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Department of Agricultural and Consumer Economics, University of Illinois Urbana-Champaign

Current Expectations of Future Corn Prices, and Ghosts of Prices Past

Bruce J. Sherrick

Department of Agricultural and Consumer Economics
University of Illinois

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It is generally regarded that futures markets provide the best aggregated beliefs about future prices by market participants, given all currently available information; and thus that current prices are also the best estimate of future prices. Changes in futures prices thus reflect changes in information, or resolution of uncertainty prior to expiration. Even if price levels do not change, market participants generally become more certain about the production and demand as time progresses, and the uncertainty around the prices usually declines with time as well. The prices of options on futures reflect the degree of uncertainty about the futures prices and provide a means to recover additional probabilistic information about price uncertainty, or the probability of prices moving to various other levels, either higher or lower than the current futures price.

Corn futures prices have increased significantly recently, and are currently substantially above the values used in to establish “projected prices” for crop insurance guarantees. However, the projected prices for insurance purposes were, at the time established, the best estimate of the price expected at harvest. Likewise, the volatility at that same date reflected the perceived likelihoods for changes in prices of various magnitudes. Changing information about the condition of the crop and prospects for yields have obviously resulted in revised expectations about future prices, and have also resulted in somewhat abnormal volatility patterns through time for the December corn contract.

Figure 1 contains historic December 2012 Corn Futures prices, and some additional information related to the prices expected at various dates. The average price during February is used to establish the projected (indemnity) price of $5.68/bushel for federally-sponsored crop insurance policies. As can be seen, the current prices are substantially higher than the original projected price. It would also be interesting to assess the probability one would have assigned at the end of February to the possibility of corn futures exceeding the current price of roughly $7.90 in this third week of July. Using components of the iFarm Crop Insurance Evaluator that recover futures price distributions from options market data, the implied distributions of future prices can be recovered. For example, on March 1, the implied distribution indicated that there was a 10% chance that prices would exceed $7.54 at expiration, and only a 7.1% chance that prices would reach $7.90. One interpretation is that the conditions resulting in today’s prices were viewed then as representing roughly a one in fourteen year event.

