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Risk Management in the Dairy Industry

Introduction

Throughout the 1970s and 1980s, prevailing milk prices tended to be stable. This was the result of high support prices, which served to mute price signals from the marketplace. As the support price level has dropped, the price movements from dairy commodity markets have become more influential. Consequently, minimum prices, which incorporate commodity prices, have become more unstable and unpredictable.

The use of tools to manage prices received or prices paid is a departure from traditional business conduct in the dairy industry — that is, producers and processors both have tended to be price takers, not price makers. Both producers and processors have also been content to live with price predictions, decisions and consequences, even if they were wrong. The development of risk management tools in the dairy industry has given producers and processors the ability to reduce the inherent price instability in an industry that relies on the marketplace for price information.

What is Risk?

Risk is the probability of an alternative (perhaps negative) outcome — the higher the probability, the higher the risk exposure to the individual or the firm. In the dairy industry, everyone can appreciate a certain kind of risk — price risk. One example of price risk is fluctuations in input costs (such as milk) that may affect the financial stability of a processing company. Another example of price risk is variability in the price received by producers for milk sold every month. The field of risk management provides tools to address these issues; the tools give users the means to eliminate or mitigate the probability of undesirable price outcomes.

Market analysts and brokers will often subdivide price risk further into price uncertainty and price volatility. While they may sound identical, they are not. Uncertainty implies no knowledge of where price is headed, while volatility implies expected price movement. Furthermore, price volatility does not imply that a firm is facing a high degree of price risk. Why not? Firms may use tools to “lay off” risk and protect profitability, such as the futures market, forward contracts or options.

Cash Contracts and Forward Contracts

Everyone is familiar with cash transactions; they occur everyday. Simply, cash transactions are characterized by immediate and simultaneous payment and delivery. When cash transactions are made, supply and demand are known, and price is relatively easy to determine. In contrast, a forward contract requires a price negotiation (and, perhaps, actual payment) in advance of when services or the product are delivered. Forward contracts are made without agreement as to what supply and demand might be at a future date. Disagreement on the contract price may be evident because of the length of time that elapses from the date of discussion until the contract's delivery date. Price volatility may be affected by the forecasts made by the buyer or the seller. Some everyday examples of forward contracts are airline tickets, college tuition, automobile insurance and rent paid on an apartment.

The primary benefit of forward contracts is the reduction of price risk, which comes about because the price is agreed upon in advance of the actual transaction. However, a number of detracting points are worth considering. First, the contract is binding and is impossible (or nearly so) to cancel. Second, although the contracts are binding, they are not guaranteed, and as a result, one party may be subject to default risk. Third, because the price is likely to "move" from what was agreed upon, the buyer is likely to pay more (or the seller is likely to receive less) than the going rate. Fourth, the contracts include specific terms and are unique to the original parties involved. Consequently, they are not easily traded to a different party.

Futures Contracts

A futures contract is a sales contract that specifies:

1. a description of the commodity to be traded,
2. the quantity of the commodity to be traded,
3. the delivery point,
4. the delivery period,
5. the terms of delivery.

In short, all details of the transaction with the exception of price are fixed and known in advance; potential buyers and sellers understand that price is the only variable remaining that must be negotiated. The commodity to be traded must also be undifferentiated (not branded) and homogeneous. The terms of the contract make it homogeneous and "tradable", whereas forward contracts are not easily exchanged between parties because they are very specific in their terms.

Futures contracts are available for many agricultural commodities, as well as metals, natural resources and currencies. About 90 contracts are available on 10 exchanges, which are located mostly in Chicago and New York.

While futures contracts may have some similarities to forward contracts, they do have unique characteristics and aspects.

1. Trading of contracts is conducted on an organized exchange with specific rules for trading.
2. Contracts are standardized for size, delivery date and delivery location.
3. Contracts can be legally cancelled by taking an equal and opposite position because the contracts are generic and not personal. This means if you have purchased a futures contract, you may offset your position by selling a futures contract identical to the one being held. For example, a producer who sells a futures contract for 200,000 pounds of Class III milk with a December delivery date must at some point before December buy a futures contract for 200,000 pounds of Class III milk with a December delivery date. The opposite position cancels the producers position, and no actual delivery must be made.
4. The exchange acts as a common guarantor of all contracts; the exchange covers the contract in the event that one party defaults.

