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Commercial Use and Speculative Measures of Livestock Futures Markets Revisited

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Commercial Use and Speculative Measures of Livestock Futures Markets Revisited

John B. Rowsell, Michael A. Hudson,
and Raymond Leuthold*

There are a number of ways to evaluate the success of futures markets. One clear criterion for success is the trading volume of the contract. Volume is a composite measure of commercial and speculative use. Following the inception of livestock futures trading in the mid-1960s, trading volumes for live cattle peaked in 1979. With the initiation of option trading in late 1984, trading volume in live cattle began to move upward again.

Despite the apparent success of live cattle futures markets from a perspective of volume and durability, little is known about the factors which affect trading volume for live cattle. In contrast, the conceptual foundations for identifying factors which affect trading volume are well developed for grains (see Hoffman, Working (1953, 1954, 1960, and 1967); Gray (1960, 1961)). The results of these works suggest that trading volumes are related to physical supply and hedging use of the contracts.

Leuthold investigated relationships between volume and open interest for live cattle, live hogs, and feeder cattle contracts and various measures of supply. The results suggested that supply variables, such as cattle on feed, sow farrowing, and pigs per litter, explained a relatively small portion of the variability in volume and open interest.

This paper revisits the time period Leuthold examined for live cattle and extends the analysis up through 1987. This provides an opportunity to examine if there has been changes in factors influencing the trade in live cattle futures. The additional time period of 1981 through 1987 provides for a comparison of impacts across a number of contract innovations, such as the 1981 change in contract specification, the 1983 certificate delivery systems for live cattle, and the innovation of trading in options of live cattle futures contracts. During this time period, a plethora of new non-agricultural futures instruments came into being, with explosive growth in their volume of trade.

The relationship between the physical market variables and the composition of trading activity are examined in this paper. The objectives are to quantify if and how the composition trade in live cattle has changed. Then to identify the factors that influence the trade and composition of trade, and how those factors have changed over the time period examined.

Review of Development and Trends During 1970-1987

The composition trade data are based on the Commodity Futures Trading Commission's (CFTC) monthly *Commitment of Traders in the Commodity Futures* report. The commitment data were augmented with monthly market data for prices of relevant inputs, and market price for slaughter cattle. Commitments data and futures volume and open interest were aggregated over all contracts being traded. Monthly and quarterly supply and disposition variables

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for cattle were also compiled. The analysis was conducted over the 1970-1987 time period, with identical analysis conducted over 1970-1980 and 1981-1987.¹

Initial examination of trends in monthly volume would indicate that during 1981-1987 there was an astonishing level of growth. The data in Table 1 indicates that average monthly volume in 1981-1987 is 24% higher than the average monthly volume for 1970-1987. This indication is reinforced by the 41% increase in average monthly volume for 1981-1987 in comparison to 1970-1980. While the later time period indicates significant growth, it actually is a stabilization of growth. The peak in monthly volume occurred in 1979. The volume of trade in 1981-1987 indicates the live cattle future contract has progressed into a mature and stable futures contract.

Table 1. Average Monthly Volume of Trade in Live Cattle Futures			
	1970-87	1970-80	1981-87
Average	297,268	259,997	367,551
Maximum	720,066	720,066	580,397
Minimum	26,970	26,978	180,963

Growth in the trade of futures contracts on the Chicago Mercantile Exchange (CME) during the period examined has been significant. The introduction of the International Monetary Market and the development of financial futures and index futures has brought a diversification in trading volume outside the traditional agricultural commodities. The data in Table 2 emphasizes the relative decrease in importance of the total volume of trading in the live cattle contract.

Table 2. Average Monthly Volume of All Futures Contracts on CME and Relative Volume of Live Cattle to All Other CME Volume		
Period	CME Average Monthly Volume	Live Cattle Volume as % of Total CME
1970-1987	2,036,543	25.5%
1970-1980	760,533	33.9%
1981-1987	4,442,735	9.6%

*CME volume includes meat complex and IMM but does not include options trade.

The live cattle futures contract experienced a growth in trading volume of 9 times from 1970 to 1987. In contrast, the monthly average volume of trade on all futures contracts on the CME was 25 times its 1970 level in 1987. The 1987 volume of live cattle futures trade was 72% of the level in 1979 when trade in live cattle futures peaked. Trade in live cattle futures relative to total volume went from 17.4% in 1970 to 6.3% in 1987, with a peak of 55.2% in 1974.

