CHOICES
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Commodity Prices Rock World Markets: Structural Shift or Short Term Adjustments?

Henry Bahn

Skyrocketing agricultural commodity prices are worrisome to consumers and policymakers world wide. Protests and food riots have occurred in over 30 countries, and while some importing nations eased tariffs to encourage trade, some exporters limited trade to protect short domestic supplies. As prices continued to rise over the past several months, key rice–growing countries imposed export restrictions leading to even tighter supplies; countries importing rice faced sticker shock, with prices 60% to 70% higher than just a few months ago. In some cases, family food expenditures have risen dramatically.

The World Bank issued an urgent call to rich nations to help stem rising food prices, warning that unrest in poor countries is spreading, and 100 million people risk falling deeper into poverty. United Nations Secretary General Ban Ki–moon has urged nations to seize an "historic opportunity to revitalise agriculture" as a way of tackling the food crisis. The UN Food and Agriculture Organization warned the developed countries that unless they increase yields, eliminate trade barriers, and move food to where it is needed most, a global catastrophe could result.

In the U.S. food inflation is hurting consumers, school lunch programs, and food banks. Domestic grain merchants, facing high transaction costs, are curtailing some types of contracts, leaving farmers to finance the price risk burden directly. Demand for food grains as biofuel feedstocks sparks moral, as well as economic, debate about the consequences. Adverse weather in the Midwest could result in reduced corn yields later this year.

Are these issues symptomatic of a massive change in agricultural commodity markets, or a short–term response to a collision between policy change, short carry–over stocks, and unpredictable weather? The search for causes leads to the rounding up of a variety of suspects, some usual, some unusual: increasing food demand in rapidly growing developing countries, unprecedented demand for oil from China and India, subsidized biofuel production, reckless speculation in commodity markets and the weak U.S. dollar are all cited as causal. But there is little solid evidence to indict a single cause. The current situation is a complex one that includes supply and demand changes that began over a decade ago, structural adjustments, short–term phenomena, and perhaps, just plain bad luck.

This series of articles by top U.S. agricultural economists explores what's been happening and provides some insight to this emerging phenomenon. Several topics are addressed, including grain prices, the changing behavior of grain merchandisers, the potential impacts of changing food demand and grain supplies, and how feed grain prices may affect meat supplies and prices.

In Farm Commodity Prices: Why the Boom and What Happens Now? Pat Westhoff identifies a number of supply and demand factors that have contributed to the increase in commodity prices. Some of these supply and demand shifts may be temporary, while others are more likely to persist.

Articles in this Theme:

John Lawrence, James Mintert, John Anderson and David Anderson, in Feed Grains and Livestock: Impacts on Meat Supplies and Prices, conclude that the challenge to producers will be to survive the transition from the old equilibrium based on lower grain prices and export driven livestock and poultry production to the new equilibrium with demand for grain also driven in part by energy demand.

The penultimate article, Scott Irwin, Philip Garcia, Darrel Good, and Eugene Kunda's "Convergence of CBOT Futures Contracts," notes that commodity price convergence problems are inconsistent over time and across markets and are different than, although related to, non-delivery basis performance issues. Commodity price convergence problems are not fully understood at this point, and the authors caution against substantial changes in contract specifications whose unintended consequences could be worse than the remedy, particularly if market conditions change in the near future.

The final article is Price Risk Management Alternatives for Farmers in the Absence of Forward Contracts with Grain Merchants. Darrell Mark, B.Wade Brorsen, Kim Anderson, and Rebecca Small address the thorny question of grain farmer alternatives to the cash forward contracts that risk–shedding commercial buyers are increasingly reluctant to offer. Several solutions exist, each with disadvantages relative to forward contracting grain with merchants or elevator operators, proving, once again, that there is no free lunch in the risky business of production agriculture.

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Farm Commodity Prices:Why the Boom and What Happens Now?

Pat Westhoff

JEL Classifications: Q11, Q18, Q42

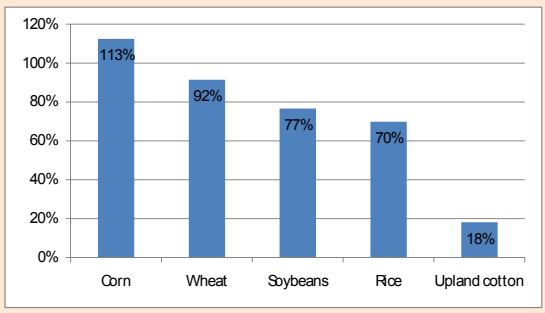
For many years, the price of food was a nonstory. Food price inflation was about the same as the general rate of inflation, and farm commodity market developments rarely drew the attention of those not directly involved in agriculture and the food industry.

That has changed. Rising commodity prices and high food price inflation here and abroad have put agricultural commodity markets in the spotlight. The media are full of stories about the causes and impacts of the commodity boom. In this context, it may be hard to imagine that there is an angle to the story that has not already been covered repeatedly. However, some very simple economics may help us to understand some of the reasons for the increase in prices and to speculate about what might happen in the future.

The Boom

The prices of corn, wheat, soybeans, rice and many other farm commodities have increased sharply since 2006. Exactly how much prices have increased depends on the indicator. Looking at marketing year averages, the U.S. producer price of corn has more than doubled over the last two years, and prices for wheat, soybeans, rice, and many other commodities have also increased sharply (Figure 1). Comparing the lowest futures prices of 2006 to the highest futures prices of 2008 would yield even greater estimates of the increase in commodity prices.

Figure 1. Change in U.S. season average farm prices between the 2005/06 and 2007/08 marketing years



Source: Calculations based on World Agricultural Outlook Board data from May 2008.

In contrast, the decline in the value of the dollar means that farm commodity prices have not increased as much in terms of most foreign currencies as they have in dollar terms. While grain, oilseed and milk prices have increased sharply, prices for cotton, cattle, hogs and many other commodities have not. Consumer food prices have increased more than at any time since 1990 and more than the general rate of inflation in the U.S. economy. Still, current annual consumer food price inflation of about 5% is far below the rate of increase in farm commodity or energy prices.

Why the Boom?

The increase in farm commodity prices clearly cannot be ascribed to any single cause. Two of the best explanations of how we got to the current situation are provided in reports by Trostle and Schnepf. Both make it clear that the list of contributing factors is very long, and that it is difficult even to rank the factors in order of importance.

Instead of trying to identify all the causes of the current market situation, let us apply some very simple economics to isolate developments that warrant further attention. All else equal, economists normally expect higher prices to increase quantities supplied and reduce quantities demanded. If grain prices have roughly doubled over the last two years, the quantity of grain produced in the world should have increased and the quantity of grain utilized should have declined. If instead we observe reductions in production or increases in use, we can conclude there must have been some underlying shift in supply or demand that is contributing to the rise in prices.

Supply Side Factors

Focusing first on the supply side, consider what has happened to grain production in a number of important exporting countries over the last two years. In the European Union, Australia, Ukraine and Canada, production of wheat and other grains was actually lower in 2007 than in 2005, in spite of sharply higher market prices (Figure 2). Reduced production translated into reduced exports, thus limiting supplies in international markets.

Why would production decline in the face of higher prices? The whole story may be complex, but weather is clearly an important factor. In all four exporters, grain yields per acre in 2007 were below 2005 levels, primarily because of drought and other weather–related factors. If better growing conditions result in a return to normal yields in 2008, the increase in production could put downward pressure on prices. The prospect of increased 2008 production in these major wheat exporting countries may be one reason why July futures market prices for wheat declined from over $12 per bushel in mid–March to less than $8 per bushel just two months later.

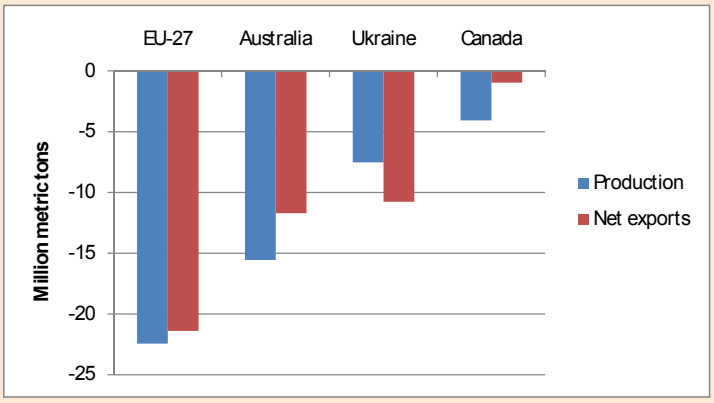
It would be a mistake to blame poor crops for all of the increase in world grain prices. While global wheat production in 2007 was less than in 2005, world corn production increased by almost 12%, with increased production in the United States accounting for most of the change. Considering five major grains (corn, wheat, rice, barley and sorghum), total world grain production increased by an estimated 81 million tons, or 4.1%, between 2005 and 2007 (Foreign Agricultural Service 2008). That suggests world grain production actually increased in per–capita terms, which is inconsistent with a story that production shortfalls are solely to blame for the run–up in world grain prices.