Futures contracts also provide valuable economic functions. Futures contracts:

1. Shift price risk to other parties involved in futures markets who are willing to take on risk in hopes of a future payoff.
2. Help to stabilize prices near the point of delivery specified in the contract.
3. Provide a means for price discovery and information collection.
4. Promote fair and orderly trading.

Hedging and Speculating

What is hedging? In general terms, a hedge is a guard against a loss by making a counterbalancing “bet”. More specifically, the objective of hedging is to maintain the market value of inventory during the period it is held. One way to do that is to take equal and opposite stands in the futures market and the cash market. This practice has been termed "locking in" a desired price.

While hedging is a useful tool to help minimize risk, it is not the only answer to all pricing difficulties. Futures based risk management does not guarantee higher prices. While hedging may lead to higher–than–market prices, it may also lead to lower–than–market prices. Remember, hedging “locks in” a price, which may or may not turn out to be higher than the cash market price.

What, then, is speculating? As elementary as it may sound, speculating is the opposite of hedging. In one sense, a speculator is someone who lets the market determine whether or not money will be made on held inventory. Put another way, any firm holding inventory without the protection of futures contracts is speculating that the value of the inventory will remain the same or increase. Speculating can also be accomplished without any inventory at all. In this regard, a speculator makes money by buying and selling futures contracts; a speculator may move into and out of several positions every day in an attempt to make profits.

Two examples:

1. Jack's Cheese Company has limited input to his customers as to how retail prices for its cheese should be set. By using the futures market to lock in raw product costs, Jack's is hedging.
2. White Gold Company sells pints of fluid milk in convenience stores. It typically adjusts its retail prices according to raw material prices. By using futures to lock in raw material costs, White Gold is speculating. Why is White Gold's activity in the futures market not called hedging? The answer is because White Gold may pass along any increase in raw material cost to the retail price. By locking in costs for raw materials, White Gold is speculating that raw material costs will increase or at least not go any lower.

What is the difference in the two examples? Risk exists when values are fixed at only one end of the marketing chain. In example #2, it is not imperative to fix costs if the sale price is not fixed, and thus, there is no hedge necessary for White Gold.

Because trading volume and market "thinness" are a concern for exchanges, futures contracts are available for certain products only. On the Chicago Mercantile Exchange, futures are available for federal Class III milk (cheese) and federal Class IV milk (butter and powder) and for finished butter.

Basis

Unfortunately for California producers and processors, what is available to trade on the exchanges follows federal order pricing and not California pricing. As such, the minimum prices that are realized in California will not always match very well with those on the exchanges. This is the idea embodied in what is called basis, which is the difference between a cash price at a specified location and the price of a futures contract for the same commodity.

Dissimilarities in the systems' minimum pricing formulas are the reason for price differences. One large difference is the use of National Agricultural Statistics Survey prices by the federal pricing system and the use of the Chicago Mercantile Exchange by California. A second difference that applies to

differences in the federal Class III price and the California Class 4b price is that the federal system includes barrel prices in their price calculation while California does not.

While the pricing formulas are similar, these two stark differences can account for large price differences. For example, the average difference between the federal order Class IV prices and the California 4a price from January 1995 to July 2000 was $0.17. However, during the same period, the difference ranged from +$0.21 to –$0.98. The extent to which basis values vary is called basis risk, and while basis risk may be small relative to outright price risk, it is also not controllable or manageable by hedging. Given this, it is unlikely that a California producer or processor can hedge to the extent that he or she is totally insulated from changes in market prices.

How Hedging Works

With a hedging strategy, the producer takes a position in the futures market that is equal and opposite to the position taken in the cash market. A dairy producer who plans to ***sell*** milk at a future date and plans to ***buy*** futures contracts for the same time period is hedging. The position in the cash market is plain to see — the producer sells the milk that is produced. The futures position may not be quite as easy to understand. In order to get in and out of the futures market, the producer must offset any position taken. For example, a producer who buys a futures contract for 200,000 pounds of Class III milk with a December delivery date must at some point before December sell a futures contract for 200,000 pounds of Class III milk with a December delivery date. The opposite position cancels the producers position, and no actual delivery must be made.

