GLOBAL ECONOMIC TRENDS: FORAGE, FEEDS AND MILK

Leslie J. (Bees) Butler[1]

ABSTRACT

Recent research has revealed that most agricultural markets are impacted by linkages to international markets, trade flows and US monetary policy, particularly those that affect international exchange rates. These linkages are increasing the price volatility of prices on our domestic markets. The result is that despite agricultural policies or industry actions aimed at stabilizing prices in domestic agricultural markets, broader involvement in international markets will continue to create price volatility in our domestic markets. This paper discusses the possibility of establishing a futures market for alfalfa, or alternatively, the possibility of finding cross-hedging possibilities in current futures markets.

INTRODUCTION

- We have recognized the increasingly global nature of markets for US agricultural products for several years. A number of recent papers in the literature have endorsed these trends and have increased our understanding of the strong links between international markets, trade flows, and the prices of our agricultural products. These international linkages have had an impact on trade flows for exports and imports (as might be expected), but more recently have been linked to the increasing volatility of our agricultural markets, and in particular, the prices that agricultural producers receive for their produce.
- Of course, price volatility is not new to agriculture. The highly inelastic nature of the demand for agricultural products is a major reason why price volatility might be expected. Increasing instances of volatility in milk prices has been recognized for at least the last 15 years, and the magnitude of the volatility has been increasing with each cycle we have experienced. In fact, the volatility of milk prices has been one of the many reasons why dairy feed prices, and particularly, alfalfa prices, have also increased in volatility.
- A recent study at UC Davis shows statistically that California alfalfa production is influenced by:
    - the profitability of alternative crops (cotton, tomatoes, trees and vines, particularly cotton prices),
    - the size of the state's dairy herd (because about 70% of California alfalfa is consumed by California dairies),
    - water availability and water costs,
    - variability of alfalfa prices (standard deviation of prices),
    - price expectations (lagged prices),
    - milk prices, and,

[1] Leslie J. Butler (ljbutler@ucdavis.edu), Department of Agricultural & Resource Economics, University of California, Davis, CA 95616. IN Proceedings, 2010 California Alfalfa & Forage Symposium and Corn/Cereal Silage Mini-Symposium, Visalia, CA, 1-2 December, 2010. UC Cooperative Extension, Plant Sciences Department, University of California, Davis, CA 95616. (See http://alfalfa.ucdavis.edu for this and other alfalfa symposium Proceedings)

    - the prices for corn and soybeans.
- The common thread running through all of these observations is the complex and volatile nature of constantly changing exchange rates. The analysis of exchange rate changes is extremely complex, and the details are far too numerous to go into any detail here. But the most significant implications of these changes are they (1) create volatility in domestic agricultural markets, and, (2) there is very little that individual producers or even agricultural industries can do about it.
- The issue of exchange rates is also beyond the control of most countries. Current policies in most countries is a "race to the bottom" – by which is meant, almost all countries in the world are currently engaged in attempting to reduce the value of their currencies in order to make their exports more competitive on world markets, because all countries are interested in increasing their exports in order to overcome the effects of the global financial crunch that we have experienced in the last three years.
- One of the macro-economic policies recently carried out here in the US is to inject $600 billion into the economy in order to drive interest rates lower. The effect of lower interest rates in the US is posited to force foreign investment down. This in turn will supposedly force foreign investment to go to other countries, thus forcing the recipient country's market-determined exchange rates to increase.
- So…the question is….what, if anything, can the individual producer do about the price uncertainty that results from these macroeconomic forces impacting our domestic agricultural markets and destabilizing prices?

PRICE VOLATILITY AND RISK

- What types of risk are producers exposed to:
    - Production or yield risk
    - Price or market risk
    - Institutional risk
    - Human or personal risk
    - Financial risk
    - Management of Risk
- Producers have a number of options to manage risk in agriculture, as well as a number of tools. Producers may choose any one or a number of the following options and, depending on their circumstances, decide how to mix and match them to reduce risk on their individual enterprises[2].
    - Enterprise diversification
    - Additional/alternative enterprises
    - Vertical integration
    - Production and marketing contracts
    - Hedging in futures and options contracts
    - Insuring crop yields and crop revenues
    - Financial reserves, leveraging and liquidity
    - Leasing inputs, custom work and off-farm employment/income

[2] "Managing Risk in Farming: Concepts, Research, and Analysis", by Joy Harwood, Richard Heifner, Keith Coble, Janet Perry, and Agapi Somwaru, Market and Trade Economics Division and Resource Economics Division, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 774, March 1999

- In this paper, I want to focus on just one risk management strategy – that of using futures contracts to reduce the volatility of prices that alfalfa producers currently experience and will likely experience in the future.

