AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Fed Cattle Forward Contract Volume and Basis Relationship

Zelalem Abahana, Matthew Diersen, Jing Li and Nicole Klein*

*Former graduate student, professor, assistant professor and professor,
Department of Economics, South Dakota State University.

Contact information:
Matthew Diersen
SDSU Box 504
Brookings, SD 57007
Ph: 605-688-4864
matthew.diersen@sdstate.edu

Poster prepared for presentation at the Agricultural & Applied Economics Association 2010 AAEA, CAES, & WAEA Joint Annual Meeting, Denver, Colorado, July 25-27, 2010

Copyright 2010 by Abahana, Diersen, Li, and Klein. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

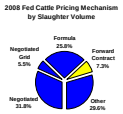
Fed cattle forward contract volume and basis relationship

Zelalem Abahana, Matthew Diersen, Jing Li and Nicole Klein
Department of Economics, South Dakota State University, Brookings, South Dakota

Introduction

Tight supplies of fed cattle in recent years have producers seeking competitive forward contract bids. The forward market is attractive as an alternative to a smaller spot market (by volume) and when faced with variable basis levels when hedging with futures contracts. Producers are routinely encouraged to weigh a forward bid against a basis-adjusted futures price when choosing a hedging or pricing mechanism. Producers that are risk-averse or seeking a buyer for a specific delivery time may also want to enter into forward contracts. Buyers (e.g., packing plants) enter contracts to assure supply for a given time or to obtain cattle at a favorable price. While commonly used forward contract behavior has not been extensively analyzed. Specifically, the relationship between volume and basis on forward contracts is not well understood.

Without models one can only look at weekly volume or year-to-date volume and compare it to other years. We have built delivery month-specific models to assess seasonal differences. By also modeling basis, a volume response to basis can be used for forecasting or to say how much basis would need to change to affect volume.



- Contracts for delivery in April of 2008 reached 13.2% of slaughter volume.
- Other would include small packers, auctions, packer-owned cattle.
- Contract volume was much lower in 2009, but has rebounded in 2010.

Literature

Most of what is understood about forward contracting relates to price levels during a delivery or spot month. For example, Muth et al. (2008) finds that forward contracts were associated with relatively low and volatile prices. Parcell, Schroeder, and Dhuyvetter (2000) included the aggregate volume of cattle forward contracted as an explanatory variable for monthly basis on futures. The volume was not significant in that study. Ward, Koontz, and Schroeder (1998) found a negative relationship between forward contract volume and aggregate transactions prices. Walburger and Foster (1997) also found a negative relationship, but stress that it does not seem to be economically significant. In contrast, Elam (1992) stresses that a forward contract price will be at a discount to a basis-adjusted futures price.

Objectives and Methods

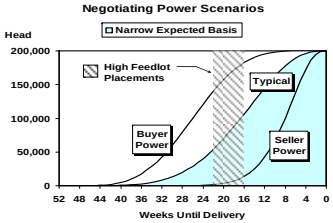
The objective of this study is to examine the relationship between forward contract volume and basis levels for fed cattle. Conceptually, several patterns of contract volume are possible: 1) constant across the contracting horizon, 2) proportional to feedlot placements, and 3) changing based on near-expiration needs of packers. These patterns will be assessed considering the basis levels observed throughout the contracting horizon. Seasonal effects will also be analyzed. Using relatively new data from mandatory price reporting we build forecasting models for volume and basis. These help explain behavior in this market and give insights into prices and trading volume to expect.

Preliminary analysis suggests wide variability of forward contract volume (head contracted) and basis levels depending on the month and year examined. Thus, producers and buyers have general uncertainty about just how many cattle will be contracted for a given month. The empirical procedures include time series analysis to test for basic underlying patterns in volume and basis and a vector autoregression (VAR) model of volume, basis, and time to expiration. Patterns in weekly and cumulative volume can be analyzed while including changes in basis levels. Preliminary results suggest that the month-effect is prominent leading to discussion of seasonality in placements, slaughter, and their respective impacts on pricing behavior. Comparisons of point-in-time volume and basis levels to earlier years have been presented in various Extension settings.

