

Lean Hog Futures Forecast Errors, 2000-2019

The lean hog futures market is a setting where anyone can “vote” their opinion about what they think prices will be in the future. This market is made up of many buyers and sellers, and market participants bring their own information to the table as they make decisions with real impacts on their bottom lines. Much of this information is local or proprietary and is costly or even impossible to discover outside of a market setting. The futures market does the work of distilling this information into futures prices, and this means that futures prices represent a well-informed forecast at a particular point in time. Past research shows that futures and futures-based forecasting methods are as good, or even better, than other forecasting approaches, but just how accurate are futures prices as forecasts?

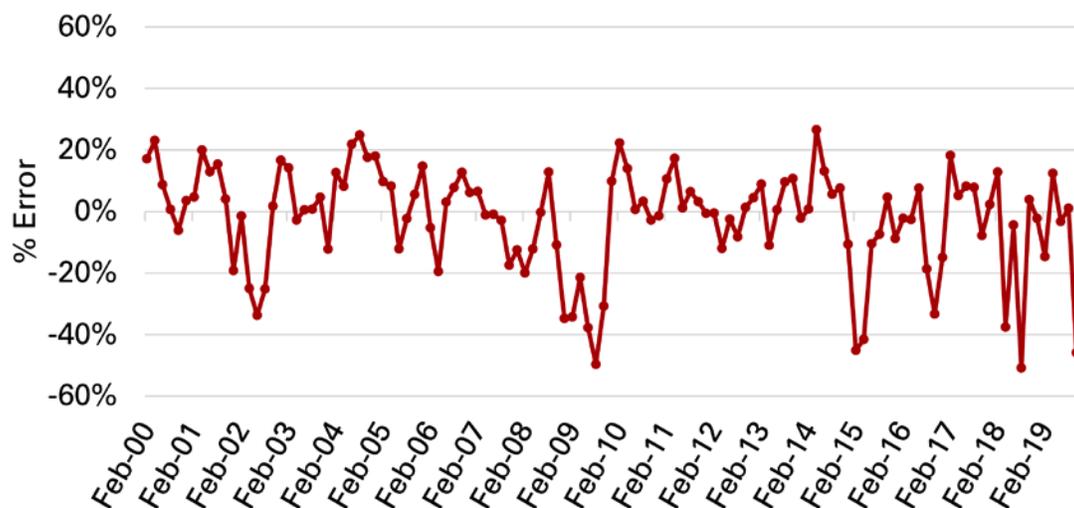
To answer this question, this simple analysis compares 20 years of lean hog futures prices to the price at contract maturity. Five forecast periods (8, 16, 24, 32 and 40 weeks out) are evaluated for each even-month (February, April, June, August, October, December) lean hog contract from 2000 to 2019. For each period, futures price forecasts

are created by averaging futures settlement prices for the selected week (Monday-Friday), while the maturity price is the average price of the last five trading days of each contract. The forecast error is simply the maturity price minus the forecasted price at a period prior to maturity. A positive error implies the forecast was too low. On the other hand, a negative error means the forecast was too high. If futures prices truly embody all relevant information for the lean hog market, one would expect that over the 20-year period there would be no predictable pattern to the errors and that they would be on average close to zero.

Results

Figure 1 shows the 24 week out forecast errors as a percentage of the maturity price for all 120 even-month contracts for 2000 to 2019. As hypothesized, the errors are more or less distributed around 0% in a random pattern, although forecast errors for five contracts drop below negative 40%. The first of these large negative errors was the August 2009 contract, which corresponds with H1N1 influenza outbreak. While no forecast errors exceed 30%, more than

Figure 1. Percent Error for Lean Hog Contracts at 24 Weeks Out



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half (64) of the errors are positive. Roughly 33% of errors fall within +/-5% of zero, with slightly more errors being greater than 5% compared to those that are less than 5% (43 vs. 38). There are periods with persistent over or under forecasting (e.g., the H1N1 outbreak), but these intervals do not appear to follow a predictable pattern.

