



Economic Letter

Market Expectations and Corn Prices: Looking into Future to Explain Present

by Michael D. Plante and Jackson Thies

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Market expectations of future supply and demand are important in determining current prices for agricultural products such as corn, which are harvested annually and stored for later use. Prices can quickly move when beliefs change—due to new data, for example—even if events far in the future are involved.

It might seem impossible to understand what the market expects regarding the future. But the U.S. Department of Agriculture (USDA) releases forecasts for supply, demand and inventory levels for many crops, including corn, and market watchers await these predictions to glean insight into anticipated conditions. These prognostications often provide a basis for understanding market expectations.

The run-up in corn prices that began in summer 2010 highlights the usefulness of watching market expectations (*Chart 1*). Historical data available after corn prices initially jumped tell a story about the increase and why it occurred. But looking at market expectations of future supply and demand, as proxied by a specific USDA forecast, tells a story almost in real time about the increase and why prices have remained elevated.

Historical Data

The USDA is an important source of historical information about the corn market. Data are organized by market year, which runs from September to the following August, and include numbers on supply, demand and inventories.

The data show that corn production and consumption both trended up over the last decade. The harvest in the 2010-11 market year was about 26 percent larger in the U.S. and 40 percent greater globally than in 2000-01. Consumption also increased during the period—by 43.9 percent in the U.S. and 40 percent globally.

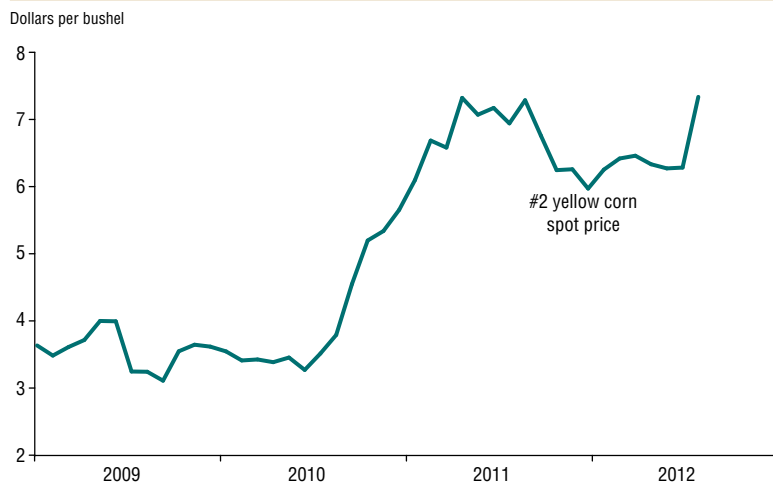
Significantly, growth of annual production and consumption don't move synchronously. In the case of production, weather can significantly influence how much corn is harvested in any given market year. In some instances, consumption outstrips the amount of corn produced (*Chart 2*).

Depleting Inventories

Inventories are important to the market because they help meet unexpectedly high demand or low production, both within and across market years. This explains how consumption can exceed production. Excess demand is met with corn from storage.

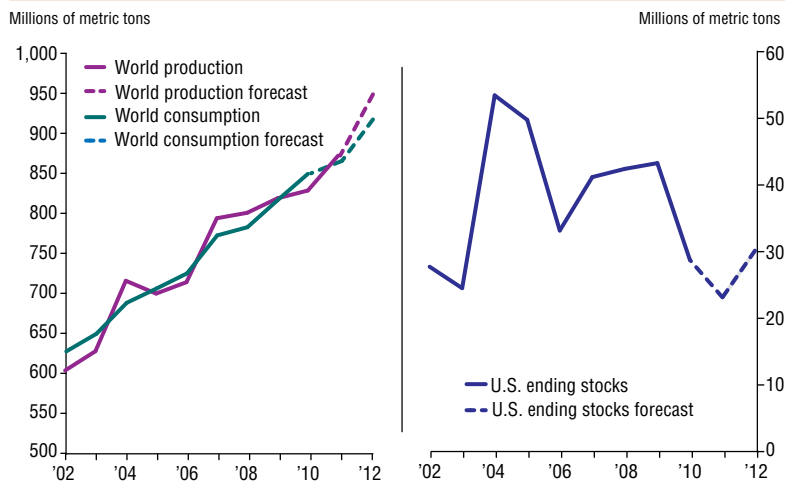
The USDA publishes data on U.S. inventory levels in December, March, June and September in its Grain Stocks report. Not surprisingly, inventories are seasonal—peaking in December after the harvest and reaching a trough the following September. The final number in September, referred to as ending stocks, provides an indication of how strong demand was over the market year relative to the harvest.

Chart 1 | Corn Prices Climb in Mid-2010



SOURCE: Wall Street Journal.

Chart 2 | Global Corn Consumption and Production Rise amid Varying U.S. Inventories (Ending Stocks)



NOTE: Market years—from September through the following August—are depicted. For example, 2007 reflects ending stocks for market year 2007–08.

SOURCES: U.S. Department of Agriculture; authors' calculations.