Conceptual Model

Observed contracts with volume and basis are the result of negotiations between packers (buyers) and feedlots (sellers). When the parties look ahead to a given delivery month they have individual motives to enter into contracts. Parties on each side of the transactions would also have different and dynamic amounts of negotiating power. Conceptually, there is a typical pattern where contracts are entered into throughout a reasonable period leading up to the final delivery time. It likely starts out slow when production risk would be high (e.g., cattle may not be old enough to predict finish time, quality, or weights). There is likely an increase during the period when placements of cattle into feedlots occur.

The pattern of total volume likely has some reasonable boundaries based on the relative negotiating strength of buyers and sellers. The buyers may want to line up specific quality levels or quantities of cattle for a given month – giving the negotiating power to sellers. In contrast, there may be ample supplies of market-ready cattle anticipated – giving the negotiating power to buyers. The trade jargon suggests that at times packers are "short bought" and in need of cattle while at other times feedlots are "backed up" with many cattle. If buyers have more negotiating power, one anticipates more contract volume early in the placements period. Then, once buyers have obtained the preferred volume, they would take more cattle at a wide basis level. If sellers have more negotiating power, one anticipates more contract volume late in the placements period as sellers wait to sell cattle at a narrow basis level.



- Precise beginning point of marketing horizon is unknown.
- Total volume at the end of the delivery period is unknown.
- Volume is expected to coincide with placements of cattle on feed.
- Buyer negotiation power would likely be observed with a wide basis.
- Seller negotiation power would likely be observed with a narrow basis.

Data

The data are primarily from USDA-AMS reports titled "National Weekly Direct Slaughter Cattle – Prior Week Slaughter and Contract Purchases". The reports contain weekly volume and basis information sorted by delivery month. The weekly data is available consistently from 2003 to the present. The trend has been for a longer horizon or starting date for entering contracts. The current format was adopted beginning with the July 21, 2008 report and includes a breakdown by basis month.

Total new signings last week: 51,259		Cumulative total for listed months: 1,862,780			
Delivery Mo./Basis Mo.	New Last Week	Cumulative Total For Month	Basis Wtd Avg	Basis Level Min	Basis Level Max
Apr '10/Feb		1,161			
Apr '10/Apr	1,207	321,143	($4.43)	($5.25)	$8.00
Apr '10/Jun		185			
Apr '10/Aug					
Apr '10/Oct					
Apr '10/Dec					
Total Apr Deliveries	1,207	322,873			
Last Yr Apr Del.		204,845			

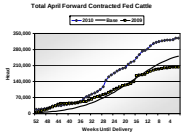
Source: USDA-AMS, April 12, 2010

Results

The preliminary analysis focused on contracts with an April delivery month and using basis figures relative to the April futures contract. April often has the highest total volume of contracts. The results that follow are specific to April for total volume, weekly volume, and basis. A comparison is then made across months. In these results there was no adjustment for roll from contract year to contract year.

Total Volume

The total volume contracted was modeled from 2003 through 2008. Given the large annual changes we chose to model the log of total volume. The best model was a quadratic model of weeks until delivery to the log of total volume. The resulting model is non-linear benchmark based on weeks until delivery. The pattern for the April 2009 delivery month generally followed the expected pattern. There were more contracts entered during late 2008, but then fewer in early 2009. The pattern for the April 2010 delivery month reflects a large spike in volume in late October of 2009, followed by a relatively large ending volume.

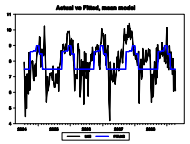


- Forecast can be adjusted for longer contracting horizons by adding weeks until delivery.
- Forecast can be weighted to favor recent or fundamentally similar years.
- Surrounding months are often similar and may be substituted if cattle are presumed to be "pulled forward" or "backing up".