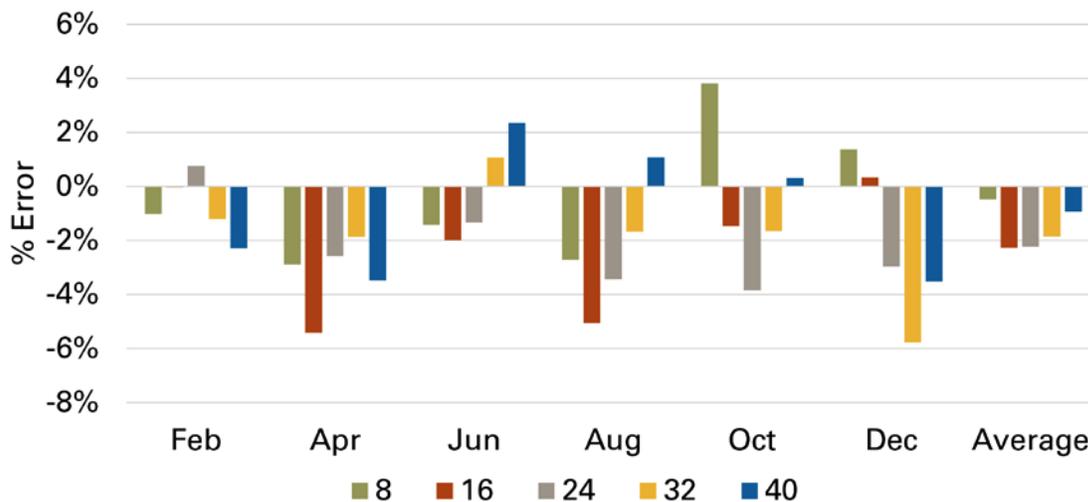
Figure 2 reports the 20-year average percent forecast error by contract and weeks to maturity. There is no obvious pattern across the contracts. April futures price forecasts are too high on average, as are February and August forecasts (except for 24 and 40 weeks out, respectively). June, October, and December forecast errors vary widely across weeks to maturity. Over the 20-year period, on average, all forecasts are slightly higher than maturity prices. It is important to keep in mind, however, that each average is calculated from only 20 forecast errors, so large errors in only a couple years can change the average dramatically, especially when errors are typically pretty small.

It is important to remember that research such as this has consistently shown that markets are efficient and that highly predictable patterns in the data that could be used to generate a profit will be exploited until the profits are bid out of the

system. So, if the presence of forecast errors are to be a cause for concern, it should not be that futures prices over or under estimate prices at maturity. Futures prices, and thereby forecasts based on these prices, account for all public and nonpublic information at a specific time. Macroeconomic conditions, policy changes, weather events, international developments, and other possible internal and external shocks are continuously occurring. Thus, the concern should be regarding whether “extreme” events giving rise to large forecast errors are becoming more frequent and/or their price impacts more severe.

It is instructive to consider more than just forecast error averages. Table 1 reports the same average forecast errors presented in Figure 2 alongside the forecast error standard deviation for each contract month by time to maturity. Standard deviation is a simple measure of variability around the average, and under normal circumstances, the actual forecast error is expected to fall within plus or minus one standard deviation of the average error roughly two-thirds of the time. For example, for the eight weeks out forecast for the February contract, about two-thirds of the time the forecast error should fall within -11.78% and 9.74%. For all contract months, the variation in the forecast error

Figure 2. Average Percent Forecast Error by Contract and Weeks to Maturity, 2000-2019



tends to decrease as the time to contract maturity decreases, reflecting a decrease in uncertainty as more information becomes available and is reflected in the futures price.

Table 2 provides the average and standard deviation of futures price forecast errors by weeks to maturity across all 120 contracts from 2000 to 2019. The overall forecast error is -1.55%. For context, based on the average lean hog futures price of \$70/cwt for the period 2000-2019, a 1.55% error equates to only \$1.09/cwt. As expected, the variability in forecast error increases as time to maturity increases.

This analysis provides insight into how accurately lean hog future price forecasts predict prices at contract maturity. As shown by the average forecast errors for 8, 16, 24, 32 and 40 weeks out, a futures contract price may under or over predict prices in any given year. Forecast error standard deviations demonstrate that there is considerable variability in forecast performance, but that this variability decreases as contracts approach maturity. Overall, futures price forecasts are very useful and effective predictors of prices at maturity.

Table 1. Average and Standard Deviation of Lean Hog Futures Forecast Error by Contract and Weeks to Maturity, 2000-2019

Weeks Out		Feb	Apr	Jun	Aug	Oct	Dec
8	Average	-1.02%	-2.90%	-1.43%	-2.71%	3.81%	1.36%
	Standard Deviation	10.76%	15.73%	10.59%	13.54%	11.82%	8.05%
16	Average	-0.04%	-5.42%	-1.99%	-5.05%	-1.47%	0.32%
	Standard Deviation	14.25%	19.62%	12.38%	17.62%	13.52%	14.03%
24	Average	0.76%	-2.58%	-1.33%	-3.43%	-3.85%	-2.96%
	Standard Deviation	17.53%	19.66%	14.23%	19.53%	16.46%	13.31%
32	Average	-1.20%	-1.87%	1.06%	-1.68%	-1.66%	-5.77%
	Standard Deviation	17.28%	23.15%	14.66%	22.01%	14.87%	15.61%
40	Average	-2.29%	-3.47%	2.34%	1.07%	0.31%	-3.52%
	Standard Deviation	16.73%	22.16%	19.62%	22.13%	15.82%	13.51%

Table 2. Average and Standard Deviation of Lean Hog Futures Forecast Error by Weeks to Maturity, All Contracts, 2000-2019

	8 weeks out	16 weeks out	24 weeks out	32 weeks out	40 weeks out	Overall
Average	-0.48%	-2.27%	-2.23%	-1.85%	-0.93%	-1.55%
Standard Deviation	11.98%	15.28%	16.67%	17.98%	18.36%	16.06%

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