Trading places...

The role for derivatives in the Australian dairy industry

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Introduction

The dairy industry is a significant sector within Australia’s agricultural industry, and an important component of the Australian economy.

In round numbers the Australian dairy industry:
- produces about 10 billion litres of milk each year from a herd of nearly 1.7 million cows
- employs around 40,000 people
- generates nearly $5 billion in farmgate revenues, which is transformed into about $13 billion of dairy products for consumption, and
- exports about $3 billion in dairy products.

However, the Australian dairy industry is currently experiencing significant turmoil. Dairy farmers are descending on the halls of parliament, protesting about their dire financial plight, and asking those in government to intervene and help solve the industry’s problems.

For dairy farmers, this turmoil seems all too frequent. It is once again channelled into the farmgate price for milk that dairy farmers receive.

Regardless of industry, price volatility creates risk. The more significant that volatility is, the more significant that risk is on a business. For long term assets like dairy farms, not knowing how your financial performance is likely to fluctuate each year makes it near impossible to plan properly and make strategic decisions.

If dairy farmers know at the beginning of a season what the minimum farmgate milk price is going to be, they are able to make operating decisions that enable them to maximise their profits for the year, and even make strategic investments for the coming seasons.

For example, if the expected farmgate price is above a dairy farm’s basic cost of production – which is usually based on a grass-fed herd, then a dairy farmer might decide to purchase additional feed to help bolster milk production above what they could achieve on grass feed alone. But if a farmer, in good faith, makes production decisions like this based on an expected farmgate price provided at the beginning of a season, and then that farmgate price falls at the end of the season, then the farmer’s expected profits for the year will fall, or even evaporate.

The Australian dairy industry faces an interesting array of challenges. The basic product it produces needs to be transformed for it to be stored and resold at a much later date. We produce more than we need to meet local demand, and the excess product that is produced is sold in a global market at a world price. We are not a significant enough player in the world market to set the price, and therefore, to a large degree, the fortune of our local industry is at the whim of global market forces.

However, these challenges are not unique to dairy, or other Australian agricultural products. Yet, other industries have been able to find ways to manage these challenges and implement strategies to minimise the risk of extreme price volatility.

In this Research Paper, KPMG Economics briefly examine some of these issues and identify approaches that could be employed to help the dairy industry recover and prosper.
The lineage of the Australian dairy industry can be traced back to 1788, where seven cows and two bulls made the journey with the First Fleet to become the embryo of the modern industry².

From these modest beginnings – which, consistent with the theme of the First Fleet, included a 7-year period on-the-run when the cattle escaped their ‘captivity’ from a farm at Parramatta³ – the national dairy herd has now grown to around 1.7 million⁴.

One of the most significant reforms experienced in the dairy sector was the implementation of industry deregulation in 2000. This action removed state and federal industry-specific legislation, including discontinuing regulated sourcing and pricing of drinking milk, and the supporting of manufacturing milk prices⁵.

The purpose of this Research Paper is not to evaluate the pros and cons associated with the implementation of dairy industry deregulation in Australia, but rather to take it is as a given that the days of heavy government intervention in the domestic dairy sector are over, and that market forces will continue to dictate the prosperity of the industry into the future.

With a primary focus on the Victorian and Australian dairy industry, key facts⁶ associated with the industry’s performance over nearly the past two decades include:

- Victoria’s share of the Australian dairy industry increased post deregulation, growing from about 62 percent of the dairy cattle herd in 1998 to about 68 percent in 2015.
The number of the dairy cows (in milk or dry) in Victoria was about 1.27 million in 1998, and as of the end of FY15, herd size had decreased to 1.15 million (or -9.5 percent); while at a national level the number of the dairy cows (in milk or dry) had fallen from 2.06 million to 1.69 million (or -18 percent).

Consistent with the reduction in herd size, the number of dairy businesses has declined significantly. In 1998, there were 8,500 dairy businesses in Victoria producing milk, but by 2015 the number of dairy businesses had fallen to just under 5,200.

This rationalisation bought with it a change in business practices, with on average, dairy businesses in Victoria increasing their average milk producing herd size from 150 head in 1998 to 220 in 2015. This compares to elsewhere in Australia, where the average number of dairy cows (in milk and dry) per dairy business has grown from 111 to 138 between 1998 and 2015.

The average price received by growers for milk produced (c/L) has grown at 3.6 percent per annum, from about 25.6 c/L in 1998 to 47.1 c/L in 2015. Prices for producers have been extremely volatile, with the standard deviation on the average nominal price for the period from 1998 being 25 percent. This price volatility has been somewhat muted in recent years, but has still ranged between 12 percent and 14 percent since 2010.

Consistent with the profile of price received for milk produced, and the shakeup that has occurred within the dairy industry over the past two decades, average gross revenue from milk production per dairy business has also been extremely volatile, with year-on-year revenue swings ranging between +51 percent and -33 percent between 1998 and 2015.

Average farm debt accelerated during the mid-2000’s, but declined in FY07 and FY08 as the industry received higher prices and improved profitability.

