EU Agricultural Markets *Briefs*

No 11 | March 2017

Managing risk in the dairy sector: how futures markets could help

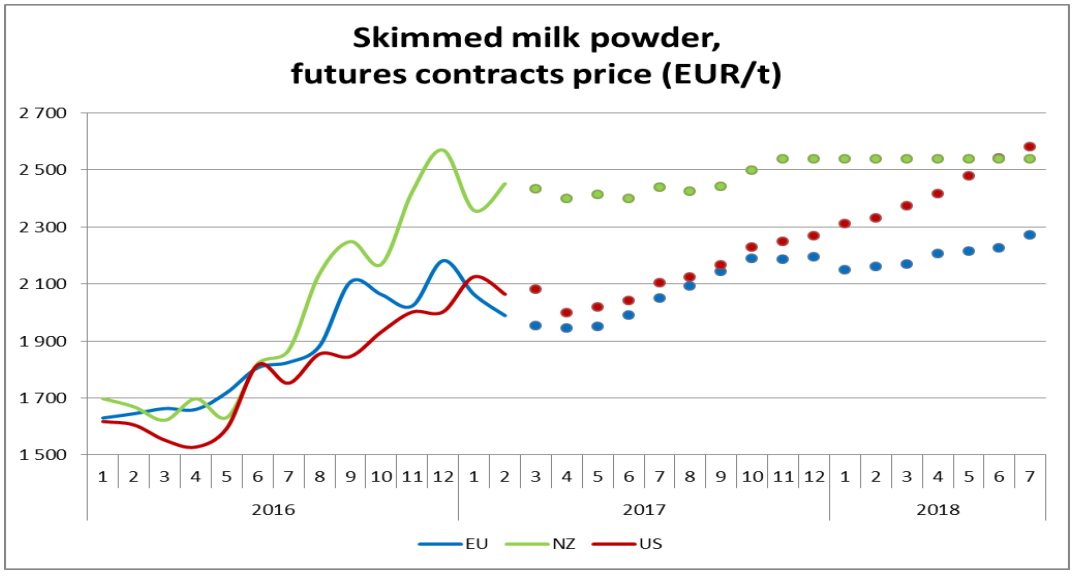
Contents

The aim of this market brief is to analyse financial markets' instruments, such as futures and options, in the dairy sector. In a period characterised by relatively high volatility and low prices, these tools could help farmers and processors in setting up sound hedging strategies.

After presenting facts and figures on price volatility in the dairy sector, the brief explains how futures markets work (with examples) and illustrates what they can bring to operators.

It then reviews futures markets currently available in the dairy sector in the EU, making a comparison with the US and New Zealand and with futures on crops in the EU.

Finally, the brief explores the obstacles which are causing the still rather limited use of futures and options in the dairy sector, highlighting explanatory factors and identifying key issues.



Source: DG Agriculture and Rural Development based on Thomson Reuters.

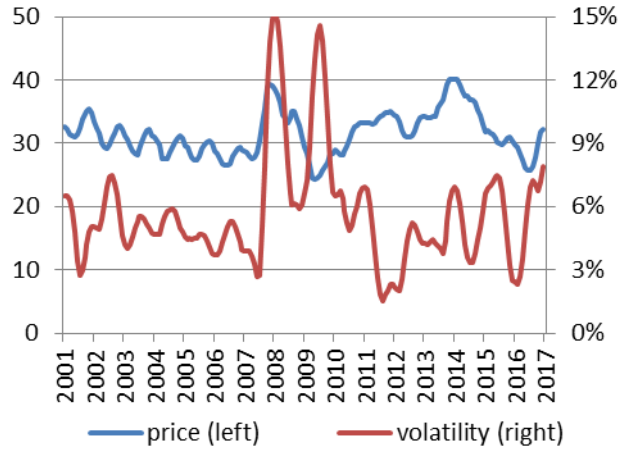
EU Agricultural Markets Briefs are available on Europa:
http://ec.europa.eu/agriculture/markets-and-prices/market-briefs/index_en.htm

Agriculture and Rural Development

1. Introduction

After a period of record high price levels for dairy products, rapidly followed by milk prices, prices started declining at the beginning of 2014 and their fall only bottomed out in Summer 2016. The EU raw milk price did not reach the 2009 low (minimum EU average registered at 24.4 EUR/100 kg in May 2009) but still dropped to 25.7 EUR/100 kg in July 2016 (see Graph 1), raising once more the question of how best to protect farmers against excessive price variability.

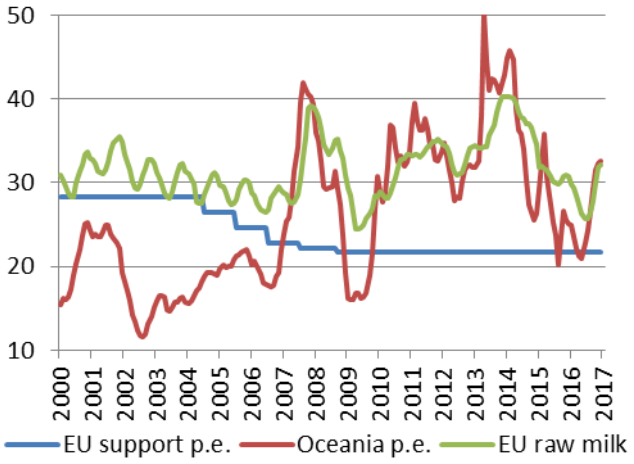
Graph 1: EU raw milk price (EUR/100 kg) and volatility (1-year CoV[4])



Source: DG Agriculture and Rural Development, based on prices notified by Member States.

Direct payments provide a cushion to farmers' income (27%[1] of dairy farmers' income in 2013 but 38% in 2009). In case of strong decline in prices, the safety-net (private storage aided scheme at first and public intervention when prices decline more) impedes SMP (Skimmed Milk Powder) and butter prices to go below intervention price levels[2] by removing volumes from the market, in the case of intervention via public buying-in. The support price expressed in milk equivalent is 21.7 EUR/100 kg (see Graph 2). During the recent crisis, these and several other measures were activated (see Table 8 in Annex) and the EU raw milk price average did not reach the milk support price equivalent level. Nevertheless, for many farmers the low milk prices and the lack of price stability are difficult to cope with to run a sustainable business, especially when farmers have planned investments based on higher average milk prices.

Graph 2: Milk prices: EU farm gate, EU support and world, in EUR/100 kg



Note: p.e. is milk price equivalent based on SMP and butter[19]
Source: DG Agriculture and Rural Development, based on prices notified by Member States and AHDB (Agriculture and Horticulture Development Board).

Futures markets are already widely used in sectors such as cereals, where the perception of price volatility is also high, to hedge against strong price variation. In the dairy sector, futures markets were more recently created (especially in Europe) and are less used, even though in the US the share of SMP traded on futures markets is already significant.

2. Price volatility in the EU dairy sector: fact and figures

Raw milk and especially dairy product prices have become more volatile since 2007, i.e. well ahead of the expiry of milk quota system in April 2015. This occurred after the decrease in intervention prices introduced by the 2003 CAP reform, which contributed to bring European and world dairy product prices closer (see Graph 2).

For raw milk, volatility[3] peaked in 2007 when prices went up from 27 to 38 EUR/100 kg in 6 months, and in 2008/2009, when prices dropped from 35 to 25 EUR/100 kg in 9 months. It must be remarked that milk prices went up slightly before the 2008 boom in all commodity prices.

[1] Share of decoupled payments in the farm net value added of specialised dairy farmers. Source: FADN EU dairy farms report, based on 2013 FADN data: http://ec.europa.eu/agriculture/rica/pdf/Dairy_report_2015.pdf.

[2] 1 698 EUR/t for SMP (reached in August 2015) and 2 217.5 EUR/t for butter, not reached during the recent crisis. During this crisis, the private storage aided scheme was activated very rapidly (in September 2014), but given the excess of milk supply on the EU market, it could not halt the price decline and offers to public intervention started in July 2015.

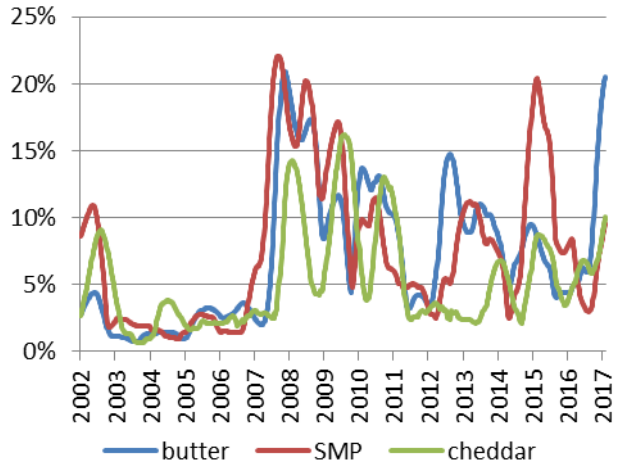
[3] ***Methodological caveat***: there are several measures/estimators for volatility, such as standard deviation of the changes in price, variance of log-returns, coefficient of variation and so on. All of them produce different numbers (so particular attention should be paid every time, when reading about volatility) but they all show the same pattern.