The full story on the supply side is, of course, far more complicated than suggested by these simple comparisons. While world grain production increased between 2005 and 2007, world oilseed production declined slightly, in large part because of the shift in U.S. acreage away from soybeans and into corn in 2007. World grain stocks have been declining, as consumption has exceeded production in most recent years. Stocks have now dropped to levels where it is harder to satisfy demand by continuing to draw down stocks. Grain production and exports from some countries may increase in 2008, but market participants are also well aware that U.S. corn acreage appears likely to decline significantly this year, limiting future supplies.

Demand Side Factors

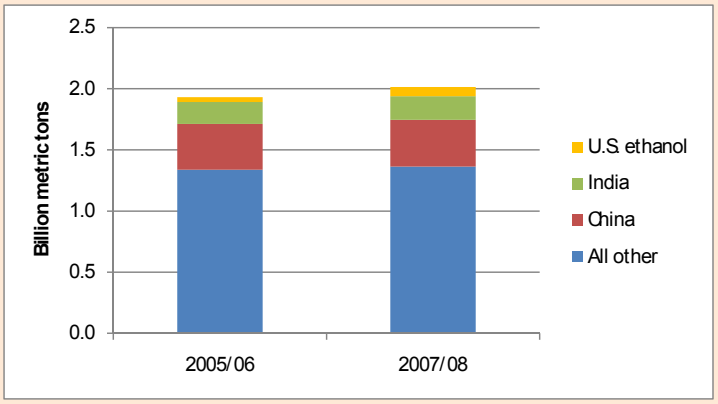
In spite of sharply higher prices, global grain consumption has actually increased by an estimated 83 million metric tons, or 4.3%, over the last two years (Figure 3). This only makes sense if there has been a significant shift in the demand for grain, as population growth alone could only explain an increase of about half that magnitude.

Figure 2. Change in production and net exports of five major grains for selected exporters between the 2005/06 and 2007/08 marketing years



Source: Calculations based on Foreign Agricultural Service data from May 2008 for corn, wheat, rice, barley and sorghum.

Figure 3. World consumption of five major grains, 2005/06 and 2007/08 marketing years.



Source: Calculations based on Foreign Agricultural Service data from May 2008 for corn, wheat, rice, barley and sorghum.

The Role of Biofuels in Higher Food Prices

The role of biofuels in the increase in food prices is hotly debated. Press reports from FAO's conference on world food security highlighted widely different estimates. USDA Secretary Schafer was quoted as saying, "According to our analysis, the increased biofuels production accounts for only 2 to 3% of the overall increase in global food prices" (Lynch). The same news story reports that, "A World Bank analyst estimated that biofuel production has accounted for 65% in the rise of world food prices."

Why do these and other estimates differ so greatly? In digging a little deeper, one quickly discovers that comparing the various studies is like comparing apples to rutabagas. The estimates often refer to different time periods, define "food" differently, and hold different things constant. One study may look at the last twelve months, consider a wide range of food products and separate effects caused by higher energy prices from effects caused by other factors. Another study may look at a longer time period, focus only on grain prices, and more broadly define biofuel effects. Thus, in trying to reconcile the various estimates, it is important to understand just what is being measured. It is critical to be clear about what the estimates do and do not mean in a case like this, where different parties have a very strong interest in "spinning" expert estimates to their advantage.

The data represented in Figure 3 can serve as a type of Rorschach test. Some look at the figure and note that demand has increased in a number of countries and that U.S. ethanol use of grain accounts for less than 4% of global grain consumption in 2007/08. These people tend to argue that strong economic growth in India, China and elsewhere is causing diets to change in ways that increase the demand for grain and other foods, and that growth in biofuel demand is at most a small part of the story.

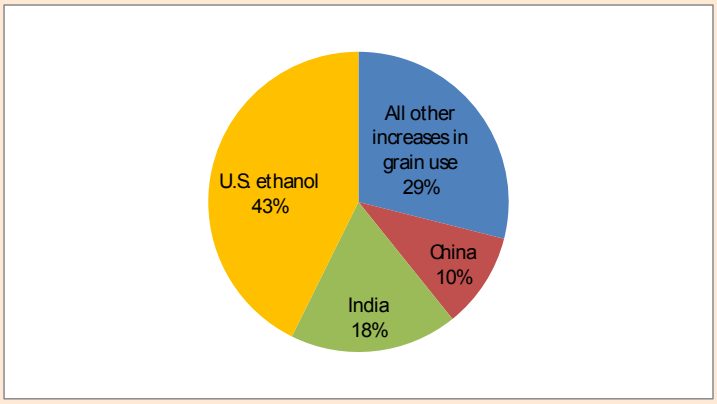
Other people prefer to focus on the changes in global grain consumption over the last two years (Figure 4). India and China continue to be an important part of the story, together accounting for about 28% of the increase in global grain consumption. However, since India and China account for an even larger share of the world's population, that suggests per–capita grain consumption in those two countries has not increased more than it has in the world as a whole.

Instead, the spotlight shifts to the 35 million metric ton increase in U.S. use of corn to make ethanol. This accounts for 43% of the increase in global grain consumption between the 2005/06 and 2007/08 marketing years. Excluding the use of U.S. corn to make ethanol, the increase in global grain consumption is about 2.5%, just slightly more than the increase in the world's population over the same period. In other words, world per–capita use of grain for purposes other than making ethanol is essentially unchanged from what it was two years ago.

In spite of sharply higher prices, oilseed meal and vegetable oil consumption also have increased in a wide range of countries. China is an even more important factor for oilseed meal and vegetable oil markets than it is in the case of grains. Biofuels are again an important part of the story. Industrial uses (including for biodiesel production) account for 36% of the increase in global vegetable oil consumption between the 2005/06 and 2007/08 marketing years. Unlike the case of grains, most of this increase in industrial use of vegetable oil has occurred in the European Union and other countries outside the United States.

Most would agree that food demand for grain is not very responsive to prices, but it is remarkable that even a doubling of world prices appears to have caused barely a ripple in the estimated consumption figures in most countries. Rising incomes change food consumption patterns, often in ways that make consumer purchases

Figure 4. Change in world consumption of five major grains between the 2005/06 and 2007/08 marketing years.



Source: Calculations based on Foreign Agricultural Service data from May 2008 for corn, wheat, rice, barley and sorghum.

less responsive to the prices of basic farm commodities such as grain and vegetable oil. Policies and other factors can limit how much of any given change in world commodity prices is transmitted to food consumers. Still, it is surprising that sharply higher world commodity prices have not made at least a dent in consumption estimates.

Factors Affecting Both Supply and Demand

Three additional factors affecting both the supply and the demand for food require at least a brief mention.

1. The weaker dollar means that food prices expressed in foreign currency terms have not increased as much as they have in dollar terms. This has supported U.S. exports and contributed to the increase in dollar–denominated prices. However, even after correcting for the weaker dollar, the prices of grains, oilseeds, and other farm commodities have increased in almost all currencies. Thus, the weaker dollar by itself cannot explain market developments.
2. Higher energy prices have contributed to higher farm commodity prices by increasing costs of production and by increasing the demand for biofuels. High petroleum and natural gas prices increase fuel and fertilizer costs. They also raise the cost of transporting agricultural inputs to producers and outputs to processors and consumers. High gasoline and diesel prices make biofuels more competitive, encouraging expanded production.
3. Countries have responded to high prices in ways that have exacerbated the situation. To restrain domestic price increases, some countries have restricted exports and reduced import barriers. These and other measures have suppressed domestic price increases, but at the expense of reducing supplies on world markets and, thereby, further raising prices in international markets.

Balance of Factors

A paper prepared by the Food and Agriculture Organization (FAO) reviews many of the factors contributing to the current situation. News reports about the FAO's High–Level Conference on World Food Security, held in June 2008, highlighted debates about the contribution of biofuels to the increase in global food prices (See Box).

What Happens Now?

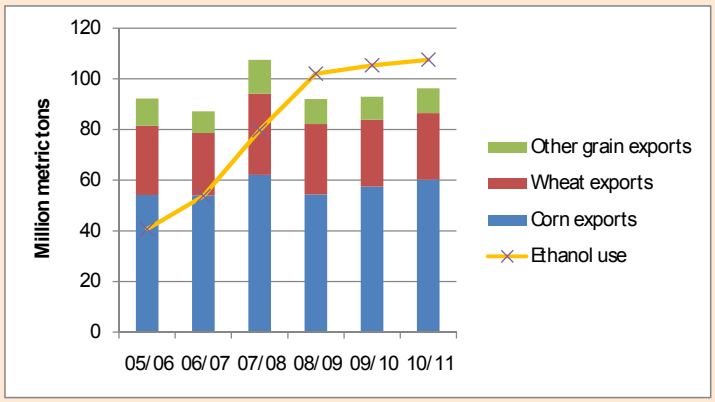
Some of the factors that have caused farm commodity prices to increase are likely to prove transitory, suggesting prices could decline from the lofty levels of early 2008. Already, the prospect of a larger 2008 wheat crop has contributed to a significant decline in wheat futures prices. By mid–May, futures prices for rice and soybeans had also retreated somewhat from record levels, as the most severe concerns about tight supplies had at least slightly lessened.