Examination of the relative composition of trader position is useful as an indicator of trader stability. Table 3 presents the composition of traders on a monthly average basis from the *CFTC Commitment of Traders in the Commodity Futures Report*.

The data in Table 3 indicate that the composition of traders remained relatively stable. The only two categories of trade that have changed to any degree is the decrease in the long-reporting speculative position from 9.9% in 1970-80 to 5.6% in 1981-87. This 4.3 percentage point shift in composition of trade was compensated by the 4.7 percentage point growth in long-reporting hedge positions.

The dominate, identifiable group of traders were the short-reporting hedgers. The long and short non-reporting positions were the largest categories of traders, but these categories

¹ Note: Due to the lack of availability of Commitment of Trading Data, 1982 and October and November of 1983 were excluded from the analysis.

Table 3. Relative Composition of Trader Positions			
	Percent of Open Interest*		
	1970-1987	1970-1980	1981-1987
Long-Reporting Speculative Positions	8.4	9.9	5.6
Long-Reporting Hedge Positions	6.5	4.8	9.5
Long-Reporting Spread Positions	3.4	4.2	2.0
Long Non-Reporting Positions	31.7	31.1	32.9
Short-Reporting Speculative Positions	3.9	4.0	3.5
Short-Reporting Hedge Positions	18.3	18.0	18.8
Short-Reporting Spread Positions	3.4	4.2	2.0
Short Non-Reporting Positions	24.4	23.8	25.7
Total	100.0	100.0	100.0
*Relative compositions calculated as: $\{ \text{No. of Positions} / (2 \times \text{Open Interest}) \} \times 100$			

cannot be broken into hedgers and speculators. The data in Table 3 indicate the positions held by the reporting short hedgers were not being offset by the two reporting long categories. Though not conclusive evidence, it does suggest that large, short-hedge positions depend on small non-reporting traders to offset their positions.

Factors of Influences Among Commitment and Market Data

With the intention of identifying relationships, simple correlation matrices were produced for commitment and physical market data. The full 1970-1987 period was examined, as were the subperiods into 1970-80 and 1981-87. The subdividing of the total period was performed to identify relationships that had changed over time. Most of the variables examined are consistent with those that Leuthold examined. The additional variables of relative volume, live cattle volume relative to total CME volume, was included in the analysis. The commitment data were aggregated to produce the additional variable of total long-reporting positions and total short-reporting positions. These latter two variables were produced to examine if, regardless of being hedgers or speculators, long and short traders have consistent relationships with other variables. The final two variables created with the commitment data were total reporting speculative positions and total reporting hedge positions. These last two variables examine the question that certain conditions effect speculative and hedging interest regardless of which side of the market they are taking.

The correlation matrix for 1970-87 is presented in Table 4. Except for the relationship between long-reporting speculative positions and long reporting hedge positions, the relationship between the various categories of traders is strong. During this time, as noted previously, the live cattle futures went through a significant growth phase. In part the strong correlation between composition of traders appears to be related to an overall upward trend in use of the live cattle futures contract experienced. The strong relationship between open interest and volume and the commitment positions tends to confirm this suggestion. Relative to similar analysis by Leuthold, the relationships between various positions do not appear to be as strong as they once were.

The relationships between long-reporting speculative positions and short-reporting hedge positions is the strongest of the identifiable trader groups. Short-reporting hedge positions are highly correlated with long, non-reporting positions. The short-reporting hedge position

Table 4. Correlation Coefficients Among Live Cattle Futures Market Commitment Data. Monthly, January 1970-December 1987