Measured with a yearly ***Coefficient of Variation (CoV)***[4], volatility reached 15% in these two periods, in comparison with a pre-2007 average around 4%. Since then volatility oscillated between 2% and 8%, with an average level comparable to the pre-2007 period. What is completely new is that volatility follows a more 'unstable' path (in other words volatility is more volatile) and prices have lost their previous seasonal pattern.

The perception of many farmers, however, is that of having more volatility: what was observed is a steady growth in milk prices from 24.4 to 40.2 EUR/100 kg over a period of 4 years (2009-2013) followed by a steady decline in two years and a half up to 25.7 EUR/100 kg in July 2016. Despite the fact that it is referred to as a 'volatility issue', this pattern corresponds to changes in trends rather than volatility. Indeed, volatility is 'only' a measure of amplitude and frequency of price changes.

For dairy products volatility peaked at 20% in 2007 and 2008 (see Graph 3). What strongly differs from raw milk is that the level of variability post-2007 remains significantly higher than it was before.

Graph 3: Volatility of dairy product prices (1-year CoV) in the EU



Source: DG Agriculture and Rural Development, based on prices notified by Member States.

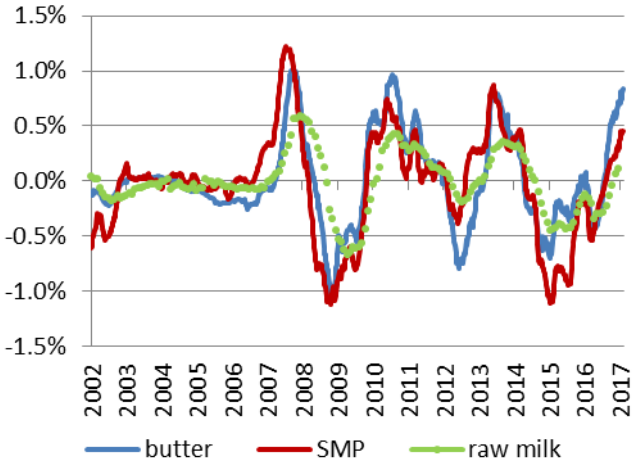
Volatility of cheese price more than doubled (on average, from 2 to 5%) and volatility of other dairy products is regularly above 10%. Indeed, volatility of SMP (and WMP) prices again reached 20% at the beginning of 2015, when prices declined rapidly. The same threshold of 20% is now reached by butter, due to the strong recent increase in price: in fact, the EU butter price moved from 250 EUR/100 kg to 400 EUR/100 kg in 6 months only.

One of the possible explanations for the higher price volatility of milk powders compared to cheddar cheese could be the higher share of SMP and WMP traded on the world market[5].

It should be noted that whey powder prices are often more volatile than any other dairy products (especially in the past and recently in 2016), while emmental cheese is the product with the lowest volatility.

For cheese, the specificity of certain cheese types can partly explain a lower volatility.

Graph 4: Trends of dairy products prices (1-year Compound Weekly Growth Rate) in the EU



Source: DG Agriculture and Rural Development, based on prices notified by Member States.

Also for price trends, here represented by ***Compound Weekly Growth Rates (CWGR)***[6], the picture changed compared to the pre-2007 situation (see Graph 4): trends are less stable, with more pronounced swings and frequent changing in both direction and magnitude.

A period with large and frequent oscillations around a flat and stable mean (high volatility, no change in trend) would simply represent a 'noisy' and fast-moving market. On the contrary, the current situation for dairy products prices is characterised by a period of uncertainty/instability with rather high volatility as

[4] The Coefficient of Variation is a standardised measure of dispersion, showing the extent of variability in relation to the mean of the population. In formula: (standard deviation) / average

[5] Around half of EU SMP and WMP production is exported. Similarly, more than 50% of world production of SMP and WMP is traded. By contrast, less than 10% of EU butter and cheese production is exported and around 10% of world production is traded. The booming demand for butter might explain the recent peak in volatility.

[6] A Compound Growth Rate is an imaginary number that describes the rate at which an initial value would have grown in order to reach the final value, if it had grown at a steady, constant rate. In formula: (final value / initial value) ^ (1/num of obs) - 1

well as changing trends (when the market is readjusting/moving searching for new equilibrium point) which are harming the profitability of dairy farmers and processors.

3. Comparison with other sectors in the EU and other dairy markets worldwide

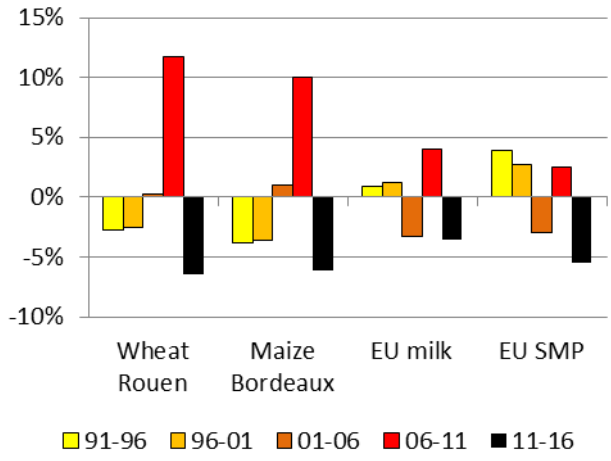
Before explaining the potential role of futures markets it is worth observing the specificity of EU dairy markets with respect to other sectors and other markets, to identify similarities and differences.

Concerning long term trends (Compound Annual Growth Rates), EU milk prices remained relatively stable between 1991 and 2001, while cereal prices were decreasing among others further to the decline in intervention prices which started in 1992 (see Graph 5).

The decrease in SMP and butter intervention prices started in 2004 and translated into a small decrease in milk and dairy products price levels over the period 2001-2006, while on the contrary cereals prices remained stable.

EU and world prices for the dairy sector started converging with the decrease in the intervention price (see again Graph 2) and since 2007 trends evolve in the same direction.

Graph 5: Annual price trends (CAGR) in the EU dairy sector compared to other sectors



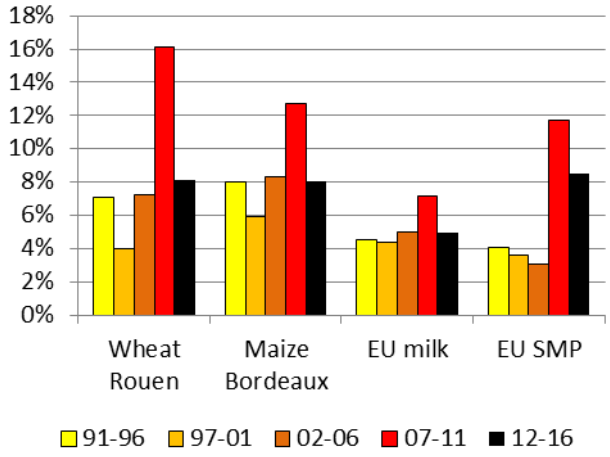
Source: DG Agriculture and Rural Development.

The only significant difference with the crop sector is that the magnitude of 2006-2011 upward trends was lower for milk and dairy products, while the more recent downward trend is comparable. Indeed, the price 'co-movement' between agricultural and other commodities is particularly pronounced with crude oil but evident also for many other commodities.

The same conclusion is valid for volatility, here expressed as average of 1-year Coefficient of Variation over the period (see Graph 6). Again, volatility peaked in 2007-2011 and was higher for wheat (around 16%, with monthly spikes up to 30%), while comparable for maize and SMP, around 12%.

The observations for the last period are in line with the historical average, except for SMP which is still more volatile; milk in particular moved back to the usual volatility range around 4-5%.

Graph 6: Volatility (average of 1-year CoV) in the EU dairy sector compared to other sectors



Source: DG Agriculture and Rural Development.

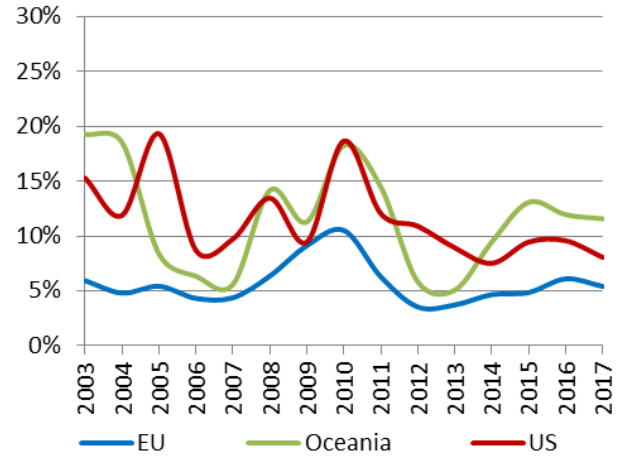
In general, volatility is on average lower in the EU than on world markets, around 6-7% for all EU products with respect to 11-12% in the US and Oceania.

Volatility for raw milk in the US and Oceania (see Graph 7) follows rather similar patterns, registering peaks in the same periods (2007, 2009 and 2014-2015): the evolution in the EU is similar, but less pronounced, smoothed and far lower.

SMP (together with WMP) is clearly the more globally interlinked product (see Graph 8), with high correlations and similar evolution. Peaks of volatility are registered in the same periods (in 2007, a small one in 2013 and the last one in 2015).