Producers have already demonstrated a willingness and ability to adjust their crop mix quickly to exploit changes in relative returns, as seen in the shifts in U.S. corn and soybean acreage in 2007 and 2008. However, a more important question is how supplies will respond in the aggregate and in the long run. So far, the sharp increase in prices has not resulted in large increases in the total area used for crop production in the United States or in other countries, nor has there been a large increase in yields that can be attributed to improved returns. Over time, however, one would expect high prices to result in more land being used for crop production than would have been the case otherwise, and investments in new technologies that will eventually pay off in terms of higher crop yields per acre.

Some of the demand–side factors that contributed to the increase in prices appear likely to stay with us for some time to come. Unless there is a severe global recession, continued income growth in China, India and many other middle–income countries is likely to result in further dietary changes and increased demand for many commodities.

While growth in the demand for biofuels could eventually slow, a lot of biofuel production capacity has already been built or is under construction. If petroleum prices stay above $100 per barrel and supportive policies remain in place, it seems likely that most of that capacity will be used and additional capacity will be built, provided feedstock prices do not rise to levels that make biofuel production unprofitable. Even at the lower

Figure 5. U.S. grain exports and ethanol use of corn.



Source: Calculations based on Food and Agricultural Policy Research Institute estimates from January 2008.

petroleum prices assumed in baseline projections prepared by the Food and Agricultural Policy Research Institute in early 2008, ethanol use of corn exceeds total U.S. exports of all grains combined in the 2008/09 marketing year (Figure 5).

The growth in biofuel production further tightens the linkages between energy and agricultural markets. If petroleum prices are high enough, petroleum and biofuel prices are likely to be closely linked—by mid–May 2008, the U.S. price of ethanol was already approximately equal to its energy value relative to gasoline, after correcting for the $0.51 per gallon tax credit then in effect.

In the long run, one would not expect biofuel producers either to make excess profits or to fail to cover operating costs. If expected biofuel profits are large, new plants will be built. This will result in increased biofuel production that will tend to increase demand for feedstocks, which in turn will result in prices for those feedstocks being bid up until the returns to biofuel production are no longer excessive. On the other hand, if plants cannot cover operating costs, they eventually will be forced to shut down.

To oversimplify somewhat, petroleum prices are likely to largely determine biofuel prices and biofuel prices are likely to largely determine prices for corn and other feedstocks in the long run. Since producers will choose which crops to plant based on relative profitability, this suggests that long–run prices for soybeans, wheat and other commodities also will be largely determined by petroleum prices.

This stylized picture does not tell the full story, of course. When they are binding, biofuel use mandates weaken or even sever the linkage between the price of petroleum and the demand for biofuels. In any given year, there is only so much capacity to produce biofuels, so biofuel demand for agricultural commodities is likely to be much less price responsive in the short run than it will be in the long run. There are many reasons why petroleum prices and grain prices will not always march in lockstep in the future.

Finally, one should not be blinded by short–run developments. Several times in the past, most recently in the mid–1990s, many people became convinced that the world had fundamentally changed and that agricultural commodity prices would be on a new higher plateau forever more. In each case the conventional wisdom was shattered shortly thereafter, and real prices for agricultural commodities resumed their long–term decline. While there are many reasons to think, "This time is different," it's important to remember that the same has been said before.

For More Information

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Feed Grains and Livestock: Impacts on Meat Supplies and Prices

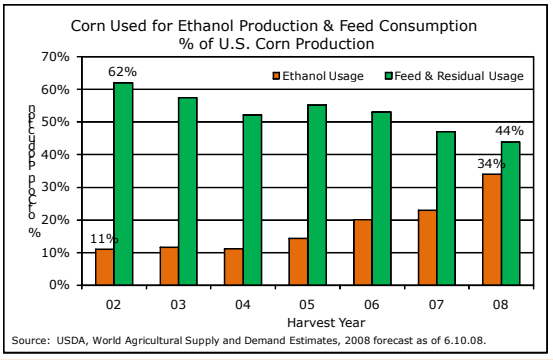
John D. Lawrence, James Mintert, John D. Anderson and David P. Anderson

JEL Classification: Q11

Agriculture in the United States is undergoing a significant change. Grain, oilseed, and land prices have increased significantly, creating a subsequent increase in the income and wealth of many rural Americans—unless you are in animal agriculture. Feed is the largest single cost item for livestock and poultry production, accounting for 60%–70% of the total cost in most years. Although energy, labor, and other inputs have increased, feed costs have increased anywhere from 40%–60% (depending on the species) in the last two years. As price takers in competitive markets, animal producers cannot simply pass their higher costs on to consumers. To date, rising costs have largely been absorbed by livestock and poultry producers, often with significant financial loss. However, higher costs of production will ultimately have to be reflected in higher prices for meat, milk, and eggs at retail counters in the United States and elsewhere. This adjustment process is complex, lengthy, painful, and not without unintended consequences. In this article we attempt to explain what is happening to feed costs, including the likely consequences of the recent ethanol boom on these costs and how the different sectors—beef, dairy, pork, and poultry—are adjusting to higher costs. Importantly, speed of adjustment will vary significantly as industries with shorter production cycles, such as poultry, are able to respond in a matter of months whereas adjustments in industries with longer production cycles, such as beef, can take a period of several years.

Rising Feed Costs

When analyzing the impact of escalating feed costs on animal agriculture, it's important to consider the causes of these increasing prices as well as overall solutions to the problems resulting from higher feed costs. A variety of factors have contributed to higher feed grain prices. However, unlike most other periods of rising grain prices, recent price increases have been driven primarily by strong demand, not supply shocks. In particular, rapid growth of ethanol production in the United States has been a key factor. Domestic feed usage has historically been the largest use for U.S. feed grains, but ethanol production is taking an ever–increasing amount of corn in the United States (Figure 1). Corn prices have increased dramatically. For example, Omaha corn prices average $1.91/bu in January–March 2006 and were $4.92 for the same period in 2008, a $3/bu, or a 158% increase. Yet, on the last day of May corn in Omaha was priced at $5.45/bu and July 2009 corn futures topped $7/bu, so feed costs continue to rise.



We have had high grain prices before so it's useful to examine how livestock producers responded in the past to a sharp increase in feed costs. Perhaps the best analogy to our current situation is the price shift that occurred in the 1970s. Corn prices increased from a season average of $1.08/bu for the 1971–72 crop year to $3.02/bu for the 1974–75 crop year, a 179% increase. In response, the U.S. hog breeding herd decreased nearly 15% in two years and U.S. beef cow inventories decreased 19% between 1975 and 1979. Retail prices for pork and beef increased 56 and 46%, respectively, during the same periods. Although the magnitude of the shifts may differ this time, smaller supplies and higher prices are expected.

Impact on Specific Sectors and Individual Industry Solutions

The current financial losses in most of animal agriculture are not sustainable. Ultimately, higher prices throughout the marketing chain will be required to offset the large increase in production costs. While increased domestic or export demand may help support livestock and poultry prices, higher prices will also come about because quantities supplied to consumers will decline. We'll offer insight into how the major components of the livestock sector have been impacted by rising feed prices and how each industry is responding to increasing costs and declining profits.

Beef Industry

As in all of animal agriculture, production costs have risen sharply in the cattle sector, primarily as a result of rising feed costs. For example, in the cattle finishing sector a monthly survey of commercial cattle feedlots by Kansas State University indicates that the cost of gain increased from an average of about $0.54 per pound in 2006 to $0.74 in 2007 and preliminary estimates indicate feedlot costs of gain will average well over $0.80 per pound during 2008, an increase of 54% in just two years. Cattle feeding returns estimated by Iowa State University indicate cattle feeders experienced the largest loss on record ($167 per head) during April since the series began in the 1960s.

Production costs in the cow–calf sector have also skyrocketed over the last two years. Again, most notable has been the rise in feed costs. Kansas Farm Management Association (KFMA) data documents the shifting cost structure as feed costs per cow increased from $287 in 2006 to $346 in 2007, an increase of 21%. Recent feed grain and protein supplement prices, along with a sharp increase in forage production costs, indicate that total feed costs will rise again during 2008, possibly approaching $450 per cow, an increase of more than 50% in just two years. The same KFMA data indicate that returns in the Kansas beef cow–calf sector still exceeded variable production costs in 2007 by about $50 per cow, but the projected rise in feed costs during 2008 will almost certainly push returns below variable production costs, encouraging some producers to either reduce their herd's size or to exit the industry.

