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The Cost of Forward Contracting Wheat

by

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One of the basic principles of economics is that there is no such thing as a free lunch. In regard to forward contracting, we might expect the same. A farmer who forward contracts wheat is receiving a service. The farmer is protected from price risk. The grain company takes care of paperwork, default risk, futures commission, margin calls, and basis risk. However, the grain company also benefits because the grain company has a known source of grain at a known price. Thus, economic theory cannot say for certain that a farmer who always forward contracts will, on average, receive less than a farmer who always sells at harvest. Barkley and Schroeder derive a theoretical model of forward contracting with live cattle and argue that who pays the cost of forward contracting is an empirical question. Therefore, this paper reports a study of Gulf forward basis bids for hard red winter wheat which sought to determine what on average a farmer is paying for the service of forward contracting.

The paper also compares the cost of forward contracting with the cost of hedging. Elam found forward contracting was more costly than futures hedging of live cattle. The dataset used here, however, is much richer than Elam's. The wheat basis bids are observed daily and thus the hypothesis that the risk premium decreases as time to delivery decreases can be tested. The wheat bids are all for the same quality of wheat and thus much simpler techniques can be used to study them. The procedures involve both parametric and nonparametric regression.

FORWARD CONTRACTING OF WHEAT

An elevator forward contracting with a producer to buy wheat at harvest normally forward contracts the same wheat to an exporter, flour mill, or other end user. The end user in turn offsets the forward contract by selling wheat futures contracts until the wheat is sold on the cash export market or as flour. The formula for the forward contract price is

(1) forward contract price = July futures price + Gulf forward basis bid
     - local elevator margin

Past research has generally found that grain futures contract prices do not consistently decline or increase during the life of the contract. Our discussions with local elevator managers suggest they receive the same margin on forward sales as they do on cash sales. Although they may add a cushion if they do not have a contract for transportation costs. The exporting firm bears the basis risk and hedging cost. Thus, the forward basis bid should reflect the cost of forward contracting. Basis risk should decrease as the time to delivery

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decreases. Therefore, the forward basis bid (and thus price received by farmers) should increase as time to delivery increases.

DATA

Data are unpublished Gulf forward basis bids for hard red winter wheat from 1975 - 1991. Because bids for 1979 were unavailable, 1979 was not included in the study. Bids were for each business day from January 2 until June 30 and were for delivery in the last half of June. No bids were quoted in 1988 until April 20 and in 1989 bids began March 20. No bids were quoted during these periods because there was little interest in forward contracting.

One observation was deleted due to a limit move in the futures market on that day. Delivery time was calculated as the number of calendar days from when the forward contract bid was quoted and the last day in June. The data set provides sixteen years of cross-section time-series data.

PROCEDURE

Both nonparametric and parametric regression methods are used. The general function estimated is

(2)   forward basis bid = f(year, time to delivery)

Hardle describes a large number of nonparametric regression methods. Because multiple observations with the same time to delivery are available, the simplest nonparametric method can be used. The method is to take the means for each day across years to remove the effect of year. Then 7-day moving averages are used to estimate the effect of time to delivery. Like most nonparametric regression methods, the results are then presented graphically. The 7-day moving average is selected to remove the effects of weekends. The approach yields an unbiased and consistent estimate of the weekly average. The approach, however, does yield a biased and inconsistent estimate of the value on a given day. The approach essentially fills in valleys and smooths off peaks. The advantage of nonparametric regression is that an explicit functional form is not imposed.

The parametric equation is

(3) $$FBB_{it} = \alpha_0 + \sum_{i=1}^{15} \alpha_i D_i + \alpha_{16} DEL_t + \epsilon_{it}$$

where FBB_{it} is the forward basis bid in year i, t days from delivery, D_i is a dummy variable which is one if a year equals i and is zero otherwise, DEL_t is days to delivery and ϵ_{it} is a normally distributed random variable with mean zero and constant variance. The parameters α_i, i=0,...,16 are estimated with ordinary least squares.