Dairy farms are now consistently carrying higher debt levels than has historically been the case, and since 2009 average debt per dairy farm has ranged between 125 percent and 150 percent of their annual revenue from milk production.

Consistent with revenue outcomes, profitability has been highly volatile and rates of returns quite low, averaging only 2.2 percent since 1990.
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The world market for milk products has grown significantly since 1999, with world milk supply now about 30 percent higher than production levels 17 years ago.

Australia consistently produces greater amounts of fresh milk than it consumes, with the remainder utilised in manufacturing processes and exported as various dairy products, including milk powders, butter and cheese.

Since the turn of this century Australia’s milk production as a proportion of world supply has declined. In 2000, Australia contributed about 11.2 million metric tons (mt) of fluid milk into a world market of about 386.2 million mt of fluid milk, which represented about 2.8 percent of world supply. By 2015, Australia’s fluid milk production had fallen to about 10 million mt, which represented around 2 percent of world supply (491.2 million mt).

The major milk producers in the global dairy supply chain are the European Union (148.1 million mt), the United States of America (94.5 million mt) and India (64 million mt). New Zealand produces about 21.4 million mt, but more than 97 percent of this is exported.
Other important factors influencing the world dairy market include:

- Global trade in whole milk powder (WMP) has increased substantially, growing by 150 percent between 2001 and 2015.
- Demand from China was the primary driver of this massive growth in WMP global trade. In 2001, China imported about 41,000 mt of WMP, however by 2014 WMP imports into China had increased to 671,000 mt. However, the imported volumes of WMP in 2013 and 2014 was in excess of underlying domestic demand, which resulted in an inventory build up of the product. The impact of this stock build up has been a dramatic fall in the volume of WMP imported into China in 2015, declining by more than 50 percent to 310,000 mt.
- The global price for milk, as measured by milk powders or other traded dairy products, shows high levels of volatility.
- Analysis of the GDT Price Index for dairy products, which is an amalgam measure for all dairy products traded, shows in balancing demand and supply fluctuations, price adjustments contribute twice as much as compared to supply adjustments in achieving equilibrium in the global dairy market.
- It appears that prices for milk paid to dairy farmers in Australia follows the world price. As Australia is a relatively small player in the world dairy market, it is not surprising that the domestic dairy industry is a ‘price taker’ rather than a ‘price setter’.
The phenomenon of ‘hog cycles’, which are generally referred to as agricultural cycles, is well understood in economic literature, first recognised in the 1920’s by economists Hall and Ezekiel10 and Hanau11, and then further developed into the ‘cobweb’ theory by Kaldor11 in the 1930’s.

Broadly, the milk cycle occurs in the following way. When milk production has been profitable for a while, producers as a group begin to expand production to take advantage of the expected profit opportunity. In the very early stages of expansion, the increase in non-milk producing herd numbers may reduce milk production temporarily as feed is shared between a greater number of cows per farm, resulting in lower milk production per cow. Expansion typically continues until larger supplies cause prices to drop to unprofitable levels for most producers. Some producers respond by either cutting back on their production (through slaughtering stock) or by leaving the dairy business. As a smaller milking herd is later reflected in smaller supplies of milk, prices normally trend higher again, profits improve and the stage is set for another period of cyclical expansion12.

KPMG Economics’ analysis of supply and price data for milk at a global and Australian level shows that the milk market follows a near perfect ‘hog cycle’. The global cycle occurs within the same year, while in the smaller market of Australia the supply response lags by one year which reflects the time taken for infant dairy cows to produce milk.

However, we note that different to the theoretical models, the price and supply oscillations for the milk cycle are on different scales. That is, a relatively small change in supply appears to generate a significantly larger change in price.
Using futures to help manage price risk

While the phenomenon of the ‘hog cycle’ was identified in the 1920’s, it wasn’t until the 1960’s that financial markets created tools to help mitigate the risk associated with it. The Chicago Mercantile Exchange (CME) developed frozen pork belly futures contracts, which allowed meat packers to manage the volatility in the spot market for hog prices, and also manage inventory price risk for already processed frozen pork carcasses.

A futures and derivatives market for dairy products already exists, with trading occurring on exchanges in Europe (EUREX and NYSE Liffe), the United States of America (CME) and New Zealand (NZX). These exchanges offer a range of dairy futures and options contracts, including for both the physical delivery and cash settlement for these contracts.

It appears that participants in the Australian dairy industry do not utilise these risk management tools – or utilise them to a large degree – in managing the price volatility that exists in the sector.

The rationale as to why the Australian dairy industry is not using forward contracts and options more extensively seem obtuse, including ‘the derivative market isn’t deep enough’ or ‘contracts aren’t written in $A denominations, so we’d just be taking on more forex risk’.

There are good examples of how other Australian agricultural sectors have employed futures contracts and options to help provide certainty to farmers for products that are exposed to global price volatility.
Dairy farmers should look to sugar growers for answers

Of the Australian agricultural industries that utilise futures contracts, the one that is the most aligned to the dairy industry is sugar. That is:

– sugar cane and fresh milk both require ‘processing’ in order for the product to be stored for longer periods
– the domestic market only consumes about 21.5 percent of local production, with the remainder exported
– the Australian sugar industry produces about 2.5 percent of world sugar production15.