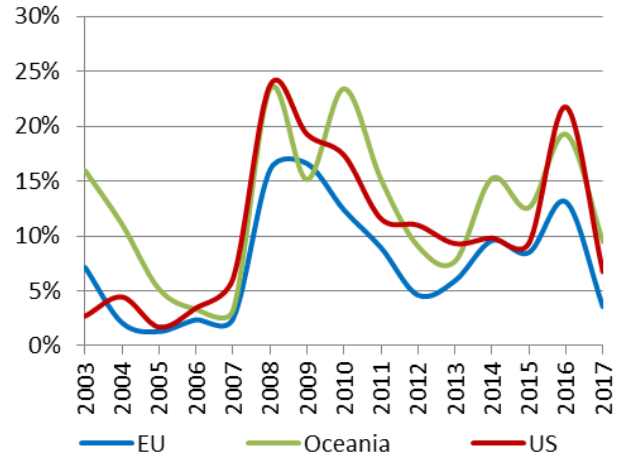
On the contrary, butter seems to be the more disconnected market as is clearly shown in Graph 9, where calm periods in the EU correspond to frantic activity in the US or Oceania.

Graph 7: Volatility (average of 1-year CoV) for raw milk prices worldwide



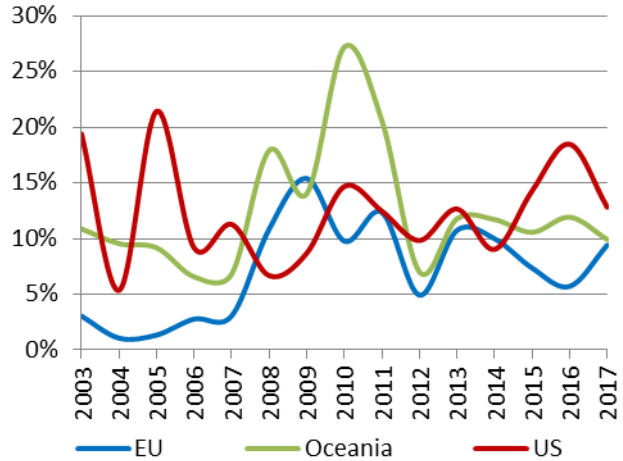
Source: DG Agriculture and Rural Development based on LTO (Land-en Tuinbouw Organisatie) Nederland.

Graph 8: Volatility (average of 1-year CoV) for SMP prices worldwide



Source: DG Agriculture and Rural Development based on AHDB (Agriculture and Horticulture Development Board).

Graph 9: Volatility (average of 1-year CoV) for butter prices worldwide



Source: DG Agriculture and Rural Development based on AHDB (Agriculture and Horticulture Development Board).

4. How can futures help to address price volatility

Several measures, policies and tools can be used to address volatility: some of them are designed to reduce volatility, some others to cope with its consequences.

With a market oriented Common Agricultural Policy focused on limiting the consequences of price fluctuations via income support (direct payments), rather than on reducing price fluctuations themselves (even though the safety-net remains in place in case of strong drop in prices), private operators need to look for other solutions to address excess price variability. For example, in the dairy sector the CAP (in the so-called 'milk package'[7]) encourages the creation of producer organisations in order to reinforce the position of dairy farmers in the supply chain and collectively negotiate contract terms with the milk processors.

A key point is risk-management: a sound hedging strategy can first of all protect from unforeseen price shocks (on both sides, input and output) and keep margins under control. Moreover, it allows a forward looking strategy, for example to accompany an investment plan or a change in a farm's structure.

Precisely to this aim, financial markets introduced more than one hundred years ago futures on agricultural commodities. Some decades ago options appeared in the trading book of brokers and nowadays even some other more sophisticated products such as ETFs or index/product trackers are available[8]. Most of this brief is based on futures: some references to options (60% of the dairy contracts in the US and increasing) have been introduced, while more complex financial products are not covered.

In general, futures are used to secure both output and input prices. In several sectors futures are used for both for output prices (e.g. grains, live cattle, pigmeat) and input costs (e.g. feed, fertilizers, fuel, energy). Futures contracts represent an evolution of forward contracts (contracts between two parties to deliver a certain product at a certain date at an

[7] http://ec.europa.eu/agriculture/milk/milk-package/index_en.htm

[8] Exchange Traded Funds (ETFs) are index funds tracking non-security indices such as commodity benchmarks. ETFs are traded like shares: they are simple and efficient tools giving to customers a replication of the price movements of the commodities (including energy, metals, and agriculture) without the burden given by roll-over strategies and transaction fees. They are less regulated than futures and options, but not completely unregulated as Over-The-Counter (OTC) products.

agreed price): they are now standardised contracts (in terms of quality, quantity, delivery methods, expiry date, etc.) eliminating some issues like counterparty risks and offering the needed transparency to the market.

In markets where futures are not available, so-called commodity swaps[9] are the most used financial tool since they allow securing a price level with counterparts.

Technical box: Futures vs Options (see also Vocabulary in Annex)

Futures and options both belong to the same financial class, labelled as ***derivatives*** or 'derivative products'. Derivatives are used for different purposes, such as insuring against price movements (hedging) or on the contrary increasing exposure to price movements (speculation).

- A ***forward contract*** is a non-standardised contract between two *parties to* ***buy (or sell) an asset at a specified future time at a price agreed upon today***, typically traded Over-The-Counter (OTC).
- ***Futures*** are ***standardised*** (by quality, quantity, delivery date etc…) ***forward contracts*** negotiated at Exchanges. Futures can be based on ***physical delivery*** of the underlying asset or on ***cash-settlement***, i.e. by only making a payment in cash when the contract expires, without physical exchange of goods. To minimize credit risk, the futures exchange requires both parties to put up (and then to maintain) initial cash amount known as the ***margin.*** Futures are the largest traded instrument.
- An ***option*** is a contract that gives the buyer ('owner') ***the right, but not the obligation, to buy or sell*** an underlying asset: the purchase, if the option is exercised, happens at a pre-specified ***strike price*** on (or before) a pre-specified ***maturity date***. It is worth noting the ***asymmetry***: the seller of the option has the corresponding obligation to fulfil the transaction (to sell or buy) if the buyer exercises the option. On the negotiation day, the buyer pays upfront a ***premium*** (the price of the option) to the seller in order to have this right. An option that conveys to the owner the 'right to buy' is referred to as a ***call*** while an option that conveys the 'right to sell' is called a ***put***. Beyond futures, options are the most relevant and expanding financial class, particularly appealing due to high leverage.

[9] Commodity swaps are largely used to lock input prices: introduced in the '70, they have for a long time been a purely Over-The-Counter (OTC, see technical box) tool so outside the scope of this brief. Recently, the effect of Dodd-Frank Act and MIFID-EMIR-MAD moved part of them under the umbrella of 'regulated markets'. A commodity swap is an agreement where the floating (market) price of the underlying commodity is exchanged for a fixed predetermined price, over a regularly calendared specified period. They are purely financially settled, so no commodities are physically exchanged during all the trades. The main positive characteristic of commodity swaps is to disentangle price risk from supply risk, while the main drawback is that counterparty risk is not covered.

According to financial theory, futures markets assimilate information from the underlying spot market quickly and effectively: on a regular basis, (every time a contract expires) spot and futures prices should coincide (the so-called 'convergence'). Intuitively, the shorter the time to expiration the lower price uncertainty, until maturity when the price is uniquely the spot price. Thus, most deviations between spot and futures prices should only be short-term phenomena vanishing at each maturity.

In reality, sometimes the two prices do not converge at expiration date. This is mostly due to quality differences in the technical specification of commodities, transportation costs or sudden changes such as availability at warehouses or lower liquidity of the contract. Failure to converge is one of the obstacles to the diffusion and use of futures, as discussed later, since in such cases the crucial role/function of 'price discovery centre' is not correctly performed.

5. Use of dairy futures in the EU, US and New Zealand

Available financial products for the dairy sector

The trade of dairy financial products is a consolidated activity in the US[10], where the first 'modern' physical delivery contract was launched in 1993 for SMP and cheddar cheese and in 1995 for Class III milk[11]. New Zealand and the EU entered this type of market only in recent years: in New Zealand, the first futures contract was launched for WMP in 2010 while in the EU the first contracts were introduced only in 2015. In the EU there are currently two stock exchanges offering alternatives for dairy products:

- ***Euronext****:* based in Paris (plus London, Brussels and Amsterdam since the fusion of the national exchanges in 2000), merged with New York Stock Exchange (NYSE) in 2007.
- ***European Energy Exchange (EEX)****:* based in Leipzig, part of the Eurex Group (Eschborn, near Frankfurt am Main), owned by Deutsche Börse.

[10] The predecessor of Chicago Mercantile Exchange (CME) traded a butter futures contract for many years from 1919. In fact, the CME began in the late 1800's as the Chicago Butter Exchange, a wholesale cash market for butter, and later added cash and futures contracts for several agricultural commodities. The butter futures contract was terminated in the early 1960's because of limited trading volume.

[11] Great part of these physical delivery contracts disappeared, replaced by cash-settled contract subsequently standardised in the current form. Traditional (since 1848) open outcry negotiation (the 'Pit') has been abandoned in 2015, substituted by electronic trading platform.

In the US the main market is the Chicago Mercantile Exchange (CME) whose predecessor was founded in 1898, while the New Zealand Exchange (NZX) predecessor was already active in 1867.

A description of all products and characteristics is provided in Table 1.

Table 1: Dairy futures worldwide
Info displayed: contract size, maturities available, creation of the contract in the current form.
Colour code: orange means physical delivery, light-blue is cash-settled and dark-blue is cash settled with options available.