	LRS	SRS	LRH	SRH	LNR	SNR	LSP	SRP	RH	RS	COF	PLACE	CATSL	OI	VOL	RELVOL
LRS	1.00															
SRS	0.29	1.00														
LRH	-0.00	0.42	1.00													
SRH	0.68	0.45	0.50	1.00												
LNR	0.51	0.68	0.62	0.87	1.00											
SNR	0.59	0.61	0.66	0.73	0.91	1.00										
LSP	0.88	0.50	0.44	0.82	0.75	0.84	1.00									
SRP	0.76	0.61	0.45	0.96	0.89	0.79	0.89	1.00								
RH	0.52	0.50	0.75	0.95	0.89	0.89	0.79	0.91	1.00							
RS	0.93	0.51	0.07*	0.67	0.60	0.66	0.91	0.82	0.54	1.00						
COF	0.11	-0.03*	-0.21	-0.23	-0.25	-0.11*	0.03*	-0.14	-0.25	0.14	1.00					
PLACE	0.27	0.18	0.16	0.30	0.26	0.26	0.32	0.32	0.29	0.29	-0.27	1.00				
CATSL	0.13	-0.15	-0.12	0.24	-0.04*	-0.20	0.04*	0.17	0.14	0.06*	-0.32	0.21	1.00			
OI	0.72	0.65	0.59	0.90	0.95	0.94	0.92	0.95	0.90	0.79	-0.13	0.31	-0.00	1.00		
VOL	0.49	0.67	0.48	0.67	0.86	0.95	0.69	0.75	0.69	0.62	-0.12	0.11*	-0.14	0.85	1.00	
RELVOL	0.25	-0.08*	-0.72	-0.14	-0.28	-0.35	-0.08*	-0.06*	-0.37	0.23	0.27	-0.14	0.18	-0.21	-0.08*	1.00
PRICE	0.28	0.55	0.64	0.57	0.83	0.85	0.55	0.60	0.68	0.37	-0.22	0.11*	-0.28	0.76	0.84	-0.29

*Not significant at .10 level.

See Appendix for Variable Definitions.

represents a minimum level of demand for hedging services. It is expected that these hedging services are provided by the long-reporting speculators and other long positions. The correlation between short-reporting hedging positions and short non-reporting positions, suggests these two groups behave in concert. The strong correlation between short reporting hedge positions and short, non-reporting positions suggests much of the non-reporting of short positions may represent hedging activity.

The physical market variables and the various categories of positions held show weak correlations. These results differ little from what Leuthold reported. Price is strongly correlated with the two non-reporting positions. The placement variable is consistent in its level of correlation with non-reporting long and short positions, with reporting long and short positions, and with reporting hedgers and speculators. The placements of cattle in feedlots represents new demands for hedging services. The identified relationships between placement and each side of a position indicates that as demand for hedging services comes to the market, the hedging service were being provided by speculators, not by offsetting hedgers.

Interesting information is contained in the relationships between the volume of trade in live cattle futures relative to all other futures, and variables constructed from the commitments of traders positions. Relative volume is positively related with long-reporting speculative positions and the variable representing aggregated reporting speculative position. This relationship is of interest because it implies that as the relative volume of live cattle futures has trended lower over time so too have the reporting speculative positions. The concern becomes are these other contracts attracting away the large speculators. Given the previous identified relationships between long-reporting speculative positions and short-hedging positions, it is of concern that long-speculative positions are positively related to relative volume. The role of competing contracts becomes of greater interest.

The aggregated positions data that represent total reporting long and short positions, and total reporting hedging and speculative positions confirms expected relationships. Reporting speculative positions indicate they are dominated by long-reporting speculative positions. Reporting hedged positions are dominated by short-reporting hedge positions. Similar dominate relationships are seen between long-reporting positions and long-reporting speculative positions and between short-reporting positions and short-reporting hedge positions. From the aggregated positions data, the relationship between long-reporting positions and short-reporting positions is very strong, suggesting over this time period that large traders on either side of a position were in the market at similar times.

Correlation matrices for 1970-1980 and 1981-1987 are presented in Tables 5 and 6 respectively. These tables provide evidences of shifting patterns in relationships over the total time period examined. The data in these tables suggest that an overall breakdown in relationships between all commitment data took place in the 1980s.

The most acute shift is seen between long-reporting speculative positions and the other categories of commitment data. Tables 5 and 6 show a significant drop in correlation between long-reporting speculative positions and short-reporting hedge positions from the early period to the later period (.82 to .50). Similarly is the drop in correlation from the first to second period for reporting hedge positions and reporting speculative positions (.82 to .31). Open interest in price and volume are no longer as highly correlated with the various positions either. A similar drop in correlation and significance of correlation exists in the later period for speculators and hedgers alike. The one area where relationships have strength is between the various hedging positions or proxy for hedging activities and placement data in the latter period. Hedging activity and relative volume developed a strong negative correlation in 1981-1987. These last two relationships would suggest that hedging of live cattle has continued to grow as relative overall activity in live cattle futures has declined. This would indicate that these contracts are becoming stronger hedging markets.