It's important to note that the losses experienced in the cattle sector were not associated with large cattle price declines. In fact, prices for slaughter weight cattle in Kansas were record high in 2007, averaging $93 per cwt., 8% higher than in 2006. Increasing feed costs did push calf prices down 1 to 2% in 2007 compared to a year earlier, but annual average calf prices were still the third highest on record. So the reduced profitability was directly attributable to rising costs, especially feed costs.

Higher beef prices in the next few years from stronger domestic demand seems unlikely as beef demand has weakened moderately since 2004. Consumers' disposable income is a major determinant of consumer demand for beef and slow, or even negative, growth in the U.S. economy during 2008 and 2009 means there will be little likelihood of an increase in domestic beef demand in the short run.

Export demand for beef is improving and will help support beef and cattle prices. Since plummeting in 2004, following the discovery of BSE in the U.S. herd, beef exports have increased significantly. However, U.S. beef exports in early 2008 were still 36% below the same period in 2003. Based on the trend established early this year, U.S. beef exports in 2008 could total 6 to 7% of beef production (still below the 10% of production exported in 2003), which effectively reduces the supply of beef available in the domestic market and hence supports beef and cattle prices. Although current exchange rates will continue to boost U.S. beef exports and discourage imports, the short–run change in domestic supplies resulting from an improving international trade picture is not expected to be large enough to offset the dramatic increase in production costs.

If beef, especially export, demand does not increase enough to yield beef and cattle prices that are high enough to offset the rise in production costs, how will the industry respond? The short answer is that the industry will shrink in size to the point where fewer pounds of beef are marketed to U.S. and international consumers. This shift in the beef supply curve will yield higher prices throughout the beef sector and, over a period of several years, allow producers to cover average total costs. The magnitude of the supply shift that will be required will depend on whether feed grain prices continue to increase or stabilize at their current level and how rapidly beef exports recover, especially to the Pacific Rim countries. Modest herd liquidation is already underway as the U.S. beef cow herd declined by about 1% during 2007. Slaughter data through May 2008 suggests that the liquidation is still underway and might have accelerated somewhat from the 2007 pace. Looking ahead, the U.S. beef industry could be facing several more years of herd reduction before prices rise sufficiently to offset the new production cost regime.

Pork Industry

Pork producers enjoyed a nearly unprecedented string of positive returns between February 2004 and September 2007. However, at least part of the prolonged profitability was due to disease problems that increased farm costs but also reduced the supply of market hogs during 2006 and early 2007. An effective vaccine was widely adopted last year which contributed to a nearly 10% year–over–year increase in pork supplies during the

fourth quarter of 2007. As a result, hog prices fell to their lowest levels in four years at a time when feed costs reached nearly their highest levels in history, resulting in losses that mounted quickly.

According to Iowa State University's Estimated Returns, farrow–to–finish hog producer losses for the seven months from October 2007 through April 2008 exceeded the estimated profits of the prior thirteen months. Hog prices during that time did not cover variable costs for producers raising their own grain. Feed costs for farrow–to–finish producers selling hogs in April 2008 were $91.81 per head, 35% higher than April 2007 and 75% higher than April 2006. In late May, corn and soybean meal futures projected an additional $30 per head increase in feed cost by April 2009. If realized, total costs per head in spring 2009 will be nearly $185 per head, 70% higher than in 2006.

The pork industry is reacting to higher costs by downsizing. Breeding herd liquidation is underway in the United States and Canada, and pork supplies are expected to show a year–over–year decrease by the end of 2008 that will continue through 2009. However, small reductions in supply are not likely sufficient to move farm level prices to a level that will sustain the U.S. pork industry.

A simple comparison of prices from 2006 (corn $2/bu and SBM $175/ton) with prices from the first half of the 2007/08 crop marketing year (corn $5/bu and SBM $335/ton) indicates total production costs increased 45%. An elasticity of demand of –.4 suggests that supply will need to decrease by 18% from 2006 levels to offset the cost increase experienced to date. Demand growth, especially in the export markets, will offset some of this reduction. For example, pork exports during January–April 2008 were up over 50% compared to a year earlier. Still, a significant decrease in U.S. pork production, possibly approaching 10%, could be required to push prices back up over average total cost.

Poultry Industry

The poultry industry has viewed the recent rapid expansion of the ethanol industry with considerable concern. Having few good, commercially viable alternatives to corn as a primary energy feed, the poultry industry responded to the initial surge in corn prices beginning in late 2006 by moving fairly aggressively to rein in production; however, when corn prices began to moderate during the 2007 growing season, poultry integrators ramped production back up. Strong demand for poultry, supported largely by export demand, helped the broiler industry to maintain fairly strong prices in the face of higher production.

The quick response of the industry to escalating feed prices in late 2006, along with fortuitous demand strength, especially exports, has helped soften the blow of higher feed prices on the poultry industry. However, that situation now appears to be changing. Despite prices that appear high by historical standards, poultry producers have begun to feel the pressure of mounting feed costs and significant cutbacks in poultry production are on the horizon, based on the rise in production costs. Feed accounts for about 65% of total live broiler production costs (Dozier, Kidd and Corzo, 2008). The 35% increase in corn prices just since the end of last year suggests a roughly 20% increase in farm–level production costs. The single–sector disequilibrium model described by Lusk and Anderson (2004) can be used to illustrate the potential impact of these higher costs. In that model, a 20% increase in broiler production costs at the farm level would result in a 2% decline in the quantity of broilers offered at the retail level and a 6.1% increase in retail broiler prices.

Dairy Industry

The dairy industry has had its own unique market situation since this period of increasing feed prices began. Milk prices through this decade can best be described as volatile, going from record high to record low prices and back to new record highs. Class III milk prices were low in 2005 ($10/cwt), but were already increasing in late 2006 because of stronger demand just as corn prices began to escalate. Milk prices peaked in July 2007 at $21.38/cwt, but declined to $16.76/cwt by April 2008. Despite the recent price decline, milk production is still increasing because, unlike the beef industry, output prices are still above production costs.

From 2006 to 2008 milk production costs increased approximately $2.00/cwt according to the Agricultural and Food Policy Center's representative dairy farms (Anderson, et al. 2008). Feed costs make up approximately 53% of all production costs on the representative dairies. Historically, a $2.00/cwt increase in costs might set in motion a production decline of 2% or more. However, given the current state of milk product demand, milk production remained profitable for most producers despite the cost increase and expansion in the industry is continuing.

The strength in milk prices was largely driven by strong export and domestic demand for milk products which kept milk prices above production costs, despite the increase in feed costs. U.S. milk product exports have increased for a variety of reasons. Drought in Australia, and reduced production in the EU as subsidies decline strengthened the U.S. position as an exporter. The combination of reduced competition in export channels and a weaker U.S. dollar is largely responsible for the growth in U.S. dairy product exports.

The dairy industry also continues to undergo structural changes. More large dairies enter production or ex-

pand from existing operations, small dairies continue to exit the industry, and production shifts regionally. Various areas of the United States have experienced rapid growth, like New Mexico, Idaho, and, more recently, the Texas Panhandle. So, dairy production in some regions of the U.S. will decline, while other regions continue to experience growth. Looking ahead, it will take more time for increased milk production to push prices below production costs, although any further increases in feed costs will accelerate that process. Still, strong demand growth, especially in export markets, has so far enabled the dairy industry to avoid the large financial losses attributable to rising feed costs that have hit other livestock species.

Unintended Consequences of the Ethanol Boom

A few short years ago, most analysts and policy makers contemplating a four– or five–fold increase in ethanol use would probably have envisioned an array of related external benefits: a reduction in harmful automobile emissions, a lessening of dependence on foreign petroleum, a boost in corn prices for farmers, and an abundance of cheap by–product feeds for livestock producers. While increased ethanol production has certainly yielded some benefits, it has also carried with it a number of unintended consequences, particularly for the livestock sector.

Growth in ethanol production has made carryover feed grain supplies very tight by historical standards exposing livestock producers to more feed price risk than in the past. In turn, tight carryover supplies not only push average prices up, but also contribute greatly to corn price variability. Thus, increasing ethanol production means that livestock producers face far more feed cost risk than in the past.

One of the more dramatic consequences of the ethanol boom has been its impact on by–product prices. As corn prices have risen to historic levels, prices of substitutes for corn in livestock rations have increased sharply as well. Anderson, Anderson, and Sawyer (2008) note that the price of major corn by–product feeds expressed as a percentage of corn price trended lower over the last twenty–five years, suggesting that by–products have gotten a little cheaper relative to corn. However, with corn prices at record levels by–products, in absolute terms, are more expensive than ever before.