	New Zealand (USD)	US (USD)	EU EEX (EUR)	EU Euronext (EUR)
Milk Class III[12]		90 t 24 months 2000		
Milk Class IV[13]		90 t 24 months 2000		
Milk MKP[14]	6 000 kg milk solid, yearly (5y) 2016			
Butter	1 t 18 months 2014	9 t 24 months 2005	5 t 18 months 2015	6 t 18 months 2015
Butter oil, AMF (Anhydrous Milk Fat)	1 t 18 months 2011			
SMP	1 t 18 months 2011	20 t 24 months 1993	5 t 18 months 2015	6 t 18 months 2015
WMP	1 t 18 months 2010			
Standard whey powder		20 t 24 months 2007	5 t 18 months 2015	6 t 24 months 2015
Cheddar Cheese		9 t 24 months 2010		

Source: Euronext, EEX, CME, NZX; more details on contract specifications by following the links.

Beyond the historical reasons (and the consolidated reputation and interaction with customers), the other main difference between the US and the other markets is the wider offer of products, both in terms of dairy and financial products: options now represent a more than robust share of the trade in the US (60% of CME dairy trading book), while there are no options in the EU and a few in New Zealand.

Another particularity of the US market is the offer of milk contracts, as there is no analogous offer in the EU. The trade of the new milk contract in New Zealand started in June 2016 (first maturity September 2017) and the open interest reached around 2 500 contracts in January 2017.

In addition, the standard size of contracts in the US is much larger (e.g. 9 tonnes for butter) than in the EU (5 tonnes on EEX) and New Zealand (1 tonne).

Interestingly, all contracts available in the US, New Zealand and EEX are cash-settled. Up to now the Euronext attempt to introduce physical delivery contracts seems inconclusive, since no trade has been registered on this market.

Use of dairy financial products

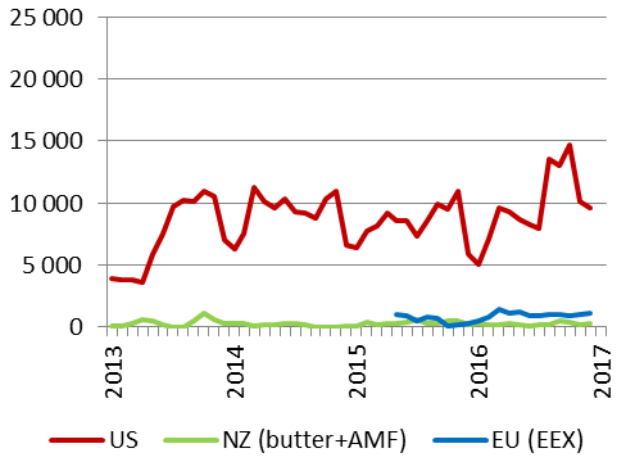
There are two measures of traded volumes on futures markets: 'open interest' and 'trade volume'. The measure '***trade volume***' includes all registered changes of ownership of the contracts (potentially the same contract moving several times back and forth) while '***open interest***' accounts for the outstanding number of contracts available that is quantities covered by contracts circulating at a given time. The ratio among the two is a good measure of the activity and liquidity of the market.

SMP and butter are the only two products for which contracts are available on the three world trading platforms. Focusing on the so called ***'nearby future'*** (the shortest maturity available, that is the first contract to expire), around 10 000 tonnes of butter contracts are circulating in the US (more than 6% of the production, see Table 2), against around 1 000 tonnes on the EEX market place and close to zero in New Zealand, even including AMF (Anhydrous Milk Fat), see Graph 10.

The open interest of SMP traded in the US is much higher and steadily growing; at around 20 000 tonnes during 2016 it represented more than 12% of production, see Table 2. In the EU open interest is far lower but increasing, passing 3 000 tonnes at the end of 2016, see Graph 11.

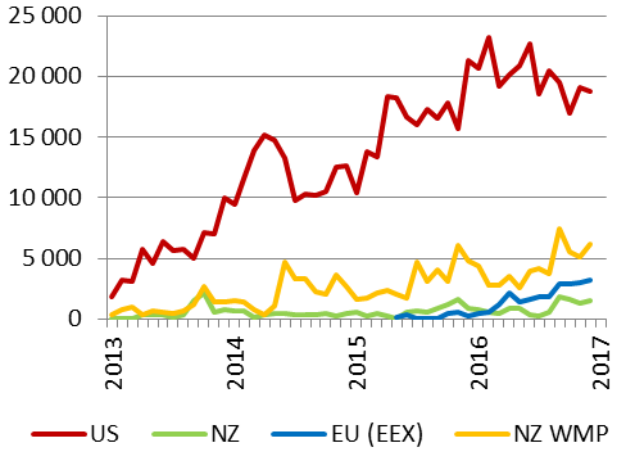
[12] The Class III milk is used primarily to produce cheese (hard and cream cheeses). The Class III milk component values are based on three dairy products: butterfat from butter, true protein from cheddar cheese and other solids from dry whey.
[13] The Class IV milk is used to produce butter and any milk in dried form. Milk component values are based on butterfat from butter and solids non-fat from SMP.
[14] The new contract, in NZD (New Zealand Dollar) only, started in June 2016. Currently it has only one maturity per year (September), up to 5 years

Graph 10: Open interest of butter contracts (nearby future, converted into tonnes)



Source: DG Agriculture and Rural Development based on Thomson Reuters.

Graph 11: Open interest of SMP and WMP contracts (nearby future, converted into tonnes)



Source: DG Agriculture and Rural Development based on Thomson Reuters.

Interestingly, SMP quantities are significantly growing in the EU, while in New Zealand the trend seems to be flatter for rather small volumes exchanged, since the trade is concentrated on WMP (over 5 000 tonnes, trend increasing).

Nevertheless, even if quantities are significantly increasing only less than 1% of EU butter and SMP production is traded on EEX. In New Zealand, slightly more that 1% of SMP and WMP production is traded on NZX.

The use of futures markets in the US is also significant for milk (more than 3% of production), and even more relevant for cheese (nearly 5%). Still, even in the US, dairy futures remain less popular than crops futures.

Table 2: Share of dairy production traded on futures market (open interest/production)[15]

	2012	2013	2014	2015	2016
EU SMP				0.2%	0.9%
US SMP	3.0%	3.8%	8.0%	11.6%	12.1%
NZ SMP	0.1%	0.7%	0.2%	0.7%	1.1%
NZ WMP	0.3%	0.3%	0.5%	1.1%	1.5%
EU butter				0.1%	0.2%
US butter	4.6%	5.1%	6.3%	6.6%	6.4%
NZ butter	1.7%	0.7%	0.3%	0.7%	0.7%
US whey	n.a.	n.a	n.a	n.a	n.a
EU whey				0.0%	0.0%
US milk	2.8%	2.6%	3.8%	3.5%	3.4%
US cheese	1.3%	1.2%	2.8%	4.9%	4.6%

Note: Products traded in the US can originate from the EU or other places; therefore this calculation is only a proxy to illustrate the penetration of futures on each market place.
Source: DG Agriculture and Rural Development based on Thomson Reuters and USDA PSD (Production, Supply and Distribution).

Available financial products for crops

The longstanding use of futures contracts in the cereal sector is widespread in the US and, from the beginning of the '90s, also in the EU. In the US, CME hosts the majority of grains contracts such as wheat, maize or soybeans. In Europe it is Euronext taking the lead.

The rapeseed grain futures contract was the first one to be launched in the EU (1994) and to become successful: the rapeseed contract was launched in close cooperation with the oilseeds industry (more efficiently than in the dairy sector) and the same happened for the milling wheat contract a few years later. It was clearly a market response to CAP changes in 1992 (reduction in support price). The other contracts traded on Euronext are: rapeseed oil, rapeseed meal and maize. The majority of the contracts are recognised benchmarks for the European grain market.

Recently a nitrogen fertilizer contract was introduced, which could potentially be very useful, together with grains futures contracts, to hedge producers' margins.

European grain contracts are physical delivery contracts which, according to Euronext, should guarantee price convergence. The yearly volume of transactions (precisely trade volume, not open

[15] For New Zealand, monthly production is estimated based on monthly export data, since exports represent around 95% of the production. Butter in NZ includes AMF.

interest, see the Vocabulary in Annex) currently exceeds 6 times EU production of rapeseed and 2-3 times that of milling wheat.

With regard to sugar, the main futures contracts are traded in New York (for raw sugar) and in London (for white sugar), both traded by the ICE (InterContinental Exchange). However, these two contracts are currently not suitable for hedging needs of EU producers since contract specifications are not reflecting EU market realities and, even more important, public regulation of the EU sugar market is still very significant[16].

Comparison with financial products for crops

The share of futures contracts compared to production described in Table 2 is completely different for crops: in the US, the '***ratio open interest/production***' (see Table 3) on CME is close to 100%[17] for wheat and soybeans and 50% for maize. For the three US crops, this first ratio is decreasing: it simply means that production is growing faster than financial trade.