FUTURES CONTRACTS

- Futures contracts provide farmers (as well as processors, merchandisers, and others) with a method for reducing their risks. A primary use of futures involves shifting risk from a firm that desires less risk (the hedger) to a party who is willing to accept the risk in exchange for an expected profit (the speculator).
- A futures contract is an agreement priced and entered on an exchange to trade at a specified future time a commodity or other asset with specified attributes (or in the case of cash settlement, an equivalent amount of money).
- The U.S. exchanges that trade agricultural futures contracts include the Chicago Board of Trade; the Chicago Mercantile Exchange; the Kansas City Board of Trade; the Minneapolis Grain Exchange; the New York Coffee, Sugar, and Cocoa Exchange; and the New York Cotton Exchange.
- Contracts for major field crops (including corn, wheat, soybeans, oats, cotton), four types of livestock and animal products (live cattle, feeder cattle, live hogs, and pork bellies), and sugar and frozen concentrated orange juice have been traded for years. More recently, futures contracts for rice, boneless beef, and dairy products, including raw fluid milk, have been introduced.
- Contracts for all commodities are standardized, so the only issue to be negotiated at trading time is price. Enforcing contract terms is a key function of the exchanges where trading occurs, and guaranteeing contracts is a key function of the exchange clearinghouse.
- Most futures contracts are offset by opposite trades before delivery time, with each party to the transaction selling (or buying) a futures contract that was initially bought (or sold). Such an offset usually occurs because the major motive in trading futures is to hold a temporary position, and then trade for money, and not to physically deliver or acquire a commodity. Most hedgers offset because making or taking delivery on futures would be more costly than delivering through normal channels, while speculators generally do not want to own the actual commodity.
- The differences between futures and cash prices are termed “basis,” and reflect differences in price across space (due to transportation costs), time (which are associated with storage costs), or quality (such as differences in protein premiums for wheat). The basis is calculated as the difference between the cash price (at a given location and at a given point in time) and the futures price (associated with a specified exchange and contract month).The basis varies over time, and reflects only transportation costs and quality differences as the contract reaches maturity. Hedging then largely eliminates price level uncertainty, but not basis uncertainty, which generally has a smaller variance.
- Because futures and cash prices tend to move up and down together, losses and gains in the two markets tend to offset each other, leaving the hedger with a return near what was expected. Thus, hedging helps protect the business from changes in price levels.
- Farmers may choose to hedge in many different situations, including the following:

- *Storage hedging*—Farmers or merchants who own a commodity can protect themselves from declines in the commodity's price by selling futures contracts as the commodity is harvested or acquired, holding the resulting futures position during the storage period, and buying it back when the cash commodity is sold. Losses (gains) in the value of the cash commodity due to unexpected price changes will be largely offset by gains (losses) in the value of the futures position leaving the owner of the commodity with approximately the expected return from storage.
- *Production hedging*—Crop and livestock producers can also protect themselves from declines in prices of expected outputs by selling futures contracts at the beginning of, or during, the growing or feeding period, holding the resulting futures position until the product is ready to sell, and buying the futures back as the output is sold. Losses (gains) in the value of the output due to unexpected price changes tend to be offset by gains (losses) in the value of the futures position. However, yield variability often reduces the risk-reducing effectiveness of hedging for crop growers and may make it inadvisable to sell futures equal to more than one-half to two-thirds of the expected crop.
- *Hedging expected purchases*— Livestock feeders anticipating the purchase of corn or feeder cattle can protect themselves from price increases by buying corn or feeder cattle futures contracts to match anticipated requirements and selling the resulting long futures positions as these inputs are purchased on the cash market. Increases (declines) in the cost of feeders or feed due to unexpected price changes will be partly offset by gains (losses) in the value of the futures position leaving the feeder with approximately the expected costs of inputs. Feeders' overall price risks may be further reduced by selling futures on prospective outputs, as discussed above.

- The estimation of hedging amounts and risk reduction is much more complicated in the presence of yield risk. Generally, the effectiveness of hedging in reducing risk diminishes as yield variability increases and the correlation between prices and yields becomes more negative. Although hedging can reduce income uncertainty for many farmers, it never completely eliminates such uncertainty. In addition hedging involves possible costs for interest forgone on margin deposits and for bias in futures prices. These costs generally are small relative to the value of the positions taken, but they partly offset the risk-reducing benefits from hedging.
- An extensive literature addresses farmer hedging. Much of this literature analyzes the risk reduction associated with hedging and the calculation of optimal (generally risk-minimizing) hedge ratios, which specify the proportion of the commodity that would be hedged to minimize risk.

CAN WE ESTABLISH AN ALFALFA FUTURES MARKET?

- Futures trading is being undertaken in a number of commodities at various commodity exchanges around the world. Determining the suitability of a commodity for futures trading is a difficult task. If one were to draw conclusions on the basis of the past experience with respect to the success of futures trading, we can distinguish between the commodity characteristics and the market characteristics. In regard to the former, we may

draw on the list of commodity characteristics defined by NYMEX, the New York Mercantile Exchange, which is one of the leading exchanges for futures trading. The NYMEX criteria for evaluation of new commodities for futures trading lays down the following commodity characteristics which determine the suitability of a commodity for futures trading at NYMEX. These are price uncertainty, demand and supply uncertainty, deliverability of commodity, product homogeneity, availability of price information and trading opportunity. It must be stressed, however, that this list should only be interpreted as a list of recommendations based on experience with futures trading at NYMEX, rather than any form of sufficient or necessary conditions. There exist futures (for example, interest rate futures) where the underlying commodity is not a tangible deliverable commodity.