DISCUSSION OF RESULTS

Nonparametric Regression

The 7-day moving averages of the Gulf forward basis bids show that the farther away from delivery time, the lower the bid. Basis bids increase quickly during January and February. Few contracts are signed during these months, and some years a bid is not even quoted.

March, April, and May are the primary months that forward contracts are signed. As Figure 1 shows, the basis bid steadied and averaged between 31-33¢/bu. during these months. As harvest begins at the end of May, the bid is reflecting direct purchases of wheat and it increases rapidly. The basis bid averaged 36¢/bu. during the last half of June. Assuming that futures markets are as likely to go up as go down and that local elevators receive the same margin on forward contracts as on cash sales, the change in the basis bid equals the cost of forward contracting. Thus, a farmer would on average receive about 4¢/bu. less forward contracting on April 15 each year than by selling during the last half of June.

Parametric Regression

The estimates of the parametric regression, equation (3), appear in Table 1. The dummy variables for year show that the Gulf basis has increased over time. The Gulf basis reflects transportation costs from Kansas City to the Gulf, since Kansas City is the delivery point for the futures contract.

The coefficient on time to delivery shows that as delivery approaches, the basis bid decreases. The coefficient of -.027 cents per day suggests only 2¢/bu. difference between April 15 and June 30. Thus, the parametric approach finds the cost of forward contracting on April 15 is only one-half the cost found with the nonparametric approach. Figure 1 shows a nonlinear function and thus the linear function imposed with the parametric approach results in underestimating the cost of forward contracting.

Forward Contracting vs. Hedging

The cost of forward contracting is likely lower than cost of directly hedging in futures. The 4¢/bu. found with the nonparametric regression equals $200/5,000 bu. The cost of selling a 5,000 bu. futures contract includes commission of about $65 and interest on margin of up to $25. Also, futures have a small hidden cost in the bid-ask spread of about $12.50/contract. The total costs of futures hedging are about $102.50/contract or about 2¢/bu. Thus, for about 2¢/bu. more, forward contracting lets a farmer not have to worry about margin calls or basis risk, and allows pricing in increments other than 5,000 bushels. Thus, it is easy to see why many farmers elect to forward contract rather than hedge. Hedging, however, may be preferable for pricing earlier than March (Table 2). The nonparametric regression approach suggests forward contracting January 15 costs 7¢/bu.

Table 1.   Estimated Regression Showing the Effect of Year Dummy Variables and Delivery Time on Gulf Forward Basis Bids on Hard Red Winter Wheat, 1975-1978, 1980-1991.

	Parameter Estimates			
Variable	Parameter Estimate	Standard Error	T for H_0 Parameter = 0	Prob > | T |
Intercept	43.255	0.490	88.267	0.0001
Dum75	-22.756	0.617	-36.848	0.0001
Dum76	-21.453	0.614	-34.942	0.0001
Dum77	-29.782	0.613	-48.599	0.0001
Dum78	-10.784	0.611	-17.664	0.0001
Dum80	-14.117	0.614	-22.993	0.0001
Dum81	-14.130	0.642	-22.004	0.0001
Dum82	-4.717	0.615	-7.670	0.0001
Dum83	1.970	0.621	3.171	0.0015
Dum84	-0.910	0.609	-1.495	0.1352
Dum85	2.221	0.610	3.638	0.0003
Dum86	-1.919	0.614	-3.127	0.0018
Dum87	-5.493	0.611	-8.997	0.0001
Dum88	-0.937	0.802	-1.169	0.2426
Dum89	-3.100	0.744	-4.165	0.0001
Dum90	-1.671	0.678	-2.465	0.0138
Deltime	-0.027	0.002	-12.344	0.0001

while futures hedging is still 2¢/bu. Table 2 shows that the parametric regression method consistently yields a lower cost of forward contracting than the nonparametric regression.