If the market for by–products is efficient, by–products will be priced competitive with corn, based on their feeding value. In the long run, then, the advantage to feeding by–products will be mostly for those producers of ruminant animals that are situated close enough to an ethanol plant to realize a transportation cost advantage. In the cattle industry, this suggests a shift of comparative advantage towards Northern Plains and Corn Belt feeders with better access to wet ethanol by–product feeds than Southern Plains feeders.

With respect to the competitive position of various livestock species, prior to the ethanol boom, conventional wisdom held that increased availability of by–products would favor cattle, since ruminants are well–adapted to using these feeds. Additionally, the beef industry has the opportunity to use more forages to feed cattle and, while forage values are rising, the cost increase so far has been smaller than for grains and proteins. Longer term, however, if by–product feeds and forages are priced more competitively with corn, the beef industry's advantage could erode. With higher feed prices across the board, efficiency of gain again becomes the key determinant of comparative advantage. Thus, it is possible that, in the long run, the ethanol boom may actually enhance the poultry industry's comparative advantage derived from its greater feed efficiency.

What has been a boon to crop prices has had serious unintended consequences for livestock producers. In fact, the livestock industry has absorbed all of the costs of ethanol and the consequences of those costs are still to be felt in the rest of the economy. For example, through mid–year 2008, all major milk and meat supplies were still higher than during the same period in 2007. But as production of animal proteins decline in response to higher costs, consumer prices will increase and rural communities where livestock and poultry are produced and processed will experience downsizing and loss of economic activity that these sectors created. The new equilibrium in agriculture will have both livestock and renewable fuels. The challenge for animal agriculture is to survive the transition from the old equilibrium based on grain prices driven by the demand for domestic livestock feed and exports to the new equilibrium where demand for grain is driven by government policy and energy prices, which is expected to result in an industry providing a smaller supply of higher priced animal proteins to consumers.

For More Information

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Recent Convergence Performance of CBOT Corn, Soybean, and Wheat Futures Contracts

Scott H. Irwin, Philip Garcia, Darrel L. Good and Eugene L. Kunda

JEL Classifications: Q11, Q13

Futures markets play a key role in price discovery and risk transfer in many agricultural markets. Concerns have been raised about the performance of Chicago Board of Trade (CBOT) grain futures contracts in a number of recent forums, most prominently at the Agricultural Forum hosted by the Commodities Futures Trading Commission (CFTC) on April 22nd, 2008. Market participants have expressed concern that futures prices have been artificially inflated since the Fall of 2006, contributing to weak and erratic basis levels and a lack of convergence of cash and futures prices during delivery. In this article, we focus on the nature and consequences of recent convergence problems in CBOT (now CME Group, Inc.) corn, soybean and wheat futures contracts. We also briefly comment on proposals for changing the contracts to address the problems that have surfaced recently.

Convergence problems at delivery locations are not necessarily identical to nondelivery basis performance issues, which are not addressed in this article. Basis in some nondelivery markets may be influenced by lack of convergence, but that is not uniformly the case. Corn basis at interior processing markets, for example, is less influenced by the Illinois River basis (delivery location) than cash markets close to the River. Basis at nondelivery locations is influenced by transportation costs, storage and ownership costs, supply of and demand for storage in the local market and merchandising risk (margin risk). All of these factors have likely contributed to weaker basis at many nondelivery markets.

Convergence Patterns

The delivery process is an essential component of futures contracts with physical delivery, as it ties futures and cash prices together. In a perfect market with costless delivery at one location and one date, arbitrage should force the futures price at expiration to equal the cash price. If futures were above the cash price, the cash commodity would presumably be bought, futures sold and delivery made. If the cash price exceeded futures, users could buy futures and stand for delivery. This type of arbitrage should prevent the law of one price from being violated.

In reality, delivery on grain futures contracts is not costless and is complicated by the existence of grade, location and timing delivery "options" that have a demonstrated value to sellers of contracts. A more realistic approach is to think of a zone of convergence between cash and futures prices during delivery periods, with the bounds of convergence determined by the cost of participating in the delivery process. Previous estimates of the direct costs of delivery are in the range of 6 to 8 cents per bushel. (i.e., barge load out, storage and interest opportunity costs).

Figure 1. Basis on the first day of delivery for December 2001 through May 2008 CBOT corn futures contracts at the Illinois River north of Peoria delivery area

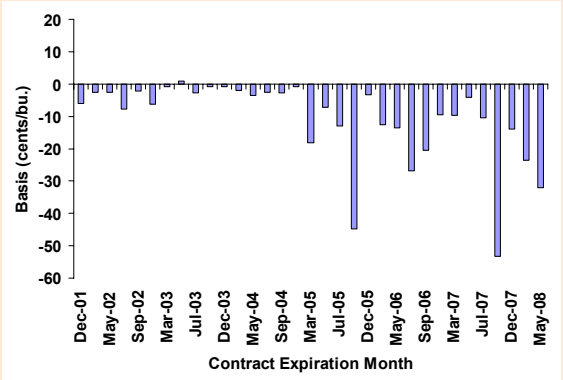


Figure 2. Basis on the first day of delivery for November 2001 through May 2008 CBOT soybean futures contracts at the Illinois River north of Peoria delivery area

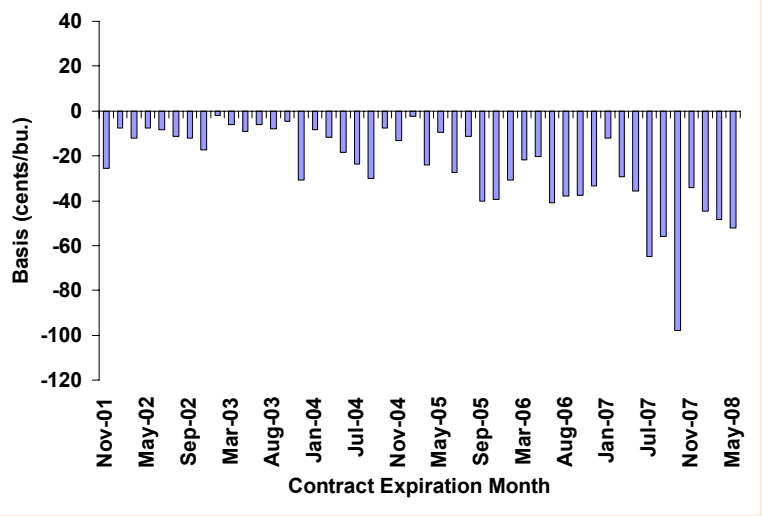
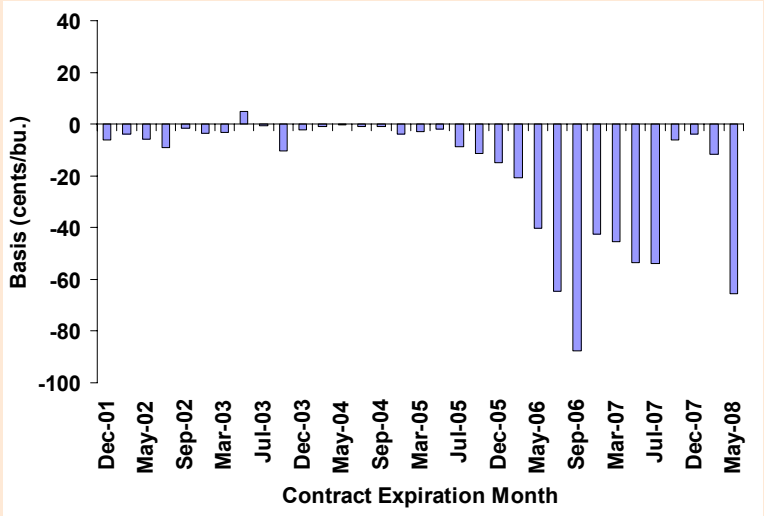


Figure 3. Basis on the first day of delivery for December 2001 through May 2008 CBOT wheat futures contracts at the Toledo delivery area



Figures 1 through 3 show the difference between cash and futures prices (the basis) on the first day of the delivery period for corn and wheat futures contracts expiring between December 2001 and May 2008 and soybean futures contracts expiring between November 2001 and May 2008. Note that a negative basis means the futures price is greater than the cash price and a positive basis means that futures price is less than the cash price. For these calculations, grade and location adjustments are made to the cash prices where appropriate. Convergence patterns at the presented location are representative of convergence behavior at other delivery locations.

Ignoring problems created by Hurricane Katrina in September 2005, convergence weakness first surfaced with the July 2006 wheat contract. Nonconvergence in wheat is extremely large by historic standards, reaching a low in September 2006 when the Toledo cash price ended up 90 cents below futures on the last day of the delivery period. This weakness in wheat persists through July 2007. Convergence is relatively good in September 2007, December 2007 and March 2008, but poor performance re-emerges in May 2008. Convergence in soybeans is poor beginning with the March 2007 contract, especially poor in September 2007, improves to almost acceptable in November 2007, but returns to very poor performance in January, March and May 2008. In general, convergence since July 2006 is better for corn than for wheat and soybeans. Convergence performance is weakest for corn in September 2007 and March 2008.