Table 3: Share of crops production traded on futures market (open interest/production)

	2012	2013	2014	2015	2016
EU wheat	11%	8%	8%	9%	10%
US wheat	100%	95%	96%	97%	95%
US maize	56%	43%	45%	48%	44%
US soybeans	111%	85%	82%	87%	83%
EU rapeseed	22%	14%	13%	17%	19%

Note: Products traded in the US can originate from the EU or other places; therefore this calculation is only a proxy to illustrate the penetration of futures on each market place.
Source: DG Agriculture and Rural Development based on Thomson Reuters and USDA PSD (Production, Supply and Distribution).

In the EU, the trend for wheat and rapeseed, (the two most important contracts, listed, quoted and traded in Euronext) is rather stable at a much lower level compared to the US, 10% and 19% respectively. This is probably due to the fact that these instruments are more recent, since trade started only in the '90s. At the same time, they reached a reasonable dimension that could be the target for the younger dairy contracts.

The difference among commodities and marketplaces is even more evident when computing the ***'ratio trade volume/open interest'***, as reported in Table 4. High values of the ratio represent liquid markets where contracts are traded, i.e. bought and sold, several times: on average, each crops contract is traded 5-7 times in the US and 2-3 times in the EU.

Such ranges represent a solid, reliable and sound market, where hedging is viable and the role of the so-called speculators is limited to providing liquidity. As a comparison, in the financial sector very liquid contracts are characterized by a value of the ratio over 100. In those cases, the link among the underlying asset and the trade activity could be broken and one could wonder whether distortions could be artificially introduced in the market.

Table 4: Ratio among 'trade volume' and 'open interest' for selected markets and commodities

	2012	2013	2014	2015	2016
Wheat EU	2.2	2.4	2.8	2.6	2.6
Rapeseed EU	1.9	2.6	2.4	2.4	2.8
Wheat US	5.1	5.1	5.5	6.5	5.9
Maize US	5.0	4.5	4.5	5.2	5.4
Soybeans US	6.4	6.8	6.4	6.6	7.2
SMP EU				0.8	0.3
Butter EU				0.4	0.4
SMP US	0.3	0.5	0.6	0.7	0.7
Butter US	0.3	0.5	0.5	0.4	0.5
Milk III US	0.9	1.1	0.9	0.7	0.8
Milk IV US	0.2	0.5	0.3	0.4	0.3
Cheese US	0.3	0.4	0.4	0.3	0.3
SMP NZ			1.0	0.7	0.4
WMP NZ	0.4	0.4	0.7	0.7	0.6
Butter NZ				0.8	0.7
AMF NZ			0.9	0.6	0.5

Source: DG Agriculture and Rural Development based on Thomson Reuters, EEX, CME, NZX.

[16] The EU sugar production is limited by a quota system and there is a minimum guaranteed price for sugar beet growers. This regime will end as of 30 September 2017.

[17] The ratio could easily go over 100% because during the life of a contract several positions could be opened and closed without any interchange of the underlying's ownership. Moreover, as already stated, this ratio could also be distorted by cross border hedging.

On the contrary, all dairy contracts are much less liquid, with this second ratio below one[18] in all three selected markets (EU, US and New Zealand). This means that contracts are sold/bought only when negotiated and then rarely traded, thus implying that hedgers are dominant in the market.

The trends of this second ratio are also particularly interesting. The increasing trend for crops is indeed a signal of an expanding trade activity with rather stable open interest; in other terms, these markets are 'mature' enough to develop in terms of trade over a more stable (see again Table 3) and consolidated amount of open interest, which is precisely the real commodity quantity that is channelled through Stock Exchanges.

Vice versa, the decreasing ratio for SMP in the EU as well as SMP and butter oil in New Zealand are clearly a good indicator of markets that are growing in terms of new contracts (quickly increasing) but with low liquidity. In these cases, the price discovery mechanism could be affected and convergence could be probably less regular.

6. Examples

Understanding a hedging strategy on a ***long position*** (i.e. the buyer's one, see Vocabulary in Annex) is rather easy. The owner of a contract will buy in the future the underlying asset at a price known today, and it can be done to secure both input and output.

On the contrary, in the following examples (in growing order of complexity) we analyse the ***short hedger position*** (i.e. the seller's one).

In all examples, 'today' is the negotiation day, explicitly stated, around Aug-Sep 2016. Maturities have been selected for particular intrinsic interest: May 2017 for the next seasonal peak in production, and December 2016 for a complete ex-post evaluation.

Real market figures/data are quoted and rounded to make numbers more readable.

[18] The ratio could go below 1 when new contracts, counting for open interest, are never more traded in the following year.

- **Example 1: how hedging works in practice with FUTURES on DAIRY PRODUCTS**

A dairy processor wants to secure his revenue for selling 5 t of SMP by fixing the selling price of his dairy commodity in advance. These are the prices of SMP contracts on the 9th of September 2016:

Table 5: Prices of SMP futures in the EU (EEX)

Maturity	Sept 2016	Oct 2016	Nov 2016	May 2017
SMP (EUR/t)	2 090	2 140	2 130	**2 290**

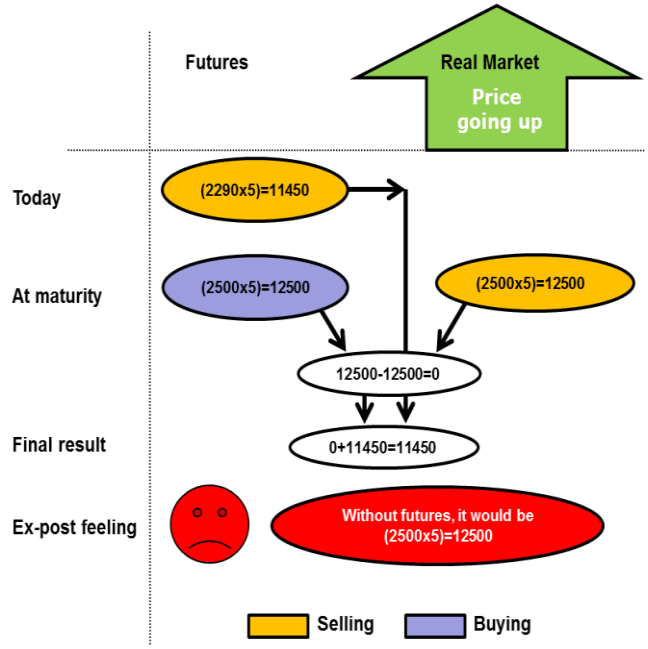
Source: EEX.

On the same day, the EU market price for SMP is 1 900 EUR/t. The processor wants to fix the price at the time of production peak in May 2017: the price of the contract with expiry date May 2017 is 2 290 EUR/t.

The strategy is the following: regardless of the physical price today, the processor sells today a contract of SMP with expiry date May 2017. At maturity, the processor physically sells his SMP on the physical market, AND buys back the SMP contract at market price, thus cancelling the previous commitment (i.e. netting his 'financial' position).

- ***Scenario 1: in May 2017 prices are higher***. The SMP price has increased from 1 900 EUR/t today to 2 500 EUR/t, i.e. +600 EUR/t.

Graph 12: Futures on SMP, Scenario 1, price up



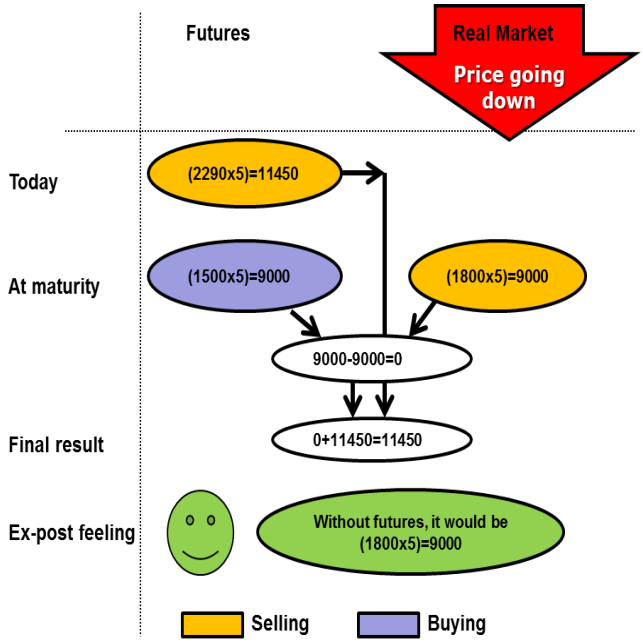
The final result (see Graph 12) for this scenario is 11 450 EUR, today's value of the futures contract with

maturity May 2017: the value on the market for the same quantity of SMP would be higher, 12 500 EUR

- ***Scenario 2: in May 2017 prices are still low***. The SMP price has decreased from 1 900 EUR/t today to 1 800 EUR/t, i.e. -100 EUR/t.

The final result for this scenario (see Graph 13) is again 11 450 EUR, today's value of the futures contract with maturity May 2017: the value on the market for the same quantity of SMP would be lower, 9 000 EUR.

Graph 13: Futures on SMP, Scenario2, price down



Summing up*:* whatever the future outcome on the market (scenario 1 assumes an increasing price while scenario 2 assumes a decreasing one), the net final result in both cases is exactly the value of the futures contract, an amount already known since the beginning. ***This is exactly what 'securing revenues' means: the original target of the processor was exactly to have a known and market-evolution-unrelated guaranteed price*.**

The hedging strategy works perfectly, provided that:

- at maturity futures contract price and spot price converge;
- the underlying price of the futures contract is a representative price, really reflecting the specific spot market's conditions.