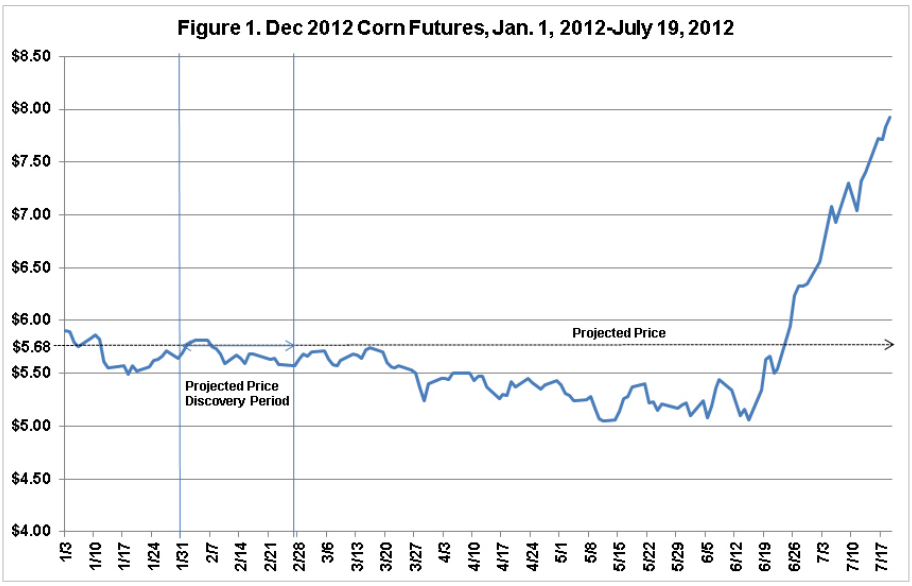
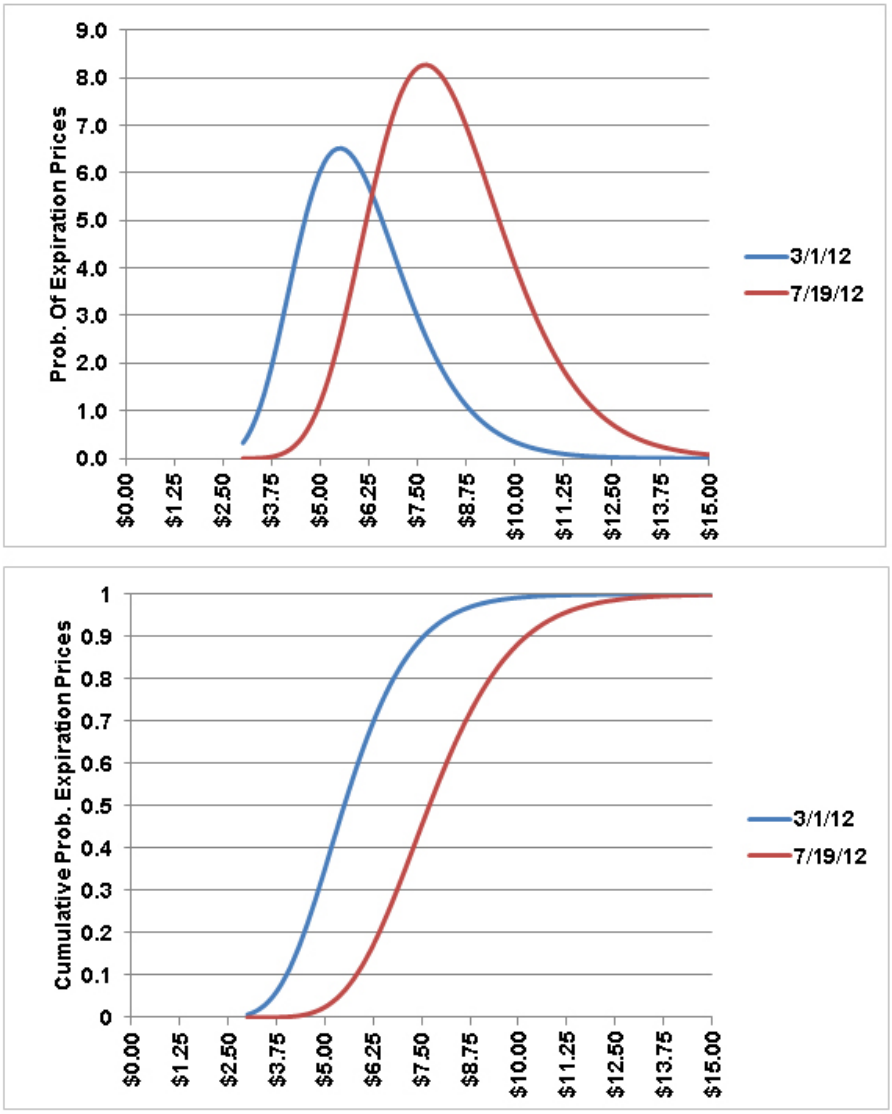
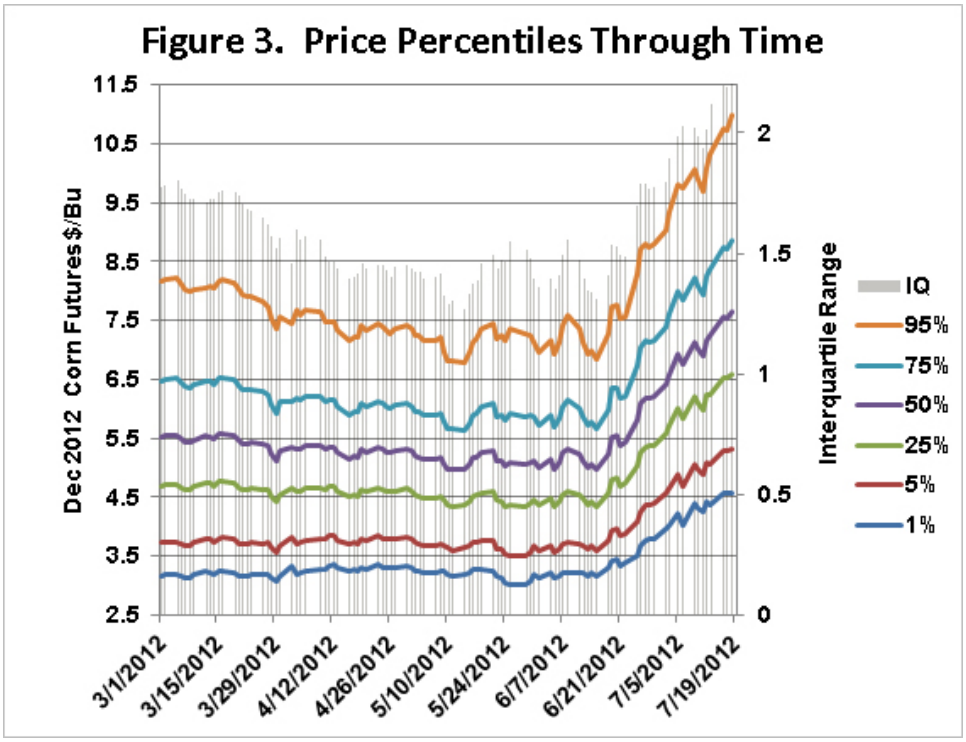