But unlike the dairy industry, domestic sugar growers have the ability to lock in a guaranteed price at the beginning of the season for up to 65 percent of their production, or choose to take on the price risk through selling their product on the spot market at the time of harvest.

Despite the competitive tensions currently occurring within the sugar supply chain in Australia, the pricing model adopted within the industry is still a good example of how risk could be more effectively managed in agricultural markets subject to significant price volatility.

The following paragraphs provide a summary of the forward pricing system employed by Queensland Sugar Limited (QSL)16 that allows for risk management strategies to be implemented by suppliers (and therefore their contracted growers) for current and future seasons.

The bulk raw sugar export program managed by QSL is run as a ‘pooling system’, where suppliers elect to pool their raw sugar together to be priced and sold. The pool works in a way where the aggregated raw sugar is priced collectively, with revenues and costs shared proportionally on the basis of amount contributed to the pool.
Broadly there are two types of pools:

- **Committed** – suppliers are required to commit a fixed volume of raw sugar before the season commences. This allows prices to be set prior to harvest (up to 3 years prior). A supplier can only commit up to 65 percent of their estimated export tonnage to these pools.

- **Uncommitted** – these pools take all the production that is not already allocated to the Committed pools.

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<tr>
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<th>QSL US Quota Pool</th>
<th>QSL Guaranteed Floor Pool</th>
<th>QSL Actively Managed Pool</th>
<th>QSL 2017 2-Season Forward Pool</th>
<th>QSL Harvest Pool</th>
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<tr>
<td><strong>Pool type</strong></td>
<td>Committed</td>
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<td><strong>Pool objective</strong></td>
<td>Encompasses the returns for sales made by QSL into the USA under the Tariff Rate Quote issued for the importation of sugar.</td>
<td>Provides a guaranteed minimum return with the potential for higher returns.</td>
<td>Targets the best return over the season by pricing more frequently as short-term market opportunities arise.</td>
<td>Priced over 2 seasons and targets the best return for raw sugar to be produced in the 2017 season.</td>
<td>Designed to manage possible production fluctuations across the 2016 season.</td>
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**QSL Pool Performance**

- **Harvest Pool**
- **Guaranteed Floor Pool - actual**
- **2-Season Forward Pool**
- **Guaranteed Floor Pool - guarantee**
- **Actively Managed Pool**
- **Passive management benchmark**
For most QSL pools the gross price of raw sugar is determined from the Intercontinental Exchange No.11 (ICE 11) futures market. ICE11 values are denominated in USD, but are converted into an AUD return through the use of USD:AUD forward foreign exchange contracts.

By selling ICE11 futures contracts and using foreign exchange futures contracts, QSL locks in a price for raw sugar prior to the sale and shipment of raw sugar to a customer, thereby reducing the exposure of a potential fall in prices prior to making a sale when the physical product is ready to be sold in the open market.
Trading places… volatility for certainty

Just because it appears the Australian milk market follows a ‘hog cycle’, it doesn’t mean there is a magical solution to resolve the current upheaval being felt in the dairy industry. However, understanding the milk cycle should allow for better pricing and supply strategies to be adopted to help mitigate the significant volatility being faced by the industry.

Using a combination of spot, futures and options contracts might allow Australian dairy producers, processors and industrial consumers to more effectively manage price shocks that impact the industry regularly.

Achieving this will transform the Australian dairy industry, enabling it to have a ‘premium’ discussion between the supply chain participants, rather than a ‘price’ discussion.

KPMG Economics appreciates that such derivative products are not readily available in the Australian financial market, but they are available in overseas markets, and with the use of foreign exchange hedges, AUD price certainty could be achieved for Australian dairy suppliers.

Implementing effective risk management strategies for price volatility in agricultural markets is complex. It takes time, with pork bellies a case in point. It can be confusing to the grower and supplier, and even for those operating in management positions within the industry. However, these are not valid reasons to continue to let the Australian dairy industry swing from peak to trough, placing pressure on livelihoods and economic value in the process. It seems only logical that dairy industry participants should look to implement price pooling arrangements with forward contracts that have been so effective in giving sugar cane farmers revenue certainty in not only a current season, but several seasons out.

By engaging in carefully implemented futures trading, the Australian dairy industry may be able to create a more stable, or even better, financial outcome for domestic milk producers. This would hopefully bring some optimism back to the industry.
End Notes

1. Australian Dairy in Focus 2015, Dairy Australia
3. Ibid
4. ABS, Agricultural Commodities, Australia, 2014-15, Cat. No. 7121.0, Table 1
6. Data sources include ABS, ABARES, Dairy Australia
7. Data sources include USDA, Global Dairy Trade, NZX
15. ABARES, Agricultural Commodities, March Quarter 2016
17. QSL Pool Choices, 2016 Season
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