In both cases, other price distortions such as market frictions could introduce some additional costs to the hedging strategy: it should not be forgotten that there are transaction cost (limited) and possibly brokerage/intermediation costs, and that in order to be operational on futures markets, margin costs/fees apply (see Vocabulary in Annex).

- **Example 2: how hedging works in practice with FUTURES and RAW MILK**

This second example focuses on the role of a European dairy collecting cooperative, or producer organisation, exposed to price fluctuations and willing to secure its revenue. The cooperative wants to sell in the future its collected production, 100 tonnes of raw milk, removing price uncertainty.

***Main issue*:** the cooperative is selling raw milk but since there is no milk futures contract in Europe it has to hedge on dairy products such as butter and SMP. Luckily, and not by chance, contracts are cash-settled, i.e. without physical delivery, facilitating such transactions and making the hedge still possible.

On the 14th of August 2016, the EU average physical price of SMP is 1 780 EUR/t and that one of butter 3 290 EUR/t, corresponding to a milk price equivalent of 27.5 EUR/100 kg[19], while the raw milk price in August 2016 is 26.5 EUR/100 kg.[20] On the same day, prices in EEX for SMP and butter contracts are the following:

Table 6: prices for butter and SMP futures in the EU

Maturity	Sept 2016	Oct 2016	Nov 2016	Dec 2016
SMP (EUR/t)	1 940	2 000	2 020	**2 040**
Butter (EUR/t)	4 100	3 990	3 960	**4 000**

Source: EEX.

Focusing on the December expiry date: SMP price is 2 040 EUR/t and butter is 4 000 EUR/t, leading to a milk price equivalent of 33 EUR/100 kg, which can lead to an expectation of a raw milk price around 30 EUR/100 kg.

The strategy is the following: regardless the physical price today, the cooperative sells today a portfolio made of 1 contract of butter and 2 contracts

[19] In formula: milk equivalent price (in EUR/100 kg) =
= (Butter price – 21)*4/83.74 + (SMP price – 31)*96/1 100.

[20] The raw milk price is higher than the milk price equivalent (based on SMP and butter prices) in times of market crisis, and lower when the market is well oriented. Historically, the difference between the two prices averages +/-3.5 EUR/100 kg in both cases (raw higher than equivalent and vice versa). However these prices are strongly correlated (the highest correlation is with a 3-4 months delay for milk).

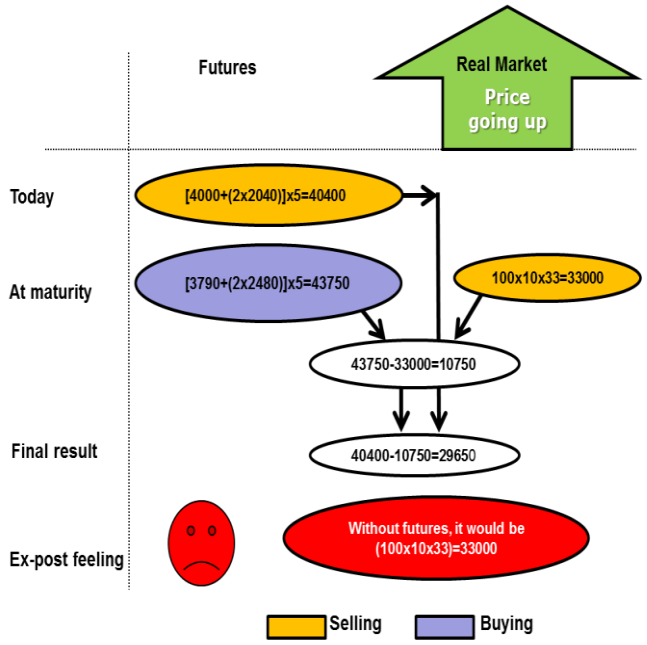
of SMP at December prices. At maturity, the cooperative sells its milk production according to prevalent market condition or price and buys back the portfolio (1 contract of butter and 2 of SMP) at market prices, thus cancelling the previous commitment (i.e. netting his 'financial' position).

Note that this strategy is tailored on the milk equivalent formula, given by the following rough approximation: 20*milk ~ butter + 2*SMP + constant (see previous footnote [19] for the formula).

Scenario 1: in December 2016 prices are high. SMP price moves up from 1 780 EUR/t today to 2 480 EUR/t and butter price increases from 3 290 EUR/t today to 3 790 EUR/t, i.e. +700 EUR/t for SMP and +500 EUR/t for butter. The December milk equivalent price is 36 EUR/100 kg, the raw milk price is 33 EUR/100 kg.

The final cashflow is 29 650 EUR, see Graph 14: the cooperative cashes 40 400 EUR today and pays 10 750 EUR at maturity. In practice, net result is 29.6 EUR/100 kg of milk, lower than what the cooperative could expect based on the target price implied by futures, 33 EUR/100 kg. In the end, the cooperative receives a price for its milk lower than what the market is offering in December but it receives a price which is anticipated thus removing uncertainty.

Graph 14: Futures and milk, Scenario1, price up

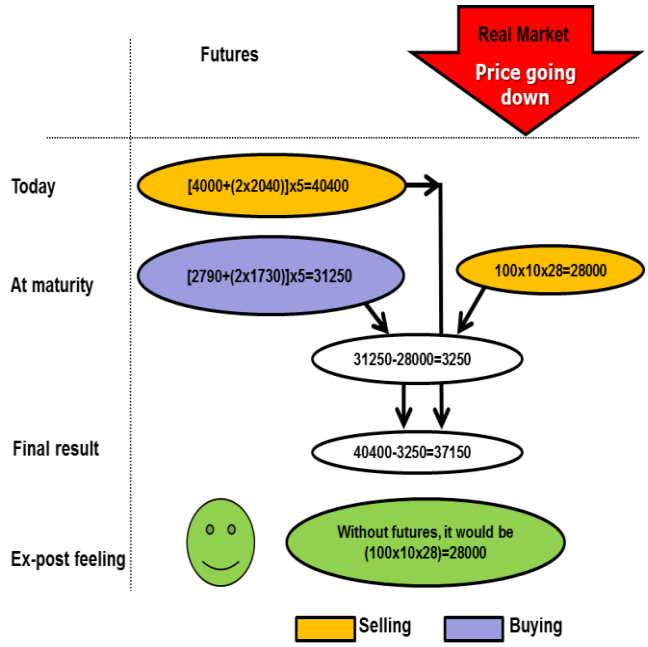


Scenario 2: in December 2016 prices are still low. The SMP price moves down from 1 780 EUR/t today to 1 730 EUR/t and the butter price is down from 3 290 EUR/t today to 2 790 EUR/t, i.e. -50 EUR/t for SMP and -500 EUR/t for butter. The milk price equivalent is 24.7 EUR/100 kg, while the raw milk price is above at 28 EUR/100 kg, farm gate price.

The final cashflow is 37 150, see Graph 15: the cooperative cashes 40 400 EUR today and pays 3 250 EUR at maturity. In practice, net result is 37.1 EUR/100 kg, higher than what the cooperative could expect based on the target price implied by futures, 33 EUR/100 kg, and higher than what the market would offer for the milk.

Summing up: whatever the future outcome on the market (scenario 1 has increasing prices while scenario 2 has decreasing ones), the net final result in both cases is not too far from 33 EUR/100 kg (i.e. the expected future milk value implied by the December contracts on SMP and butter), an amount already known today.

Graph 15: Futures and milk, Scenario2, price down



However, in Scenario 1, a farmer could be unhappy to receive 29.6 EUR/100 kg of milk, while on the market raw milk is paid 33 EUR/100 kg. This is clearly a dangerous ex-post evaluation; the initial price was 26.5 EUR/100 kg and the sure, guaranteed, independent from market-swings selling price would be around 30 EUR/100 kg. This limitation in profiting of market price increase is indeed the price to pay in order to reduce uncertainty.

Similarly, processors might be reluctant to use futures contracts for SMP and butter because of the risk, especially in an ascending market, to have to pay farmers a price for the milk significantly above the

'equivalent' price they would get on futures markets (as in Scenario 2).

Precisely to this aim, the use of options could also be considered; in fact with options there is no obligation to sell or buy, the decision to exercise the option depends on the cost and benefits.

Example 3: how hedging works in practice with OPTIONS

In this case the European dairy manufacturing company has a more challenging target: it wants to sell its output (SMP), by hedging its position in order to be simultaneously protected from a price fall, by means of more flexible instruments that allow at the same time to profit from an increase in price. To implement this 'floor hedge' strategy, the right tool is a put option, a contract that conveys the 'right to sell' (see Technical Box).

***Main issue*:** options are not yet available in the EU, but one could hedge in US and New Zealand since they offer cash-settled instruments. As in the previous example, the strategy features both physical trade on a local basis and financial/electronic trade in a Stock Exchange.

On the 9th of September 2016, the price of the underlying Non-Fat Dry Milk (US equivalent for SMP) futures contract is 88.5 USD cents/pound (equivalent to 1 950 USD /t). On the same day, prices in CME for put options on Non-Fat Dry Milk are the following (selection from 40 strikes and 24 maturities):

Table 7: Prices of SMP options in the US (CME), converted from USD cents/pound

Strike / Maturity	1 890 USD/t	2 070 USD/t	3 340 USD/t	Underlying future value
Sept 2016	2.2	126.5	1 402	1 947
Oct 2016	6.6	55	1 265	2 086
Nov 2016	7.1	36.3	1 135	2 200
Dec 2016	8.3	**35.5**	1 078	2 277

Source: DG AGRI based on CME.