Analysis of Commercial and Speculative Activity in Live Cattle Futures

The review of relationships and identification of trends in the commitment data provides the base to examine what factors explain commercial and speculative behavior. This analysis is conducted by estimating with ordinary least-square linear functions for each of the commitment categories, and the four aggregated variables derived from the commitment data. The models are estimated over 1970-1987 and 1981-1987 to test for structural change.

In this analysis, the opportunity was provided to test what effect some of the innovations in live-cattle futures had on the various commitment categories. Primarily these innovations include the 1981 contract specification changes, the introduction of the certificate of delivery in 1983, and the addition of options trading on live-cattle futures in 1984. In addition as indicated in the review of trends, it was during the 1980s that the trade in futures contracts aside from live cattle experienced explosive growth.

The models were all estimated with a lagged dependent explanatory variable. This was done to separate the influence of the other relevant explanatory variables and the general growth trend that took place in the series examined. The results of estimated functions for the two sample periods are present in Appendix Tables A-1 through A-10. A definition of variables is present in the Appendix as well. All models were tested for structural stability between the whole sample and the later time period using the Chow test.

In estimating the functions for the commitment data, the relevant relationships identified from the correlation analysis were considered. In addition, the regression analysis was used to examine the impact of recent innovations identified above in the live cattle futures contract. Testing for the impact of these innovations on the commitments data was first carried out using dummy variables representing the innovation. None of the innovation variables were found to have a statistically significant impact in this analysis, and were not reported. The lack of statistical significance may be attributed to all the innovations occurring relatively close

Table 5. Correlation Coefficients Among Live Cattle Futures Market Commitment Data. Monthly, January 1970-December 1980

	LRS	SRS	LRH	SRH	LNR	SNR	LRP	SRP	RH	RS	COP	PLACE	CATSL	OI	VOL	RELVOL
LRS	1.00															
SRS	0.42	1.00														
LRH	0.45	0.67	1.00													
SRH	0.82	0.43	0.53	1.00												
LNR	0.71	0.73	0.66	0.86	1.00											
SNR	0.80	0.68	0.68	0.72	0.90	1.00										
LRP	0.97	0.56	0.62	0.93	0.77	0.87	1.00									
SRP	0.87	0.64	0.63	0.97	0.91	0.82	0.91	1.00								
RH	0.82	0.54	0.64	0.99	0.89	0.76	0.85	0.98	1.00							
RS	0.94	0.63	0.59	0.80	0.80	0.87	0.99	0.91	0.82	1.00						
COP	0.12*	0.14	0.00	-0.13*	-0.10*	0.00	0.12*	-0.04*	-0.11*	0.14	1.00					
PLACE	0.28	0.16	0.26	0.29	0.25	0.26	0.31	0.30	0.30	0.30	-0.18	1.00				
CATSL	0.15	-0.14*	-0.07*	0.24	0.03*	-0.16	0.09*	0.23	0.30	0.06*	-0.40	0.22	1.00			
OI	0.38	0.69	0.68	0.90	0.95	0.94	0.93	0.97	0.93	0.93	0.00	0.30	0.07*	1.00		
VOL	0.62	0.77	0.64	0.68	0.90	0.89	0.71	0.78	0.71	0.74	-0.02*	0.12*	-0.12*	0.86	1.00	
RELVOL	0.21	0.24	-0.12*	0.31	0.25	0.11*	0.17	0.30	0.26	0.21	0.04*	-0.14*	0.20	0.23	0.33	1.00
PRICE	0.51	0.67	0.56	0.55	0.83	0.86	0.59	0.64	0.59	0.61	-0.07*	0.11*	-0.25	0.76	0.92	0.23

*Not significant at .10 level.

See Appendix for Variable Definitions

together as well as during the period when the growth in alternative futures contracts occurred. These results prompted the analysis of the functions for evidence of structural change.

Evidence of structural change was found in all the functions except the short-reporting speculative positions and long, non-reporting positions functions. The tests for stability were conducted using the Chow tests for analysis of variance as defined by Maddala. The significance level used was the .05 level. Three separate models were estimated for each function. The functions were estimated and compared using the data for 1970-80, 1981-87, and 1970-87. This form of analysis, while indicating evidence of structural change in the functions estimated, does not allow the structural change to be attributed to any single factor. The function estimated for short-reporting speculative positions had weak explanatory powers. The estimated function for long, non-reporting positions provide very strong explanatory power. The parameter estimates for this later function were stable with the exception of price which shifts from being a positive factor to a negative one. The negative sign on the price coefficient in the 1981-87 model is consistent with theoretical expectations.