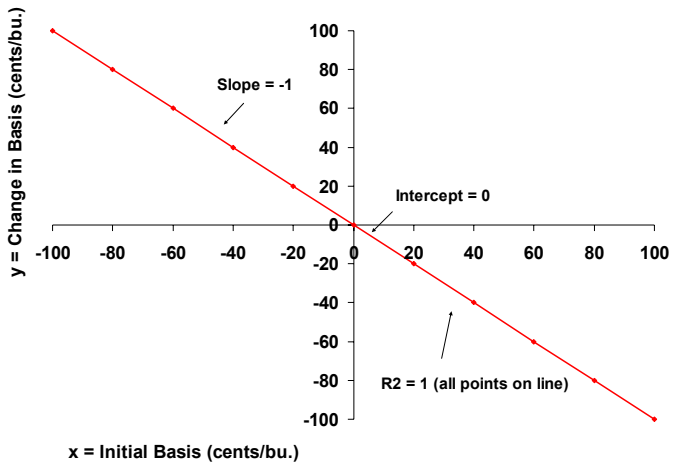
Table 1 presents average convergence performance at all delivery locations for corn, soybeans and wheat before and after 2006. Average basis levels on the first and last day of the delivery period during 2001-2005 generally are +/- 6 to 8 cents per bushel, with the exception of Illinois River delivery locations for soybeans. This is within the range of previously mentioned estimates of the direct costs of delivery. Average basis at delivery locations during 2006-2008 deteriorated (weakened) substantially in all three markets. The deterioration averaged about 14 cents per bushel in corn, 25 cents in soybeans and 50 cents in wheat.

Table 1. Average Basis on the First and Last Day of Delivery for November or December 2001 through May 2008 CBOT Corn, Soybean and Wheat Futures Contracts

Commodity/ Delivery Location	Contract Expiration Months: Nov or Dec 2001 - Nov or Dec 2005	Jan or Mar 2001 - May 2008	Difference
First Day of Delivery		**cents/bu.**	
Corn			
Chicago	0.1	-14.9	-15.0
Illinois River North of Peoria	-4.2	-19.1	-14.9
Soybeans			
Chicago	-6.0	-30.8	-24.8
Illinois River North of Peoria	-14.3	-41.1	-26.8
Illinois River South of Peoria	-15.1	-39.7	-24.6
St. Louis	-4.2	-24.3	-20.1
Wheat			
Chicago	0.2	-46.8	-47.0
Toledo	-4.2	-41.3	-37.1
St. Louis	5.7	-58.8	-64.5
Last Day of Delivery			
Corn			
Chicago	-0.1	-12.8	-12.7
Illinois River North of Peoria	-5.8	-20.1	-14.3
Soybeans			
Chicago	-11.4	-33.2	-21.8
Illinois River North of Peoria	-17.4	-47.3	-29.9
Illinois River South of Peoria	-17.5	-44.3	-26.8
St. Louis	-8.4	-28.2	-19.8
Wheat			
Chicago	-4.1	-35.4	-31.3
Toledo	-4.1	-36.9	-32.8
St. Louis	0.1	-70.7	-70.8

Note: September 2005 corn and soybean contracts excluded from 2001-2005 averages.

Figure 4. Perfect predictability of delivery location basis



Implications

While recent convergence failures are dramatic, in isolation each episode is not necessarily damaging to the overall economic functioning of markets. Real economic damage is associated with increased uncertainty in basis behavior as markets bounce unpredictably between converging and not converging. As first noted by Holbrook Working many years ago, this is damaging because basis in storable commodity futures markets should provide a rational storage signal to commodity inventory holders. A weak basis should be a signal to store and vice versa. However, this depends on the predictability of the subsequent change in basis. That is, the basis should strengthen over time thereby earning "the carry" for someone holding stocks of the commodity and simultaneously selling the futures.

The reliability of basis signals can be quantified by measuring the level of basis at some point before the delivery period and comparing this "initial" basis to the change in basis from that point forward through the delivery period. Perfect predictability of delivery location basis is illustrated in Figure 4.

Note that when delivery location basis is perfectly predictable, the relationship between initial basis and the change in basis has a slope of -1 and runs through the origin. In other words, if basis is -50 cents/bushel two months before expiration, the change in the basis over the subsequent two months should be +50 cents/bushel. Additionally, all points lie directly on the line, which indicates that storage hedges over the interval are perfectly effective in eliminating storage return risk.

Figure 5. Predictability of CBOT corn basis change to first day of delivery with all delivery locations pooled

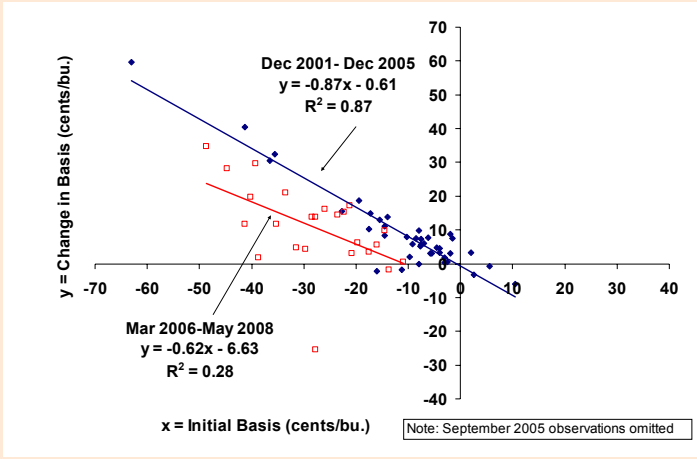


Figure 6. Predictability of CBOT soybean basis change to first day of delivery with all delivery locations pooled

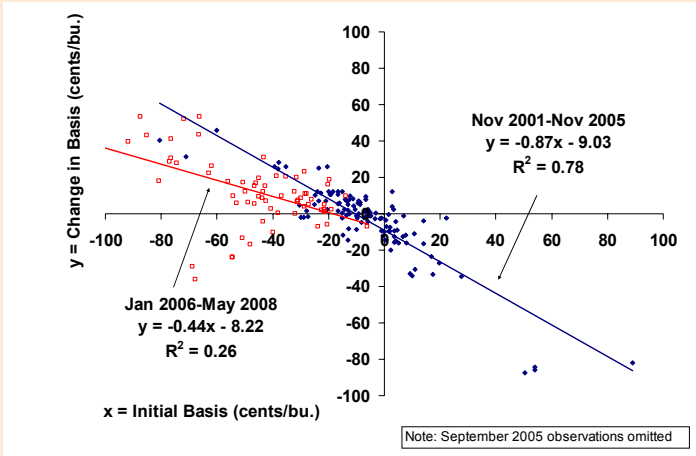
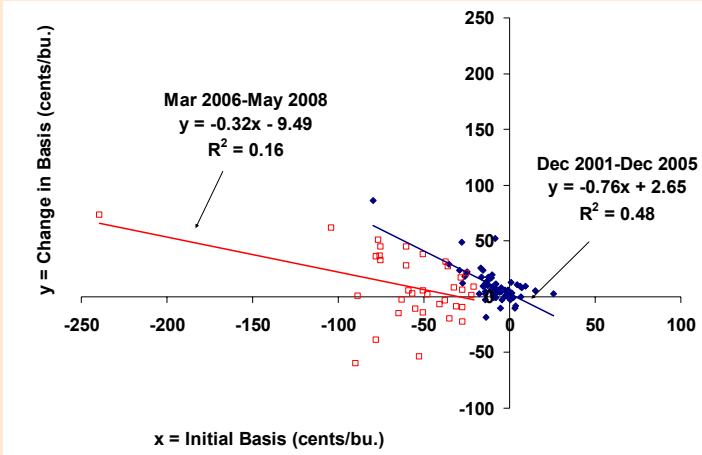


Figure 7. Predictability of CBOT wheat basis change to first day of delivery with all delivery locations pooled



Figures 5 through 7 show the predictability of delivery location basis for CBOT grain futures contracts for two periods: December 2001 - December 2005 vs. March 2006 - May 2008 for corn and wheat and November 2001- November 2005 vs. March 2006 - May 2008 for soybeans. The horizontal axis in each chart measures the level of the delivery location basis on the day after the preceding contract expires. The vertical axis measures the change in the delivery location basis from the day after the preceding contract expires to the first day of delivery. Note that observations for all delivery locations (see Table 1) and expiration months for a given commodity are pooled together in the analysis and that observations for new crop December and November contracts in corn and soybeans start on the first trading day of October, rather that the first day after preceding September contracts expire in order to avoid old/new crop cash price instabilities. In addition, September 2005 contracts are omitted for corn and soybeans due to the effects of Hurricane Katrina.