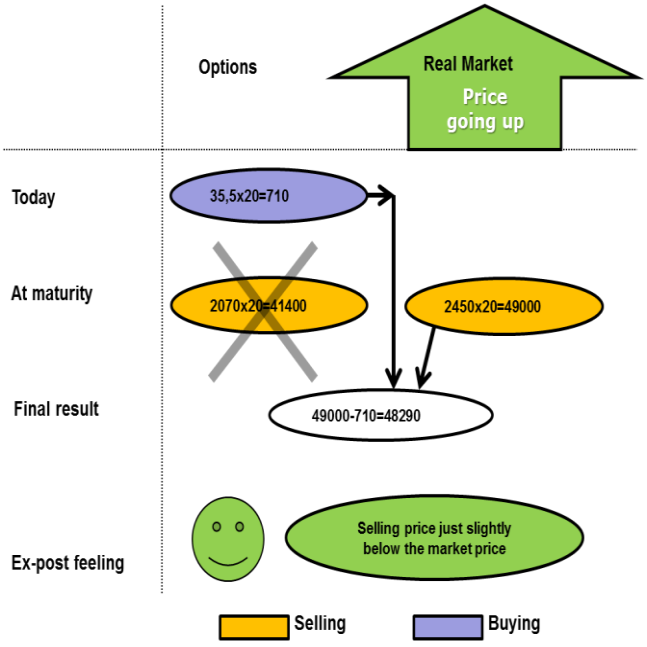
As already stated in the Technical Box, options are really flexible tools since the customer could search for protection at different thresholds (strikes): indeed, the strike price of a put option represents for the buyer the minimum guaranteed selling price. It's more costly to be protected at higher strike price (and cheaper to have less protection), in particular for short maturities.

Focusing on the December maturity and the 2 070 USD strike: by paying now an upfront fee of 710 USD (35.5 USD/t x 20 t, the size of the contract), the manufacturer gets the opportunity (i.e. the 'option') to sell 1 contract of SMP at 41 400 USD in December (2070 USD x 20 t). It must be recalled that it has the right but not the obligation to sell at the strike price agreed.

Scenario 1: in December 2016 prices are high. SMP price moves up from 1 950 USD/t today to 2 450 USD/t, i.e. +500 USD/t. The manufacturer will drop the option, since there is no motivation to sell at 2 070 something valued by the market at 2 450. The option is ***NOT EXERCISED***, the option contract is void, and it simply sells its SMP on the physical market.

Net result (see Graph 16) is 49 000 USD - 710 USD = 48 290 USD, slightly/marginally lower than the favourable market price of 49 000 USD.

Graph 16: Options on SMP, Scenario1, price up



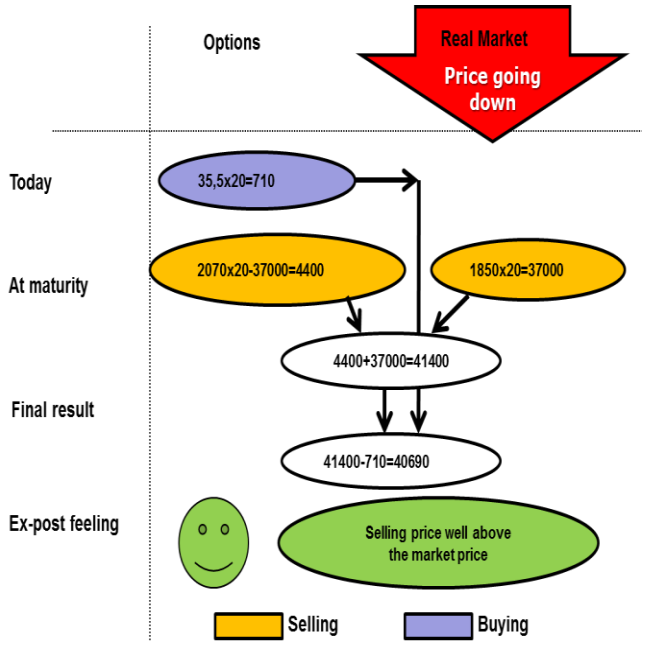
Scenario 2: in December 2016 prices are still low. SMP price moves down from 1 950 USD/t to 1 850 USD /t, i.e. -100 USD /t. The manufacturer ***EXERCISES*** the option, since it has the right (the upfront premium was paid to have it!) to sell at 2 070 something valued by market at 1 850.

More precisely, he sells SMP on the physical market at market price and ***the option contract does the***

"top-up" till the strike price of 2 070 USD: it's a key point, this is how the cash settlement system works.

Net result (see Graph 17) is 41 400 USD - 710 USD = 40 690 USD, by far higher than the un-favourable market price of 37 000 USD.

Graph 17: Options on SMP, Scenario2, price down



***Summing up*:** whatever the future outcome on the market (scenario 1 has increasing prices while scenario 2 has decreasing ones), the buyer of the option is protected: SMP will be sold at least at the strike price, or even higher when market conditions are even better.

The key point is the following: this type of hedging mechanism is similar to an insurance scheme. If market developments are positive, the company simply pays a small premium which should not affect its business; vice versa, if something goes wrong, the company is protected and its price guaranteed.

7. Obstacles to the growth of futures markets

The volumes traded on futures markets in the EU are growing fast but they remain very small. These markets are rather recent, a fact that could partly explain the low use. However, there are other obstacles to the growth of futures markets. Some of these obstacles are common to other commodities, often well-known and sometimes not entirely true:

- High transaction cost: in reality costs are currently decreasing since electronic trading is cheaper than the traditional open outcry method. Moreover, sound competition among exchanges further contributes to reducing costs.
- High intermediation/brokerage cost: the development of IT technology and electronic trade platform (together with competition between exchanges) reduced costs in recent years.
- In phases of high volatility, margin calls required by clearinghouses become very high and require significant cash flow. This could have a real impact on the financial equilibrium of the economic activity, since a 'reserve fund' should be earmarked or at least made easily available upon request. The need of such an additional account is costly and possibly culturally difficult to accept.
- Public support policies providing alternative methods of risk reduction (e. g. crop revenue insurance, price/income support…).
- Some local prices are not strongly correlated with world or EU futures prices, so small scale producers and local processors (especially for cheese) are not able to offset their price risk by means of international futures markets.
- Homogeneity of the delivered product: technical standards are easy to verify for some commodities, less for others (like cheese).
- Last but not least, liquidity in the market is a crucial factor: to establish and run a viable and sound futures market, willing speculators should be involved. On one side some participants would get rid of risk, while at the same time some other market players could bear the risk, when adequately remunerated. As already stated, futures markets simultaneously play the roles of facilitator, price discovery and risk transfer mechanism.[21]

[21] In the US, the CFTC (Commodity Futures Trading Commission) issue the Commitments of Traders weekly report, providing a breakdown of aggregate positions held by three different types of market players: 'commercial traders' (generally called 'hedgers'), 'non-commercial traders' (often called 'large speculators') and 'non-reportable' (ancillary activities and small positions). The proportion/share evolves depending on many factors (seasonality, commodity, marketplace, etc…) but roughly speaking there are every time some short hedgers (producers), some long hedgers (manufacturer) plus speculators in the middle trading contracts thus adding liquidity.

More specifically, there are additional obstacles that may affect the potential expansion of dairy futures markets in the EU:

- Milk and certain dairy products are not storable for very long periods, thus favouring by nature cash-settled instruments which are perceived as complicated and 'speculative' by potential customers. This perception is not correct: on the contrary, transparent values for futures contracts give operational information to market players.
- The size of contracts (5 tonnes of butter or SMP, i.e. more than 50 000 litres of milk) is surely a factor. The average EU dairy specialised farm produces less than 20 000 litres per month, from 7 000 in Poland to more than 100 000 in Denmark or Slovakia. For dairy farmers, the use of futures markets implies necessarily a collective approach such as Producer Organizations or cooperatives. On their side, because of their size, processors could more easily operate on futures markets; this could allow them offering more stable prices to farmers on part of their milk deliveries.
- However, because of a lack of knowledge and trust in futures, the use of such instruments remains limited. In addition, the necessary technically skilled staff and training needed to manage operationally financial hedging are expensive and may call for economies of scale.
- Physical delivery contracts (such as the Euronext ones) do not yet have enough liquidity and a sufficient number of trading operators. Also the absence of a specified delivery point is considered an obstacle by some, because homogeneity of the underlying product would not be automatically guaranteed. As an example, for cereals in the US there is the consolidated geographical 'basis system'[22] reflecting the precise position of the spot markets and the delivery points and also a quality check leading to a corresponding correction formula.
- Available contracts are for dairy products (SMP, butter, etc…), while farm output is raw milk. However, most of the contracts do not imply physical delivery, but are cash settled. In addition, milk and dairy commodity prices are well correlated. Therefore an operator could secure his revenue using contracts for dairy products (see Example): however, this increases the level of complexity of the hedging strategy (and thus the cost) and partly its effectiveness.
- Convergence of spot and futures prices at maturity is particularly important for the attractiveness of futures markets. This convergence is hampered in the EU dairy sector because there is no EU spot market place reflecting futures contracts prices. In addition, as already stated, in the case of dairy products this distortion risk is amplified due to the need for milk producers/buyers to hedge on SMP and butter prices. There is a reasonably good correlation between the milk price equivalent based on SMP and butter prices and the raw milk price but with a lag (of 3 to 4 months for the best correlation). Moreover, the milk price is strongly linked to the development of international SMP and butter prices.