SUMMARY AND CONCLUSIONS

Under the assumptions (based on prior research findings) that futures markets are as likely to go up as go down and that local elevators charge the same markup on forward contracts as they do on cash sales, changes in the basis bid are used as a measure of the cost of forward contracting. This article suggests that farmers are indeed paying a premium for the service of forward contracting. The premium paid decreases as harvest nears. The

Table 2. Approximate Costs of Forward Contracting vs. Cost of Hedging
Hard Red Winter Wheat

| Date | Cost of Forward Contracting | | Cost of Hedging |
	Nonparametric	Parametric	
April 15	4¢/bu.	2¢/bu.	2¢/bu.
March 1	4¢/bu.	3¢/bu.	2¢/bu.
Jan. 15	7¢/bu.	4¢/bu.	2¢/bu.

findings certainly do not mean that farmers should not forward contract. It just means that forward contracting is not free. The cost of forward contracting is found to be greater than the cost of hedging and that the difference decreases as harvest nears.

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Figure 1. Plot of 7-day Moving Average of Gulf Forward Basis Bids for Delivery Last half of June, 1975-1991.
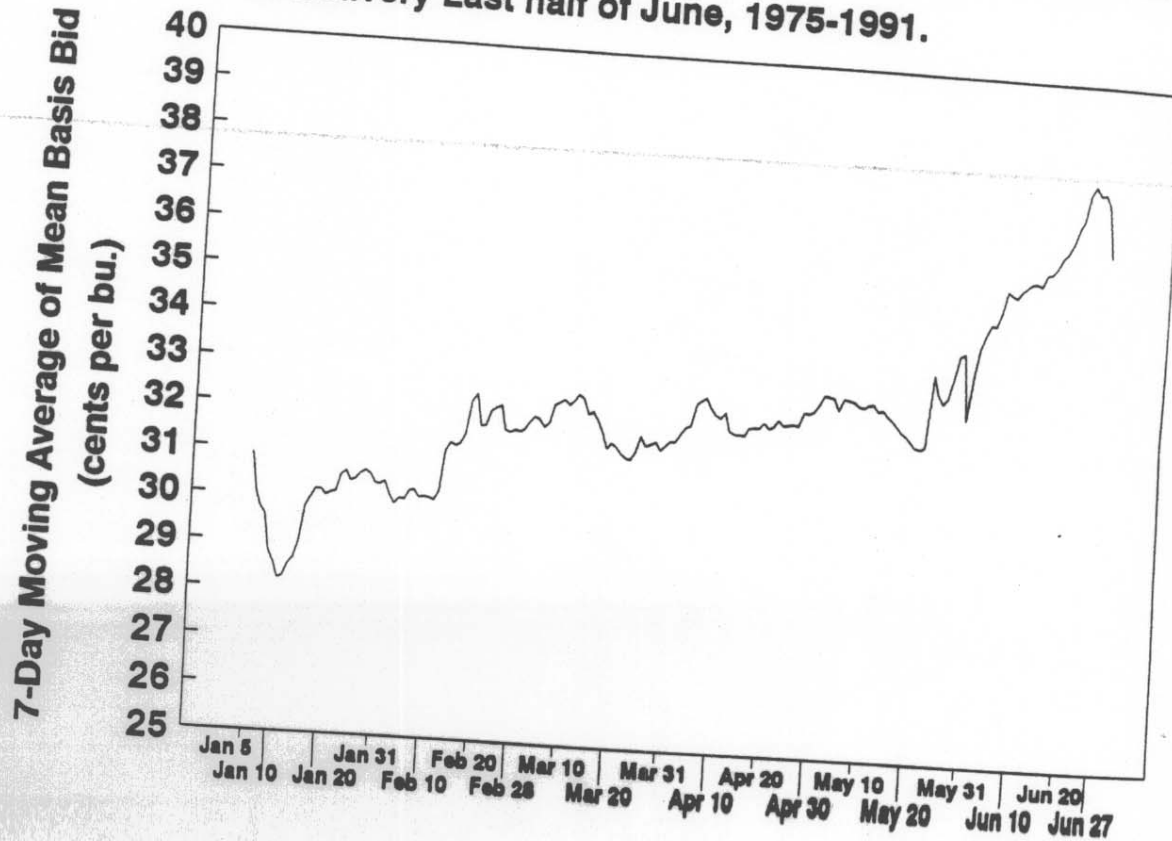
Note: Since basis bid goes up as delivery approaches, a higher price is received by selling at harvest rather than before.