Weekly Volume

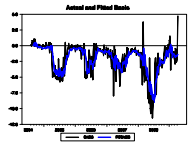
The pattern of weekly volume contracted was modeled in steps. Using the logic that contract volume would likely increase with placements of cattle into feedlots, the different multi-week effects were isolated using dummy variables. The dependent variable modeled was the log of the volume to account for the large range in volume data. The dummy variables suggest increases or shifts in weekly volume contract at 10-15, 15-20, 20-25, and 25-30 weeks before delivery. The residuals from the initial model were then modeled as an ARMA(1,1) giving a transfer function model. The explanatory power suggests the confluence of placements activity and erratic volume follow a consistent pattern in the aggregate and through time. However, the full forecasting model is difficult to implement in practice.

- Placements of cattle in feedlots have a prominent effect on weekly volume.
- May be useful for short-run comparisons with feedlot show lists.
- Initial model converts readily to expected volume during contracting period.
- With longer duration, total volume model could be adjusted by placement effects.



Weekly Basis

It remains difficult to say precisely what the basis would be compared to. Anecdotal evidence suggests that forward contract basis persisted for several weeks whether wide or narrow. The April basis was modeled as ARMA(3,1), which accounts for stable, maintained shifts across years. However, a more user-friendly heuristic would be preferable.



- Persistence in intra-year basis can be modeled.
- Likely improvement over using 5-year average basis.
- April not influenced by including weekly volume.
- Granger causality is present for delivery months of March and July through December, suggesting that basis can be explained better using weekly volume.

Conclusions

- Strong seasonal patterns exist in total volume model. The pattern is non-linear, subject to annual shifting, significantly tied to placements, and different across delivery months.
- Basis is fundamentally and structurally tied to futures-adjusted prices. Basis is also affected in the short run by market forces.
- Interaction or relation between volume and basis varies by month.
- Results complement existing literature by showing pattern up to the delivery month instead of within the delivery month. Also shows that basis has a persistent pattern within a contracting period leading up the delivery month.
- Practical forecasts can be obtained for total volume, weekly volume, and basis that can be used when negotiating forward contracts.

The following issues remain unresolved:

1. The contemporaneous view may not be accurate if reported contracts do not match timing or totals of observed slaughter volume under contracts.
2. Unknown structural changes or fundamental forces may shift the equilibrium level contracted for a given month.
3. Identification of supply or demand curves remains unclear.

Literature cited

Elam, E. 1992. "Cash Forward contracting versus Hedging of Fed Cattle, and the Impact of Cash Contracting on Cash Prices." Journal of Agricultural and Resource Economics 17(1): 205-217.

Muth, M.K., Y. Liu, S.R. Koontz, and J.D. Lawrence. 2008. "Differences in Prices and Price Risk Across Alternative Marketing Arrangements Used in the Fed Cattle Industry. Journal of Agricultural and Resource Economics 33(1): 118-135.

Parcell, J.L., T.C. Schroeder, and K.C. Dhuyvetter. 2000. "Factors Affecting Live Cattle Basis." Journal of Agricultural and Applied Economics 32(3): 531-541.

Walburger, A.M. and K.A. Foster. 1997. "Assessing the Relationship between Market Factors and Regional Price Dynamics in U.S. Cattle Markets." Journal of Agricultural and Resource Economics 22(1): 133-144.

Ward, C.E., S.R. Koontz, and T.C. Schroeder. 1998. "Impacts from Captive Supplies on Fed Cattle Transaction Prices." Journal of Agricultural and Resource Economics 23(2): 494-514.

Acknowledgments

Support for this project was provided by SDSU's Agricultural Experiment Station and Cooperative Extension Service.

For further information

Abahana is a former graduate student, Diersen is a professor, Li is an assistant professor and Klein is a professor in the Department of Economics at South Dakota State University. For more information please contact Diersen, who can be reached at matthew.diersen@sdstate.edu or 605-688-4864.