  This highlights that a hedging strategy based on futures markets is more adequate when milk is mainly channelled into large quantities of SMP and butter, rather than into business-to-consumer products. In addition, the hedging strategy can be limited to a share of the volumes bought/sold. In the case of processors proposing to farmers two milk prices (A/B price system, with a B price calculation based on butter and SMP prices), the use of futures contracts on SMP and butter might be particularly relevant. Indeed, in several countries such as France, the UK and Spain, a significant share of farmers' milk is paid according to milk market price developments (A price), while the rest of the milk is based on SMP and butter prices (B prices).

  On the contrary, a producer/manufacturer of products using large quantities of dairy ingredients (SMP for yogurt e.g.), might find naturally convenient to hedge SMP sourcing on futures markets.
- Lack of transparent, representative and timely information on prices and quantities for milk and dairy products, in order to establish a fully-fledged interconnection among spot and futures prices. Though this argument is often used, it can be contested. The European Commission publishes weekly EU dairy products' prices and monthly Member States prices and production figures. Weekly prices are also available on Member States websites. Member State prices are often very well correlated one to each other, therefore market

[22] Basis is defined as the difference between the spot price of a given (local) cash market asset and the price of its related futures contract.

places can use the most representative markets to set up their contracts (e.g. EEX uses for butter and SMP an average of prices in Germany, France and the Netherlands). In addition, the European Commission is about to finalise a revision of the legal framework for price notifications: regarding dairy products, the new provisions will focus on commodities and will allow for a better comparability between Member States.

- Last but not least, margins required by stock exchanges (more precisely by clearinghouses) are particularly high for dairy products in the EU. Again, a double bias - vs US and vs other products - is observed: in the US, last margins' observations are 5% of contract value for butter and 6% for SMP, while in the EU margins are 9% for rapeseed and 10% for milling wheat. For dairy in EU, margins are and larger than 20%.

  Once more liquidity plays a key role: the higher the transactions number (together with the number and size of players) the lower the collateral/margins required.

8. Conclusions

This market brief illustrates how futures markets can represent a useful set of tools to manage price risk also in the dairy sector. The main elements to consider are:

- Volatility of dairy products prices is significantly higher than the historical level of the early 2000s (though lower than in 2007).
- Financial tools, such as futures and options could really contribute to reduce risks for dairy farmers/processors, especially in times characterized by relatively high volatility and low prices.
- Specific futures for dairy markets have recently been introduced in the EU. The volumes traded are still low but a growing interest for these contracts is observed, especially by the end of 2016.
- In the dairy sector, cash-settled contracts may be more suited rather than physical delivery contracts.
- In the US, where dairy futures have been available for a longer period, the open interest (number of open contracts) for SMP represents 12% of the domestic production. The open interest for SMP in EU futures is significantly increasing but only close to 1% of the EU production.
- Several obstacles are reported to affect the expansion and the use of futures and options in the dairy sector:
  - dairy products are not as homogenous as grains/crops;
  - liquidity is still low;
  - the amount of knowledge required to handle these instruments is high, and lacking in the sector.

Many of the issues are already (on the way to be) solved or clearly reduced in impact. On the production side, cooperatives and producer organisations could play a crucial role, centralizing hedging thus reducing the burden for individual farmers.

Contact: DG Agriculture and Rural Development, Unit Analysis and Outlook
Tel: +32-2-29 91255 / E-mail: Agri-C2@ec.europa.eu
http://ec.europa.eu/agriculture/markets-and-prices/index_en.htm

Annex

Table 8: Measures adopted to support the dairy sector

Safety Net	Exceptional market measures	Other measures
• Prolongation of the intervention period and increase up to 350 000 tonnes of the SMP ceiling determining the quantities that can be bought at fixed price (169.8 EUR/100 kg) • Private storage aided scheme for SMP and butter • Enhanced private storage aided scheme for SMP (higher support rate with longer storage period - 365 days)	• Private storage aid scheme for cheese • 38 million EUR of exceptional aid to Baltic countries and Finland, particularly affected by the Russian import ban, also with possibility of national top-up (2014) • 420 million EUR of targeted aid for the livestock sector, with the option of a 100% top-up using national funds (2015) • Possibility of voluntary agreements between farmers to limit milk supply for a 6 months period, starting from 13 April 2016 and extended until 13 April 2017 (based on Article 222 of the Common Market Organisation) • 150 million EUR aid for milk production reduction (2016) • 350 million EUR support package to the livestock sector targeted to activities of market stabilisation and economic sustainability, with the option of a 100% top-up using national funds (2016)	• Establishment of a task force on agricultural markets • Temporary increase in state aids • Increased rates of advanced payments under the direct payment scheme • Increased funds for food promotion programmes • Advancing of the Milk Package report from year 2018 to year 2016 • Milk for Syrian school children
To know more, see also: http://ec.europa.eu/agriculture/milk/policy-instruments/index_en.htm http://ec.europa.eu/agriculture/russian-import-ban/legal-acts/index_en.htm#dairy http://europa.eu/rapid/press-release_IP-16-806_en.htm http://ec.europa.eu/agriculture/newsroom/288_en.htm http://europa.eu/rapid/press-release_IP-16-2563_en.htm		

Source: DG Agriculture and Rural Development.

Financial Vocabulary

- **Cash-settlement/physical delivery**: a settlement method used in certain futures and options contracts where, upon expiration or exercise, the seller of the financial instrument does NOT deliver the actual underlying asset but instead transfers the associated cash position. For sellers not wishing to take actual possession of the underlying commodity, cash-settlement is a more convenient method of transaction: the purchaser of a cash-settled futures contract is required to pay the difference between the spot price and the futures price, rather than having to take ownership of the physical goods. Vice versa, a physical delivery contract triggers the commitment to deliver/buy the **underlying** commodity.
- **Clearinghouse**: to minimize **counterparty risk** to traders, trades executed on regulated futures exchanges are guaranteed by a clearing house. The clearing house becomes the buyer to each seller, and the seller to each buyer, so that in the event of a counterparty default the clearer assumes the risk of loss. This particular feature enables traders to transact without performing 'due diligence' on their counterparty.
- **Derivative**: a contract between two (or more) counterparties whose value is based on an agreed-upon **underlying financial asset** (in our case agricultural commodities, but it could be bonds, currencies, interest rates, indexes, stocks, etc…). Among the others, futures and options are derivatives, typically used for **speculation** and **hedging** purposes.
- **Hedging**: an investment designed to reduce the risk of adverse price movements in an asset, not too far from an insurance policy. There is a natural risk-reward trade-off in hedging: while it reduces potential risk, it also limits potential gains, at least with basic strategies.
- **Leverage**: in futures markets, leverage refers to having control over large cash amounts of commodities with comparatively small levels of capital (such as the margin accounts). Futures positions are rather highly leveraged because the initial margins that are set by the exchanges are relatively small (typically 5-15%) compared to the cash value of the contracts in question. This makes futures (and above all options, even highly leveraged) particularly appealing for speculators: due to the high leverage, a small change in futures prices can translate into a huge gain (or loss...).
- **Long/short position**: a short position is an investment strategy where the investor sells a product borrowed in the open market. Typically, the expectation of the investor is that the price will decrease over time, at which point he will purchase the product in the open market and return the product to the broker which he borrowed from, thus making a profit. The long position is obviously the opposite one, with opposite considerations.
- **Margins**: in futures markets, margin (or performance bond in the US) refers to the initial deposit of 'good faith' made into an account in order to enter into a futures contract (in the stock market, margin is the use of borrowed money to purchase securities). The futures exchange states a minimum amount of money that must be deposited into the account (often in term of percentage of the contract): this original deposit of money is called the **initial margin**. Then, the amount in the margin account changes daily as the market fluctuates, according to the **mark-to-market** principle: every day, profit and losses computed as variation of the fair value from the previous day's market value are credited/debited. If the margin account drops to a certain level (the **maintenance margin**) because of a series of daily losses, a **margin call** is launched asking for an additional deposit into the account to bring the margin back up to the initial amount. Predetermined initial margin and maintenance margin amounts are continuously under review: at times of high market volatility, margin requirements can be raised. In financial jargon, a margin is simply a **collateral** designed to minimize **credit risk**.
- **Open interest**: the total number of open (or outstanding, that is not closed or delivered) futures contracts that exist on a given moment in a given market. It reflects the depth/size of the market, since it's the overall quantity of commodity currently traded, each contract counted once.
- **Speculators**: market participants trying to profit from changes in the price of the underlying asset. For example, a trader may attempt to profit from an anticipated drop in the price by selling (or **'going short'**, or taking a **'short position'**) the related futures contract.
- **Underlying asset**: the product on which a future/option contract is based on. The price of the underlying is the main factor that determines prices of derivative: thus, a change in the underlying results in a simultaneous change in the price of the derivative asset linked to it.
- **Volume**: the total number of contracts transacted for a specified security/commodity during a specified time period. It reflects the liquidity of the market, since every trade is counted and a single contract could be bought and sold several times.