The charts indicate a sharp decline in basis predictability for all three markets over March 2006 – May 2008. In corn, the upper right regression line indicates the futures market performs reasonably well in terms of basis predictability before 2006, as the slope and intercept are near -1 and 0, respectively, and hedging effectiveness (R^2) is a respectable 87%. The lower left regression line shows the precipitous drop in basis predictability over the last two years in corn. The slope declines moderately, but the intercept increases substantially, and hedging effectiveness drops to 28%. (Similar results are found if the outlier observation in the lower left quadrant is dropped from the 2006-2008 regression.)

Basis predictability results for soybeans are even more dramatic. The lower left regression line indicates

delivery location basis during March 2006 – May 2008 changes much less than the initial basis (slope = -0.44) and hedging effectiveness drops to 26%. Results for wheat are different from corn and soybeans, in that basis predictability was poor before 2006. Nonetheless, predictability over March 2006 – May 2008 followed the pattern of corn and soybeans and deteriorated substantially relative to the earlier period.

The bottom line from the predictability analysis is that delivery location basis in corn, soybeans and wheat generally is weaker and far less predictable over March 2006 through May 2008 compared to the preceding period. This potentially has far-reaching implications for hedging use of these markets. In particular, Holbrook Working argued persuasively that futures markets for storable commodities depend primarily on hedging for their existence. The long-run viability of a futures market may be threatened if the market does not provide an efficient hedging mechanism for producers, merchants and processors. Over the last two years, these hedgers have found the corn, soybean and wheat futures markets to be increasingly inefficient for making storage decisions and managing the risk of market positions. Since trading volume has been setting records during the same time period, this is offset to some degree by the high degree of liquidity (ease of buying and selling) available in these markets. However, if liquidity advantages do not outweigh hedging inefficiencies, decreased hedging use may result, as commercial hedgers seek alternative mechanisms for transferring and managing price risks.

Proposed Solutions

There has been no shortage of proposed solutions to the convergence problems of CBOT grain futures contracts. The solutions suggested to date tend to focus on:

1. Encouraging longs to liquidate before first notice date by changing delivery rules to force takers to load out (demand certificates) or by increasing maximum storage charges to make owning delivery instruments less attractive. The assumption being that forcing longs out before delivery would drive down the nearby contract and improve convergence.
2. Changing terms of the futures contact to a cash index rather than a certificate market, thereby forcing convergence to the cash index.
3. "Managing" the influence of long-only index funds and perhaps other groups by limiting hedge exemptions, thereby forcing those groups to trade with speculative margins and speculative limits. This solution emerges from the notion that these traders have artificially and permanently forced futures prices above fundamental value of the commodities in the cash market.
4. Expanding delivery capacity in order to accommodate more arbitrage of cash and futures prices during the delivery period and thereby force convergence.

In our view, all of the proposed solutions put the cart before the horse because we have yet to nail down exactly what caused the convergence problems observed over the last couple of years. A relevant observation in this regard is that the nature of convergence problems has been inconsistent through time and across markets. Convergence in wheat was weakest during 2006 but recovered somewhat in late 2007 and early 2008, only to return to very poor performance with the most recent contract expiration (May 2008). Convergence in soybeans was weakest in the second half of 2007 and the first half of 2008. The inconsistency makes it difficult to identify a single cause and difficult to accept a one-solution remedy.

Without a consensus as to the causes of poor convergence performance, it is questionable whether substantial changes in contract specifications are appropriate at the present time. Unintended consequences could be worse than a poorly designed remedy, particularly if market conditions change in the near future. Tweaking some contract specifications and monitoring performance makes sense, but may not be palatable to market participants who would like an immediate fix.

Agricultural economists have played a key role in analyzing similar controversies about delivery specifications in the past. Examples include onion futures contracts in the 1950s, Maine potato futures contracts in the 1970s and live hog futures contracts in the 1990s. This rich literature points to a number of variables that need to be carefully investigated with respect to CBOT corn, soybean and wheat futures contracts, such as transportation differentials, storage rates, congestion during delivery, deliverable stocks and arbitrage incentives of the different firms regular for delivery. We are currently in the process of investigating the impact of these variables on the delivery performance of the grain futures contracts.

For More Information

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Price Risk Management Alternatives for Farmers in the Absence of Forward Contracts with Grain Merchants

Darrell R. Mark, B. Wade Brorsen, Kim B. Anderson and Rebecca M. Small

JEL Classifications: G13, G20, Q13

Grain producers have historically made much less use of futures and forward contract markets than grain merchandisers and other middlemen in the grain marketing channel. When grain prices are close to government support levels, producers are well protected from price decreases and they have little need to manage risk through forward pricing. Also, producers must make many long–term investments in land and machinery, which coupled with yield risk, has made forward pricing somewhat less effective in protecting producers against the risks they face. However, as grain prices rise government supports have also become less effective in protecting producers against price decreases. Moreover, increased use of crop insurance allows producers to be able to pay nonperformance penalties associated with cash forward contracts in the event of a crop failure. Thus, producer demand for forward contracts has skyrocketed in recent years.

Most producers prefer forward contracts to futures contracts because they then avoid basis risk as well as the cash required for margin calls. Producers who forward contract receive a few cents less per bushel than they would by hedging (Brorsen, Coombs and Anderson, 1995; Shi, Irwin, Good and Hagedorn, 2004). Elevators have been willing to offer this service because it assures them a supply of grain. At the same time when farmers have a greater demand for cash forward contracts, grain merchants and elevator operators now have limited capacity to offer these contracts. The extra costs associated with margin accounts and extra working capital have been reflected in lower forward basis bids for corn, soybeans, and wheat in many Midwest and Corn Belt states. In Oklahoma, for example, elevators lowered their wheat forward basis bids about 30 cents/bushel rather than discontinue offering forward contracts. Many grain buyers began to restrict their offerings of cash forward contracts in March 2008 instead. Some elevators simply quit offering forward contracts. In other instances, buyers quit offering cash forward contracts beyond the current crop year. Some buyers are only offering cash forward contracts for grain to be delivered within 60 days.

The question then is what do producers do now? This article first explains the problems faced by elevators and offers possible solutions to their problems that would let them again offer competitive forward contract bids. Then, we review producers' alternatives to forward contracts for price risk management.

Elevators and Forward Contracts

Goodwin and Schroeder (1994) found in a sample of Kansas producers that only 11% hedged any of their grain using futures. Schroeder, Parcell, Kastens and Dhuyvetter (1998) summarized several studies that consistently showed that more producers used forward contracts than used futures hedges. These studies showed that 42–74% of producers used forward contracts to price any of their grain. Merchants and elevator operators can offer producers cash forward contracts, agreeing to purchase grain at a later date, because they can offset their risk in the futures market. Essentially, by doing so, they have hedged the producer's price risk in the futures market on behalf of the producer. So, the merchant maintains the margin account on behalf of the producer. Further, the producer is generally offered a flat price contract without basis risk. Hedging in the futures market typically involves changes in basis (the difference between the cash price in a particular market and the futures market price) from the time the futures hedge is initiated until it is offset. Grain merchants incur the risk of trading these changes in basis with the intention of profiting from these moves.

Due to higher price levels and increased volatility of futures market prices, the exchanges have increased both daily price limits (the maximum move up or down allowed in a day) and margin requirements. For example, the Chicago Board of Trade corn and soybean futures market daily price limits were increased in March 2008 from $0.20/bu to $0.30/bu and $0.50/bu to $0.70/bu, respectively. Margin requirements have increased as well. A margin account is a performance bond posted by traders to guarantee their financial performance in the market. The margin requirement is roughly equal to the maximum loss a trader can incur in one day's trade. The margin account balance is updated daily to reflect the trader's actual gain or loss for that day's trade. If the position lost money, the trader, be it a hedger or speculator, has to deposit additional funds into the margin account. This demand for a deposit is referred to as a margin call.

Therein lies the challenge for most grain hedgers—whether farmers or grain merchants or elevator operators. These traders, known as commercials, have long (ownership or buy) positions in the cash market and hedge their risk in the futures market by taking an opposite position (a short or sell position). Therefore, if prices decline, they make money in the futures market to compensate for the lower price received in the cash market. If the futures price increases, the hedger with the short futures position still realizes the same hedged price because the losses in the futures market are offset by higher cash market prices. The challenge now for commercials is that the price increases have become sudden, large, and highly volatile at a time when producers are forward contracting a higher percentage of total production. As a result, the amount of money needed to margin their positions has increased substantially. This leads to higher working capital needs and greater interest expenses being incurred. A typical grain elevator in Nebraska, for example, could be faced with a $3–5 million margin call *each day* when the futures market makes limit moves higher. Their credit lines for hedging have increased substantially as a result, so their interest costs have similarly grown.

