



Dairy Economics 101

March 2017 – Part of ADPI COE Training Modules

I. Introduction

Price volatility in the US dairy industry started 25 years ago following reforms in the 1985 Farm Bill. Changes in dairy policy in Oceania, the EU, and the US have led to increasingly volatile dairy commodity prices. Since 2007, regional dairy markets in the EU, US, and Oceania have become inter-related and dairy has developed into a global market. Dairy prices are inherently volatile due to seasonal production in some regions and the perishable nature of milk. In addition, price volatility is aggravated by government regulations (e.g. FMMO's) and imperfect price discovery and price transmission along the supply chain.

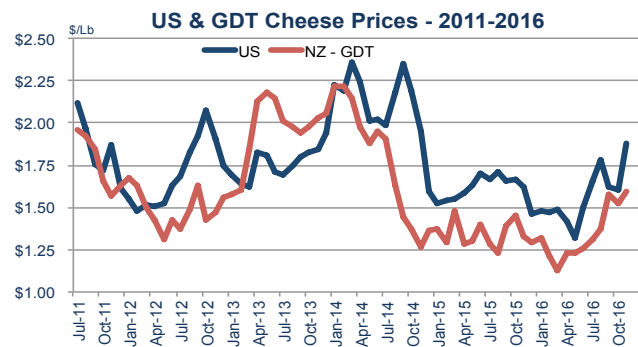
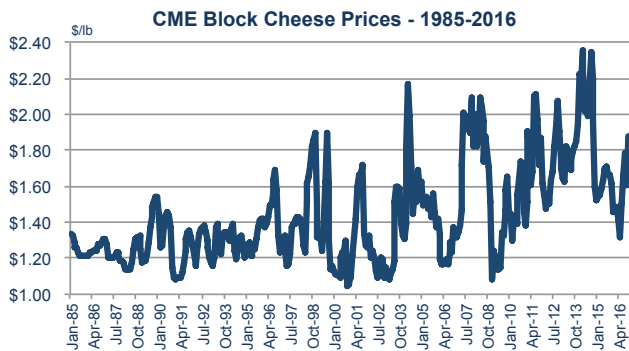
Dairy commodity prices are impacted by changes in supply conditions in key milk producing/exporting regions – EU, US, and New Zealand – and demand conditions in key importing regions – China, Russia, and Southeast Asia. The main drivers of milk production include: feed prices, farm margins, # of dairy cows, milk output/productivity per cow, and weather – impact on both feed and cow comfort. Dairy product supply and demand factors include production, stocks, trade, and consumer demand – retail, foodservice, and ingredient. In key supply regions (US, EU, and Oceania), reliable data is available, but with some time lag. In other regions, data is scarce or not useful. Demand data is notoriously difficult to obtain, particularly for US food service usage. In developing countries, data does not exist. This lack of demand data makes analyzing markets and predicting prices more challenging.

II. Commodity Prices

In the US, milk prices in the Federal Order and California regulated systems are derived from prices for 4 major dairy products – cheese, dry whey, butter, and nonfat dry milk powder. While macro dairy and economic drivers impact prices for each of these products, they also have their own unique supply and demand dynamics. In the US, CME markets for cheese, butter, and NFDM are the primary price discovery mechanisms. This market trades the marginal load of product, so that introduces additional volatility into the pricing system.

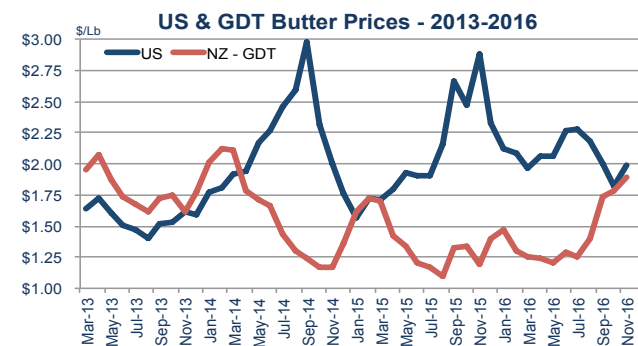
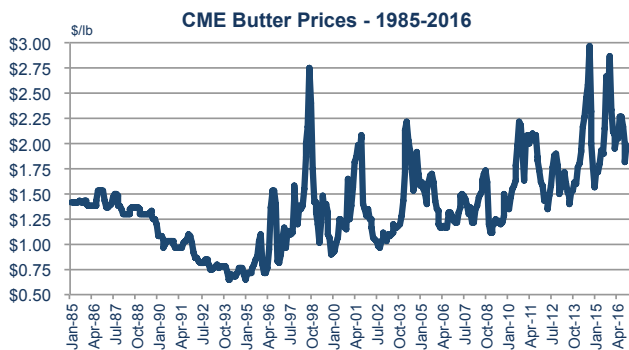
Cheese

Following a reduction in government cheese stocks and the support price in the 1980's, cheese prices started reacting to market forces in 1989. Since that time, cheese price volatility has increased with a range from near \$1.00 to \$2.50. Up until 2007, US cheese was not competitive in the global market. Since 2007, US, Oceania, and EU cheese prices have moved closer together, which has resulted in periods when US exports were competitive. Cheese production has been increasing every year, as has demand on a per capita basis. Stocks have also increased over time, so the days of supply measure of stocks is a more accurate gauge of the market's surplus or deficit.



