Lien (2004*) "Coping with Risk in Agriculture"*, 2nd Edition CABI Publishing, Wallingford.

International Dairy Federation (2007) *"The World Dairy Situation 2007"* Bulletin of the IDF N°423/2007 Bruxelles Belgium.

Dennis Kissler & Paul Pozzi (2004)"*Milk Hedging Strategies Utilizing Futures & Options"* Paper presented at the University of Arizona Dairy Extension Conference November 4th 2004. http://cals.arizona.edu/extension/dairy/conference/proceedings/2004/milk_hedging.pdf

Robert W. Kolb and James A Overdahl (2007) "Futures, Options, and Swaps"5th Edition Blackwell Publishing,

Maynard, Leigh J., Wolf, Christopher A. and Gearhardt, Matthew (2005), "*Can Futures and Options Markets Hold the Milk Price Safety Net? Policy Conflicts and Market Failures in Dairy Hedging"*. Review of Agricultural Economics, Vol. 27, No. 2, pp. 273-286,

Nicholson, Charles, and Thomas Fiddaman. "*Dairy Policy and Price Volatility*." Paper presented to Looking Ahead…or Looking Behind? 10th Annual Workshop for Dairy Economists and Policy Analysts. Memphis, Tennessee, April 23-24, 2003, http://www.dairy.cornell.edu/CPDMP/ Pages/Workshops/Memphis03/Nicholson.pdf.

Productschap Zuivel (2007) *"Statistical Annual Report 2006"* Zoetermeer Netherlands http://www.prodzuivel.nl/

Tomek, W.G. and Peterson H. (2001) *"Risk Management in Agricultural Markets: a Review"* The Journal of Futures Markets, Vol. 21, No. 10, 953–985

Sartwelle, J.D., Smith E, Kastens T and Daniel O'Brien (1998) *" Buying Hedge with Futures*" The Texas A&M University System RM2-15.0 4-98
http://www.agrisk.umn.edu/cache/ARL00048.pdf

USDA 2004 "*Economic Effects of U.S. Dairy Policy and Alternative Approaches to Milk pricing"* http://www.milkprocon.org/2004congressreport.pdf

USDA *"Annual Milk Production"*
http://www.nass.usda.gov/Statistics_by_State/Wisconsin/Publications/Dairy/anmkpd.pdf