Corn is a global commodity, and the U.S. is fully integrated into this market. Ending stocks in the U.S. tend to track the world market, typically falling when world consumption exceeds world production, and vice versa. After declining in 2006–07, U.S. inventories remained relatively flat for several years before sharply dropping in 2010–11, as Chart 2 shows.

The absolute amount in inventory, however, does not indicate adequacy to meet potential supply or demand shocks. Ten bushels of corn in storage is quite sufficient if society consumes just one bushel a year, but not so reassuring if consumption is 10,000 bushels annually. When viewed in this light, inventories have become increasingly tight over the last five years. Ending stocks for 2010–11 were close to lows last seen in 2003–04; consumption in 2010–11, however, was 30 percent higher.

In Hindsight, Easy Story to Tell

Given the data now available, the 2010 corn price story seems straightforward. Production tends to increase by enough every year to keep pace with growing consumption. However, this did not occur in 2010–11, prompting a significant inventory drawdown to meet demand.

Higher corn prices were a natural result. At the margin, higher prices made some people decide to consume less corn, easing demand-side pressure. Higher prices also reduced supply-side pressures by persuading some of those holding corn inventories to sell and inducing farmers to plant more in later years.

This assessment of trends relies on data published long after the fact. The price of corn, however, started rising in mid-2010. While market participants would have been aware of certain facts, such as the upward production and consumption momentum, supply and demand data were not available then. One hypothesis would be that, during summer 2010, the market anticipated what would happen and prices responded.

USDA forecasts for the corn market, available in various reports it publishes, help verify this scenario.¹ USDA

predictions are not perfect and are subject to revision. Despite these shortcomings, the market follows these forecasts closely, and they are an important information source that helps form supply and demand expectations.²

One particular forecast—U.S. ending stocks—seems to encapsulate the USDA's best estimate for how strong demand will be relative to supply over the course of the market year.

Predictions for ending stocks in the U.S. are first released in the May edition of World Agricultural Supply and Demand Estimates (WASDE). The forecast is revised monthly until September the following year, when the actual number is published in the Grain Stocks report.

A revision to the forecast for ending stocks signals a change in anticipated market conditions over the coming year. For example, an October WASDE report showing a decrease in the forecast from the September estimate would indicate that the USDA believes corn in storage will be lower than previously anticipated. This could be due to stronger demand, lower supply or both. Whatever the reason, there is less corn relative to demand than previously expected. Holding all else constant, this should drive the price of corn higher once the market digests the new information.

Anticipating a Tight Market

Ending stocks forecasts for the market years between 2009 and 2013 are shown in Chart 3. The squares at the end of the lines are the final readings published in the Grain Stocks reports of September 2010 and 2011. The average spot price of corn for each month is also plotted.

This chart provides visual support for the hypothesis that market participants could have anticipated what happened during the 2010–11 market year. The initial forecast for 2010–11 ending stocks, published in May 2010, was for 1.8 billion bushels of corn. In June, the forecast was lowered 13.5 percent to 1.6 billion bushels. A series of further reductions came in the succeeding months, and by December 2010, the forecast was half the original amount. In other words, starting

in June 2010, forecasts pointed to increasing market tightness. Simultaneously, the average price of corn in each month increased, consistent with the idea that the market believed the USDA forecasts and, therefore, adjusted expectations starting in summer 2010.

Corn prices have remained elevated, as Chart 1 indicates. Do forecasts provide a reason for this? Starting in May 2011, the USDA released anticipated ending stocks for the current market year, 2011–12. As seen in Chart 3, these predictions have remained relatively constant and, more importantly, have been consistently lower than the ending stocks in September 2011, illustrating the reports' impact on the market. While preliminary 2012–13 reports anticipated greatly improved conditions, the July release was revised 37 percent lower because of drought in the Midwest. Despite elevated prices, demand should be strong enough to prevent inventories from expanding to more comfortable levels, in both this market year and the next.

Spillovers to Other Crops

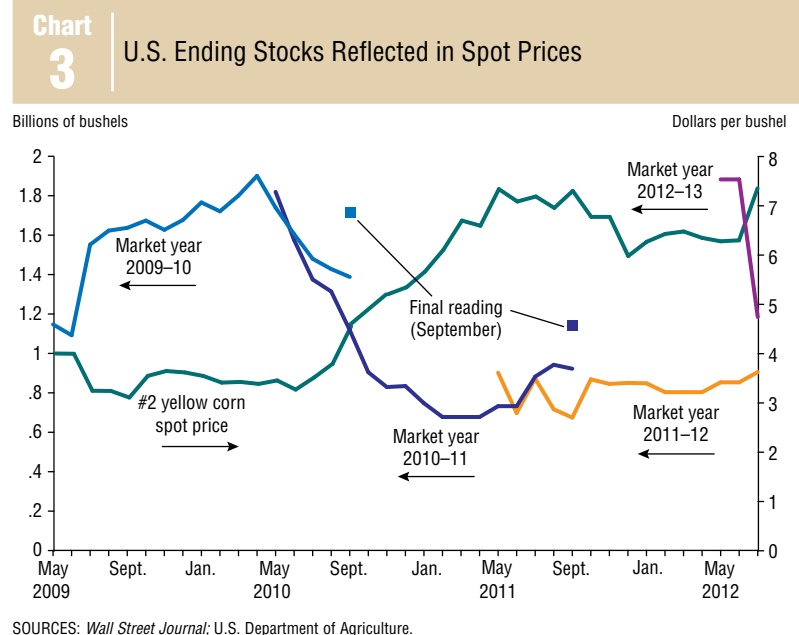
Although we focus on corn, the prices of many other crops have increased, often in tandem with corn. For example, soybeans rose from an average of \$9.45 a bushel in June 2010 to almost \$14 in June 2012. This is not a coincidence because