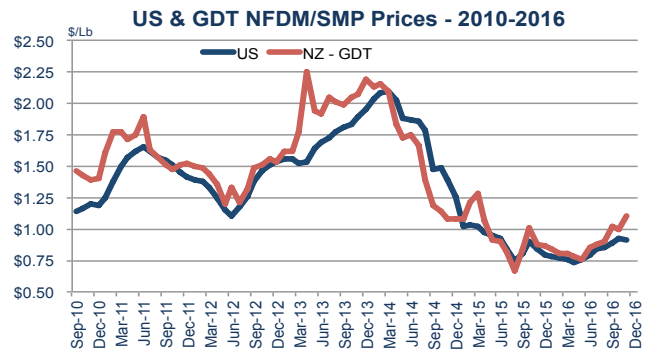
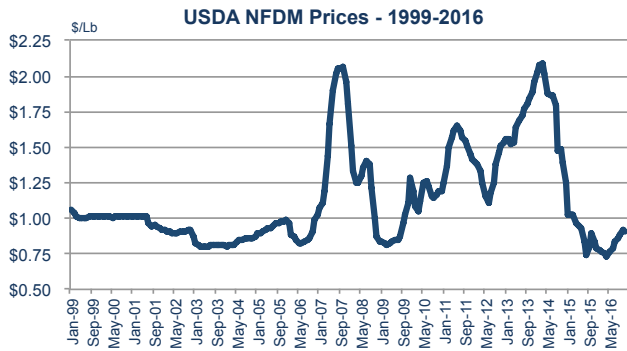
Butter

Following a reduction in government butter stocks and the support price in the early 1990's, butter prices started reacting to market forces in 1995. Since that time, butter price volatility has increased with a range from near \$1.00 to over \$3.00. Like cheese, after 2007, US and global butter prices have moved closer together at times, which has resulted in periods when US exports were competitive. However, for the last 2 years, US butter prices have been far above global levels. Like cheese, a small percent of US butter production is exported, so the domestic market has far more impact on pricing. Given the renewed interest in dairy fat in general, and butter in particular, the demand for butter has become more inelastic over the last few years. As a result, demand has been sustained at higher price levels than in the past (note uptrend in prices in CME price graph below). This has shifted the butter price structure up and likely supports higher average prices in the future.



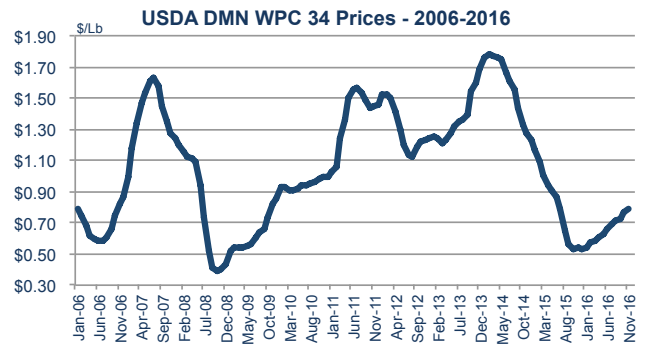
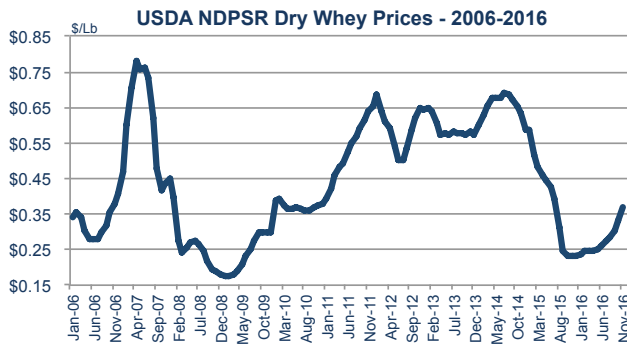
Milk Powder (NFDM)

Following a reduction in government NFDM stocks and the support price in the mid-2000's, NFDM prices started reacting to market forces in 2006, about a decade later than US prices for cheese and butter. Since that time, NFDM price volatility has increased with a range from near \$0.80 to \$2.25. Before 2006, the government subsidized US exports of NFDM. Since 2007, US NFDM prices have had to compete with NZ and more recently EU markets. Therefore, US prices closely track global prices as around half of total production is exported. A number of major importing countries of milk powder are also oil exporters, so the price of crude oil has a good correlation with milk powder prices.



Whey Complex

The whey complex consists of both protein and carbohydrate components of the liquid whey off the cheese vat. The carbohydrate stream includes sweet dry whey, the main commodity product in the whey complex, along with lactose and whey permeate powder. The prices for these products tend to move together directionally, but not in lockstep. The protein stream includes these major products: WPC 34, WPC 80, and WPI 90. There are a number of products with protein content within this range as well. The prices for the different WPC and WPI products do not always move together. WPC 34 has a higher correlation to NFDN while the higher protein products trade more like specialized ingredients. Given the low margins in cheese production, the revenue/profit generated from the whey stream often determines the viability of the cheese plant enterprise.



III. Summary

Prices for US dairy commodities have become more volatile over the last 10 years as global supply and demand factors have a greater impact on the US than before. This makes analyzing markets and forecasting prices more challenging as data is often lagged or in some cases, non-existent. In the US, there is a lot of information available, a benefit of the regulated systems for dairy. However, at times, there is simply too much data and it is difficult to make sense of things. Over the years, changes in price direction are usually a result of changes in supply (e.g. milk production). Therefore, the factors impacting milk production should be followed closely along with the key drivers of each product. As the

dairy market evolves over time, these drivers may also change, so the approach to analyzing markets needs to adjust as well.

IV. References and Additional Information

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Other resources:

USDA Dairy Market News

<https://www.ams.usda.gov/market-news/dairy>

USDA FAS Dairy: World Markets and Trade

<http://usda.mannlib.cornell.edu/usda/current/dairy-market/dairy-market-12-16-2016.pdf>

USDA FAS individual country reports

IDF World Dairy Situation (fee charged)

<http://store.fil-idf.org/product/world-dairy-situation-2016/>