The order of buying and selling matters in the futures market. If a producer wants to guard against price decreases in the future, he should sell a futures contract in the present and buy a contract in the future (at the time when prices are to be locked in). A hedging example is given below.

In August, the producer observes December Class III futures trading at $12.00/cwt. Assume a cost of production of $11.00/cwt. so the $12.00/cwt. price returns a sufficient profit to the operation. For simplicity, assume that the California overbase price and the federal Class III price are identical and that the producer receives exactly the overbase price for all milk sold.

1) In August, the producer sells a futures contract (200,000 lbs of milk per contract) for $12.00/cwt.
2) On January 5, the December Class III is announced (one month delay in price announcement for federal Class III and IV prices). The December Class III price can either be higher than or lower than the August Class III.

a) If the price is announced at $11.00/cwt., then the producer makes $1.00/cwt in the futures market...remember, he sold a contract for $12.00/cwt. and in December a contract can be bought (to offset the original position) for $11.00/cwt.
   i) Producer ***makes*** $1.00/cwt. in the futures market
   ii) $1.00/cwt. profit can be added to the $11.00/cwt. milk price that the producer actually gets for milk sold.
   iii) The producer ***gets $12.00/cwt***. for milk when the actual milk price is $11.00/cwt.

b) If the price is announced at $13.00/cwt., then the producer loses $1.00/cwt. in the futures market...remember, he sold a contract for $12.00/cwt. and in December a contract can be bought (to offset the original position) for $13.00/cwt.
   i) Producer ***loses*** $1.00/cwt. in the futures market
   ii) $1.00/cwt. loss can be added to the $13.00/cwt. milk price that the producer actually gets for milk sold.
   iii) The producer ***gets $12.00/cwt.*** for milk when the milk price is $13.00/cwt.

The second scenario described under (b) is not as favorable as the first because the cash market performed better than expected, but it is a potential outcome and illustrates a point about futures markets. The point of hedging is to lock in a price that gives an acceptable return to the operation. It should not be viewed as a "win" or a "loss" when prices are announced, but rather as making decisions that minimize price risk while returning an acceptable price.

A processor may also use futures markets to protect against price movements. However, a processor will likely want to protect against price increases, not price decreases. This may be especially true if the processor has fixed price contracts for sale of finished dairy products to customers.

1. A customer of Jack's Cheese Company wants a fixed price contract for 200,000 pounds of block Cheddar cheese to be delivered in May.
2. Jack's buys 10 May Class III contracts at $10.35/cwt. (using a 10–to–1 ratio of milk to cheese).
3. Cheese will be sold to customer at $1.2850 per pound in May (price agreed to in December).
4. Say that the futures price for Class III increases to $12.50/cwt. Jack's then makes: 10 contracts x ($12.50 – $10.35) x (2,000 cwts.) = $43,000
5. On the cash market, 200,000 pounds of cheese is sold for $1.2850 per pound = $257,000. However, Jack's paid $12.50 x 20,000 cwts. or $250,000 for the milk and it cost $0.17/lb x 200,000 or $34,000 to make the cheese.
6. While Jack's lost $27,000 in the cash market, it made $43,000 in the futures market.

Without the upward price protection afforded by participating in the futures market, Jack's would have lost $27,000 on the deal because it would have been "gambling" that the milk price would not go up, and they would have been incorrect.

Options: What they are and how they work

An option is a contract between two parties which gives the buyer the right (but not the obligation) to sell or buy a specified commodity at an agreed upon price during a known time period. Options give the buyer more flexibility than futures contracts. The two types of options are puts and calls. In addition, there are two "players" in options — buyers and sellers. The financial obligations are different (asymmetric) for buyers and sellers of options, analogous to the different financial obligations for insurance companies and consumers interested in obtaining insurance policies.

Puts give the buyer the right (but not the obligation) ***to sell*** a futures contract, and calls give the buyer the right (but not the obligation) ***to buy*** a futures contract. Puts are the most relevant type of option for producers because producers want to protect against downward price movements, i.e., puts provide protection against falling prices. Should the milk price decrease, producers with put options have the right to sell a futures contract at a pre–determined price. On the other hand, call options are the most relevant type of option for processors because processors want to protect against upward price movements, i.e., calls provide protection against rising prices. Should the milk price increase, processors with call options have the right to buy a futures contract at a pre–determined price.