It is possible to design a derivative such that elevators can hedge against the costs created by extremely high margin calls. Such options are not currently traded on futures exchanges, but they are offered in over–the–counter markets. It remains to be seen whether the industry will purchase many such options. But, the point is that markets can respond to protect elevators against the increased risk of large margin calls.

In addition to the increased capital requirements created by margin calls, elevators now face increased basis risk. The biggest source of basis risk has been the lack of convergence between cash and futures or more precisely as Roberts (2008) argues, the inconsistent convergence of cash and futures. In addition, there has been structural change in basis relationships, which makes historical basis values less useful in predicting future basis levels. For example, in Iowa basis relationships have shifted so that cash prices are highest near the concentration of ethanol plants rather than near the river as in the past. Increased transportation costs have also changed basis levels.

The inconsistent convergence of basis is likely to be a short–run problem because futures exchanges tend to take immediate action when they identify problems. Futures exchanges have already taken some action. The Kansas City Board of Trade has increased the number of delivery points. Storage costs at delivery points have been increased for the Chicago grain contracts. Exchanges may have already acted to take care of the problems of basis convergence.

Another alternative is for elevators to offset their forward contract with producers by contracting with a grain buyer like a livestock feeder or ethanol processor. In some respects, though, this is a return to the type of contracting that originally prompted the development of the futures market in the first place. Futures markets have been successful because they typically have lower transaction costs and they assure performance of the contract.

Some elevators are writing forward contracts which allow the elevator to "pass–on" margin costs, transportation, and other cost increases to the producer. The result is a quoted basis that may, under specific circumstances, be adjusted downward.

What Are Farmers' Alternatives for Risk Management*?*

Although not all cash grain buyers have abandoned or limited their use of cash forward contracts to originate grain, the potential loss of this important risk management tool should prompt farmers to evaluate other risk management strategies. Several traditional risk management tools are available that can provide price protection.

Hedging grain sales directly in the futures market is the primary alternative to forward contracting. Because hedging with futures may lead to higher net prices than forward contracting (Brorsen, Coombs and Anderson, 1995), one possibility is that producers might actually be better off by using futures in the first place. Although producers would still have basis risk, they may find that basis risk does not create too large of a problem, depending upon their location.

Capital requirements created by margin calls, however, can be a major drawback for many producers. At $1,500 per contract for the initial margin requirement, establishing a

position in the corn futures market requires $0.30/bu. For soybeans, the initial margin requirement is $3,250 per contract or $0.65/bu. While initial margins are essentially a performance bond rather than a payment, there is an opportunity cost associated with committing that capital to the margin account. For a producer hedging new crop corn or soybean sales on April 1 and holding the futures positions until October 1, interest expenses amount to slightly more than $0.01/bu for corn and nearly $0.03/bu for soybeans at an 8.5% interest rate. For a farmer growing 1,000 acres each of corn and soybeans with yields of 160 and 50 bushels per acre who decides to hedge 50% of the production using futures, the initial margin requirements for the corn and soybean futures trades would be $24,000 and $16,250, respectively. The interest costs to fund these margin requirements would total $1,023 and $693, respectively. Thus, the total committed money for this producer hedging half of expected production would total nearly $42,000.

Capital needs to fund the margin account would increase further if the futures position(s) lost money and margin calls resulted. For the short hedger, this would occur when the market price increased. So, in situations similar to those seen recently, additional funds must be added to the margin account dollar–for–dollar with market price increases. As a result, farmers could quickly exhaust their lines of credit. As one Oklahoma producer recently remarked when asked why he did not use futures markets, "I used futures once a few years ago, but the market went against me and I had to sell one of my farms just to meet my margin calls."

Farmers can enter into a basis contract with a grain merchant in addition to hedging in the futures market to provide both the price level and basis protection that a cash forward contract offers. While the risk protection of the futures hedge and basis contract combined is equivalent to the cash forward contract, the availability of basis contracts may be limited, similar to forward contracts. Recent transportation cost increases are changing how elevators offer basis contracts. The historically weak basis bids currently being offered by grain merchants suggest that producers would be better off to accept the basis risk themselves.

Options on futures positions are another viable hedging strategy, although, like futures hedging, they do not protect against basis moves. Farmers can purchase put options to establish the right, but not the obligation, to sell a futures contract at a specified strike price. For example, a producer might buy a $6/bu December corn put in the spring during planting to hedge a new crop sale. In the event that the futures price is below $6/bu at harvest time when the cash sale is made, the put option will let the hedger recover the difference between the lower futures price and $6/bu. However, if prices are higher than $6/bu at harvest, the value of the option will be near zero and not used. In many respects, purchasing an option is similar to an insurance policy.

Option premiums are determined by a number of factors, including the length of time before expiration and the volatility of the underlying futures contract. Premiums for options bought further in advance of their expiration will be higher because there is more time for the futures price to move in an unfavorable way and for the option to gain value or become "in–the–money." This large cash outlay can be a drawback for farmers when contracting a long way into the future, which is especially important when they are also contracting and paying for inputs. Additionally, options are thinly traded in deferred months, so even being able to purchase options several months or years in advance of a sale may not be possible without significantly moving the market. No research is available on the liquidity costs in options markets, but we expect that options markets are more expensive than futures markets for an equivalent amount of price protection.

Option premiums become more expensive when the volatility of the underlying futures contract increases because there is a higher probability that the option will expire in–the–money. Since grain futures market prices have become increasingly variable in recent years, option premiums have increased.

Producers can reduce the net premium cost of purchasing a put option to hedge a future cash sale by making sales of other options through either a fence or spread trade. A fence, for example, establishes a price ceiling as well as a price floor, but the ceiling price can be at a higher level than the maximum price created through a futures hedge or cash forward contract. Selling a call option (which gives the buyer the right, but not the obligation, to buy the underlying futures contract at the call strike price) with a higher strike price than the purchased put option creates this price ceiling in exchange for the premium received. Thus, a price fence, or window, between the two strike prices is created. The put gains value at prices below the put strike price and, therefore, creates a price floor, while the call option loses value for the seller at price levels above the call strike price, thus creating a price ceiling. One problem with the fence strategy is that it leaves producers exposed to possible margin calls if prices rise. Another drawback is increased costs from having two option trades instead of one.

Similarly, a vertical put spread can be created by purchasing a put option and selling another put option with a lower strike price. Collecting the premium on the put option sold reduces the net premium cost of the hedge; however, it also removes the down-

side price protection at levels below the strike price of the put option sold. While a multitude of other option trades can be made to provide price risk protection, most are so complex that many farmers are not comfortable using them and it is not clear that they offer much advantage over the simple purchase of an out–of–the–money put option.

Direct contracting with a downstream end–user is another alternative. Several cash market participants also need to hedge against the *opposite* risk that grain farmers have. Such downstream contracting, which bypasses grain merchants that are not offering forward contracts, has both advantages and disadvantages. These downstream end–users, such as livestock feeders and ethanol plants, are concerned about price increases and may be more willing than ever to forward contract and lock in their input prices. The disadvantage, however, is that transaction costs may be higher for both parties because they have to identify a willing second party, negotiate contract details, and likely seek legal counsel in constructing the contract. Additionally, these downstream end–users may not be protected by bonds, and therefore pose additional risks to sellers.

Another alternative for farmers is to obtain revenue protection that would simultaneously cover both price and yield risk. Premiums for crop revenue insurance are subsidized by 38–67% and therefore may be increasingly attractive as option premiums become more expensive. Crop revenue insurance does not, however, protect against basis risk and has limitations on how much price levels can change from year to year. While it must be purchased before planting, it does not require a cash payment until after harvest. The recently enacted 2008 farm bill offers another type of revenue protection called Average Crop Revenue Election Program (ACRE). ACRE provides indemnities to producers in states that have revenue shortfalls (determined by a 5–year state olympic average yield and national marketing year average price) who also have revenue shortfalls, after crop insurance, on their own farms. Producer risk management decisions will likely change as the details of the ACRE program and disaster payments provided in the 2008 farm bill become known.

Summary

Due to significantly higher and more volatile prices in recent years as well as the working capital required to manage risk associated with offering cash forward contracts, some grain merchants have restricted or eliminated these contracts, thereby limiting a risk management strategy at a time when farmers need it most. Grain farmers still have alternatives for price risk management, including futures and options hedges and downstream forward contracting. Each, however, has some disadvantages relative to forward contracting grain with merchants or elevator operators. For some farmers, these disadvantages will be surmountable and relatively easily overcome.

Farmers with larger operations, more working capital, and more familiarity with the futures market will likely find futures and option hedging to be a reasonable alternative to cash forward contracting. Other farmers, without knowledge of the alternatives or comfort in using them may elect not to use any risk management tools and remain completely exposed to price risk. That is possibly the biggest concern of all.

For More Information

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