Figure 2 provides more complete information about the market's assessment of possible prices at the using market data on March 1, and opening market information from July 19, 2012. The upper panel shows the probability images associated with the markets assessment of possible futures prices by the expiration of options (November 23, 2012), and the lower panel shows the same information in cumulative probability form under which one can more directly identify the implied probability associated with each price of interest and vice versa. Obviously, as prospects for substantially lower than normal yields materialized and information changed, the price distribution shifted accordingly.

Figure 2. Expected Price Distributions, March and July



If we repeat this process for all days and tabulate a standard set of percentiles, we can see how the information evolves through time. Figure 3 provides a visual display of the changing information set through time. Tabulated are various percentiles which can be interpreted as the market's estimate of the value at which there is the associated percentile chance of being below by expiration. Additionally, the interquartile range is provided, or the distance between the 25th and 75th percentile prices. It is generally the case that the interquartile range tends to decline through time as uncertainty is resolved during the growing season. Likewise, the high and low "bands" in the price distribution tend to narrow toward the median or 50th percentile, even if the levels change through time.



The left panel in table 1 provides tabulations of the probabilities of price distributions for the expiration date of the underlying options (November 23) as of both March 1 when projected prices for insurance were formed and present, taken from the options market data. Note that at the date insurance decisions were made, the options data indicated that there was a 55% chance that prices would be below $5.58 by expiration. As of July 19, 2012, the market gives only an 8% chance that harvest prices will be below projected prices. As of March, there was almost an implied 90% chance that prices would be below $7.50, and as of today, the market about a 55% chance that they will end above. The right panel provides the same information in a different format with the probabilities given and associated prices tabulated comparing March to July conditions. For instance, in March, the market expected prices to be above $4.00 in 90% of the possible cases. By July, that value has been revised to $5.81 – or an implication that there is a 90% chance that prices will exceed $5.81 at expiration. Interestingly, there is still some meaningful upside pricing possible, with a 20% chance that price will exceed $9.26 at the expiration date.

Table 1. Comparing Market Expectations, March vs. July

	Prob. below Price			Price at Prob.	
Price	March	July	Prob	March	July
$ 4.50	21.0%	0.7%	1%	$3.09	$4.62
$ 4.75	27.8%	1.4%	5%	$3.66	$5.36
$ 5.00	35.1%	2.5%	10%	$4.00	$5.81
$ 5.25	42.7%	4.1%	15%	$4.25	$6.13
$ 5.50	50.2%	6.3%	20%	$4.46	$6.40
$ 5.68	55.3%	8.3%	25%	$4.65	$6.64
$ 5.75	57.3%	9.2%	30%	$4.83	$6.86
$ 6.00	63.9%	12.9%	35%	$5.00	$7.07
$ 6.25	69.9%	17.2%	40%	$5.16	$7.28
$ 6.50	75.1%	22.1%	45%	$5.33	$7.49
$ 6.75	79.7%	27.5%	50%	$5.49	$7.70
$ 7.00	83.6%	33.3%	55%	$5.67	$7.91
$ 7.25	86.9%	39.3%	60%	$5.85	$8.14
$ 7.50	89.6%	45.3%	65%	$6.04	$8.37
$ 7.75	91.8%	51.3%	70%	$6.26	$8.63
$ 8.00	93.6%	57.0%	75%	$6.49	$8.92
$ 8.25	95.0%	62.4%	80%	$6.77	$9.26
$ 8.50	96.1%	67.5%	85%	$7.10	$9.66
$ 8.75	97.0%	72.1%	90%	$7.54	$10.20
$ 9.00	97.7%	76.2%	95%	$8.25	$11.04
$ 9.25	98.2%	79.9%	99%	$9.77	$12.83

As we have experienced, information can change rapidly, and the market's associated price expectations move accordingly. Still it is interesting to take a "snapshot" every now and then and consider what the market believes lies ahead.

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