- Although a commodity might fulfill all the above conditions, there remains the characteristics related to the structure of competition in the underlying spot-market for the commodity as well a discussion of the hedging needs of the potential participants. As mentioned earlier, futures contract settlement is undertaken with reference to the price prevailing in the underlying spot-market at the time of maturity of the contract. Needless to say; an efficiently functioning spot-market becomes a prerequisite for feasibility of futures trading for a particular commodity. Of particular importance is the structure of competition in the underlying spot-market. NYMEX recommends the examination of the market structure in terms of five and ten firm concentration ratios and market share analysis to determine the suitability of a new commodity for futures trading.

CROSS-HEDGING POSSIBILITIES

- Many agricultural commodities do not have an active futures market. This presents a problem if someone wants to reduce price risk through hedging. One alternative is to cross hedge, that is, hedge the cash commodity in the futures market of a different commodity. Before cross hedging, all alternatives and risks involved should be analyzed to determine the optimal alternative. Other pricing methods such as cash marketing, forward contracting, or deferred pricing may better match market plans. The local cash prices should be compared to the futures price series being considered for cross hedging beforehand to determine the historical relationship between the two.
- Cross hedging will generally work well for reducing price risk if (1) the price of the commodity being cross hedged and the price of the futures commodity are closely related and follow one another in a predictable manner, (meaning hedged price risk is less than unhedged price risk) and (2) large enough quantities are being traded to meet cross hedged futures contract size specifications[3].
- Production risk also adds to the risk of cross hedging. When forward pricing a crop that has yet to be harvested, production risk may be large enough to discourage fully hedging. Hedging 100 percent of expected production in advance of harvest can increase the variability of total revenue (price times quantity). However, if a storage or buy hedge is being placed, where the amount of commodity is known, the entire quantity can be hedged without the risk of being over- or under-hedged.

[3] Hedged price risk refers to the price actually received by hedging relative to what was expected, and unhedged price risk refers to general price level variability.

- Cross hedging is not a good strategy and may not reduce price risk if the price of the cash commodity does not follow the futures market price in a predictable manner. In such situations, hedged price risk may be greater than unhedged price risk.

CROSS-HEDGING ISSUES

- When conducting research to establish whether cross hedging provides price risk reduction, several issues must be addressed. First, the futures contract in which to cross hedge the commodity must be determined. For example, to cross hedge alfalfa, should oats, corn, soybeans, wheat, or some other futures contract be used? Second, the size of the futures position to take needs to be determined. Finally, the riskiness of the cross hedging relationship should be carefully considered.
- In general, the futures contract to use is one with a price pattern that is similar to the cash commodity being hedged. For example, the oats futures contract maybe the most likely choice for cross hedging alfalfa because alfalfa prices follow oats prices closely. These prices tend to move in similar patterns because individuals purchase the underpriced commodity or sell the overpriced commodity.
- Determining which contract to use when cross hedging a specific commodity is not always obvious and may require analysis comparing relative price patterns of several different futures contracts. For example, when cross hedging a commodity such as alfalfa, corn futures, soybean meal futures, or a combination of the two may be considered.
- Once the appropriate futures contract has been defined, the size of futures position to take to cover a particular cash position needs to be determined. For example, when hedging corn using corn futures, the general recommendation is to use one 5,000-bushel contract for each 5,000 bushels of corn to be hedged. However, when cross hedging alfalfa in corn futures, the one-to-one relationship is obviously not the optimal futures-to-cash hedge ratio. At times, it may be less risky to take a larger or smaller position in the futures market than the cash market position being hedged.
- Determining the size of the futures position to take requires calculating a hedge ratio. The hedge ratio is found by estimating the relationship between the futures price and the cash price of the commodity being hedged.
- A hedge ratio of 1.0 implies a one-for-one hedge where for every $1 per unit change in the futures price, the cash price of the commodity being hedged also changes by $1 per unit in the same direction. A hedge ratio of 1.5 implies that for each $1 per unit change in the futures price, the cash price of the commodity being hedged changes by $1.50 per unit. A hedge ratio of 0.8 implies that for each $1 per unit change in the futures price, the cash price changes by 80 cents per unit.
- The hedge ratio definition also indicates that the futures contract quantity is the hedge ratio times the cash quantity being hedged. The futures contract quantity is the weight or bushel amount per futures contract.
- Every commodity will have a different hedge ratio and expected basis. Seasonality between the futures price of one commodity and the cash price of another may cause the hedge ratio and expected basis to vary for different contract months. Location also may create differences in hedge ratios and expected basis patterns.