many other crops are substitutes for corn, both on the supply and demand sides.

Consider the trade-offs a farmer faces when deciding whether to plant corn or soybeans.³ Since 2005, each acre planted with corn has yielded, on average, about 3.3 times as many bushels as an acre planted with soybeans, according to the WASDE reports. If all else were equal, each bushel of soybeans would sell for about 3.3 times the price of corn. If the ratio were persistently lower, for example, farmers would have an incentive to plant more corn and fewer soybeans. This would eventually increase soybean prices and reduce corn prices. In reality, all else is not equal; certain costs are lower for soybeans, and there are some benefits from rotating them with corn each year. This suggests soybeans should, on average, sell for less than 3.3 times the price of corn.

The actual soybean–corn price ratio from 2000 to the present, along with the acres planted with corn and soybeans in the U.S., is shown in Chart 4. The price ratio has averaged 2.5 to 3 over the last 12 years and has varied over time. There has been clear substitution between the two crops, particularly when the price ratio has fallen below 2.

This suggests that prices for one crop, such as soybeans, could remain elevated if corn prices remain high



even if the other market appears well supplied. We do not explore this issue, but it indicates USDA forecasts for one crop could influence prices for other crops.⁴

Prices in the Future

USDA forecasts help show that changing expectations of future supply and demand prompted the dramatic corn price run-up in mid-2010 and the continuation of high relative demand through the middle of this year. While the number of acres planted with corn increased significantly in 2012, an early summer heat wave and the Midwest drought dashed hopes for a bumper crop and propelled prices still higher. Prices may well remain there unless next summer's planting

brings a new set of crop reports that hold promise for a substantial supply increase.

Plante is a research economist and Thies is a former senior research analyst at the Federal Reserve Bank of Dallas.

Notes

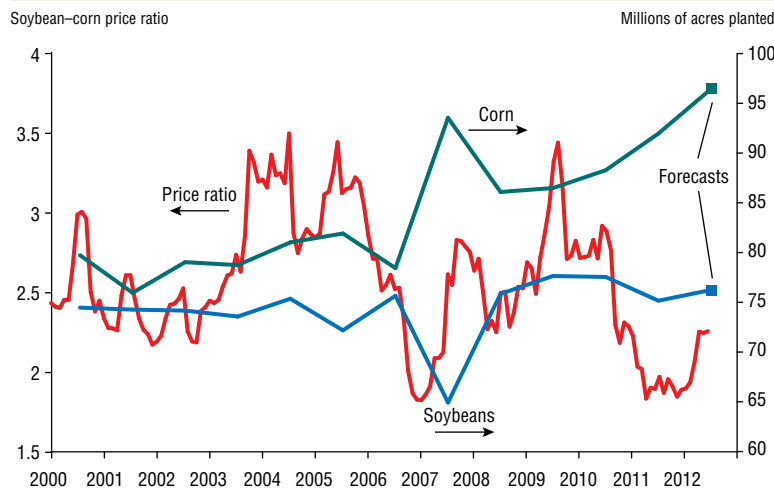
¹ See, for example, the Prospective Plantings, Acreage, and World Agricultural Supply and Demand Estimates reports from the U.S. Department of Agriculture.

² See "The Impact of Situation and Outlook Information in Corn and Soybean Futures Markets: Evidence from WASDE Reports," by Olga Isengildina-Massa, Scott H. Irwin, Darrel L. Good and Jennifer K. Gomez, *Journal of Agricultural and Applied Economics*, vol. 40, no. 1, 2008, pp. 89–103, and "Impact of WASDE Reports on Implied Volatility in Corn and Soybean Markets," by Isengildina-Massa et al., *Agribusiness*, vol. 24, no. 4, 2008, pp. 473–90, and references therein for further evidence of how these forecasts influence the market.

³ This example is for illustrative purposes only. A richer analysis would consider other crops that compete for acreage with corn and soybeans.

⁴ See "Do USDA Announcements Affect Comovements Across Commodity Futures Returns?" by Berna Karali, *Journal of Agricultural and Resource Economics*, vol. 37, no. 1, 2012, pp. 77–97, for evidence of this in certain markets.

Chart 4 Crops Compete for U.S. Acreage



SOURCES: U.S. Department of Agriculture; authors' calculations.

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