To obtain a put option, a premium is required, similar to the way that insurance policies require premiums for coverage. Furthermore, the amount of the premium varies with the price at which the futures contract transaction will be exercised, called the "strike price". Larger premiums must be paid to obtain put options with high strike prices. For example, a producer should expect to pay more for a put option for Class III futures with a $15.00/cwt. strike price than a put option with a $12.00.cwt. strike price, all other factors being equal. Furthermore, the further away the exercise date, the more expensive the premium. Driving the higher premium is the idea that there are more opportunities to have unexpected price movements over longer time periods.

For other commodities such as feed grains, a dairy producer may be interested in taking advantage of downward price movements and can use call options to do so. The call options allow the holder the right (but not the obligation) ***to buy*** a futures contract at a pre–determined price. As such, the producer can put a cap on how much he pays for feed grains without limiting any further downward price movement.

A distinction should be made between the above descriptions that pertain to ***option buyers*** and an ***option seller***. A seller of options essentially takes on the role of an insurance company in which the maximum gain is the premium collected from the option buyers. However, the maximum loss is unlimited. In general, producers should not try to sell options to other parties because of the potential losses incurred should the price move against the seller. This type of strategy is effective only when prices are stable (flat).

To be clear, the remainder of the discussion on options will be limited to put option buyers, i.e., those who want to insure against downward price movements.

Alternatives for Options

Once an option has been obtained, there are three possible outcomes. First, the holder of the option can do nothing, in which case the option would expire. Because the option refers to a specific futures contract, which has an expiration date, the put option also has an expiration (maturity) date. After the maturity date, the option has no value.

Second, the holder of the option can exercise the option by assuming a futures position at the option strike price. While this may seem like a logical action, it is not normally done. There are commissions collected when futures contracts are bought and sold. Furthermore, the delivery point may be far from the producer's location, and delivery costs may be the responsibility of the producer.

Instead, most option holders elect to pursue a third choice — option holders ***offset*** their option position. For a producer who has purchased a put option, the offsetting position is to sell a put option. If the milk price has decreased, then the put option will have value to another party. Because this transaction serves only to offset the option, it is not the same as playing the role of insurance company, a practice that is risky and not advised.

Swaps

Swaps are yet another tool for managing risk. Remember that in the futures market it does not matter who sells a contract to a buyer because buyers and sellers are not matched up directly. Also, the exchange serves as the clearing house and as the guarantor of all contracts. In contrast, with swaps, there is a direct interaction of buyers and sellers, but no brokers and no clearing house. Simply, a swap is a contractual agreement in which two parties agree to make periodic exchanges with each other. Contained in the written agreement is a specification of the product to be exchanged, the timetable for payments and any other provisions necessary. Swaps allow a more tailored arrangement than

can be made with the futures market alone, and as such, basis risk associated with location, timing, quantity, etc. can be virtually eliminated.

An example will help to illustrate how a swap can work.

An ice cream manufacturer wants to secure butter at $1.25 per pound for an extended period of time on 100,000 pounds per month. To engage in a swap, the ice cream manufacturer must find a partner willing to "sell" butter at $1.25 and buy it back at the CME market each week. The other partner does not have to actually make butter as the exchange can be used for that purpose. The "supplier" is gambling that the market price will be, on average, less than the fixed price of $1.25 per pound for the duration of the agreement. For every month the supplier is correct, he collects a premium equal to the difference between the market price and $1.25 multiplied by 100,000 pounds every month.

There are two pricing scenarios that show how price alignment affects the flow of payments. The first case is when the market price is lower than the agreed upon price of $1.25 per pound. The ice cream manufacturer makes payments equal to the difference between $1.25 per pound and the market price multiplied by 100,000 to the engaging party ("supplier"). Even though the market price for butter is less than $1.25 per pound, the ice cream manufacturer must pay a total of $1.25 per pound — a portion of it goes directly to purchase butter and a portion goes directly to the supplier per the agreement.

The second case is when the fixed price is lower than the market price. The ice cream manufacturer still gets the fixed price of $1.25 per pound that it wants. However, the "supplier" now makes payments to the ice cream manufacturer equal to the difference between the market price and $1.25 per pound multiplied by 100,000 pounds.