Two variables were created to examine the influence of price trends and trader behavior. These variables were the Rel. Max. and the Rel. Min. variables reported in the regression results. These variables only came into play in functions explaining categories that were primarily dominated by speculators and long positions. The intent was to examine what happens to positions as prices move around a short run (calendar years) minimum and maximum price. Use of the minimum and maximum prices would have created a collinearity problem, therefore these relative measures were used. The formula for calculating these variables is presented in the Appendix's Definition of Variables. The Rel. Max. variable ranges from 0 to 1 and the Rel. Min. from 0 to -1. For long-reporting speculators, these vari-

Table 8. Correlation Coefficients Among Live Cattle Futures Market Commitment Data, Monthly, January 1981-December 1987

	LRS	SRS	LRH	SRH	LNR	SNR	LRP	SRP	RH	RS	CCP	PLAGE	CATSL	OI	VOL	RELVOL
LRS	1.00															
SRS	0.93*	1.00														
LRH	-0.06*	0.24	1.00													
SRH	0.50	0.20	0.43	1.00												
LNR	0.49	0.57	0.43	0.76	1.00											
SNR	0.53	0.29	0.56	0.45	0.72	1.00										
LRP	0.68	0.25	0.66	0.68	0.62	0.34	1.00									
SRP	0.52	0.51	0.49	0.93	0.88	0.55	0.73	1.00								
RH	0.30	0.25	0.80	0.91	0.72	0.58	0.78	0.87	1.00							
RS	0.85	0.43	0.03*	0.43	0.53	0.63	0.71	0.62	0.31	1.00						
CCP	-0.26	-0.30	0.19*	-0.20	-0.25	0.00	-0.02*	-0.27	-0.04*	-0.28	1.00					
PLAGE	0.30	0.22	0.13*	0.38	0.38	0.30	0.38	0.43	0.35	0.37	-0.53	1.00				
CATSL	-0.09*	-0.10*	0.00	0.04*	-0.10*	-0.20*	-0.09*	0.30	0.03*	-0.14*	-0.19*	0.19*	1.00			
OI	0.59	0.46	0.60	0.30	0.91	0.86	0.89	0.90	0.83	0.71	-0.16*	0.42	-0.11*	1.00		
VOL	0.14*	0.25	0.30	0.27	0.48	0.49	0.32	0.32	0.33	0.22	0.00	-0.09*	-0.07*	0.46	1.00	
RELVOL	0.14*	-0.06*	-0.43	-0.43	-0.27	-0.07*	-0.20	-0.36	-0.52	0.16*	0.06*	0.34	-0.31	-0.26	0.10*	1.00
PRICE	0.22	0.02*	-0.63*	0.00	0.04*	0.18*	0.05*	-0.02*	0.29	0.22	0.07*	-0.27*	0.12*	0.63*	0.35	0.25

*Not significant at .10 level.

See Appendix for Variable Definitions.

ables indicate, as expected, that as price nears maximum level, positions decrease and as prices move away from minimum level, positions are added. The results for total reporting speculative positions were found to be consistent with this pattern. For long, non-reporting positions, this relationship was not found suggesting these traders were not as astute at identifying peaks and troughs in prices, nor were the long-reporting speculators in the 1980s.

The correlation analysis had indicated that variability in futures market positions were not as strongly correlated with price in the 1981-87 period as they had been in the 1970-80 period. The regression analysis tends to confirm this observation. The general trend was for price to go from being statistically significant in the overall sample to being statistically insignificant in the 1981-87 period. The behavior of the price variable may be related to the use of nominal prices with a inflationary time period coinciding with the major growth period for the live cattle futures contract.

For the 1970-1987 models, the price variable provides the expected relations with statistical significance for most of the commitment data. Long-reporting speculators reduce positions as price increases as do reporting speculations in aggregate and long-reporting positions in aggregate. The short-reporting hedge position model indicates that as prices increase, less short-reporting positions are taken. This relationship is consistent in the 1981-87 model as well. This suggests when prices are rising or high, hedging became less important. This is not consistent with a simple view of price risk management, but it does make sense in the context of managing price risk through selective hedging in strategies.

The lagged dependent variable was included to attempt to separate the growth trend in position so as to better isolate the relationships between these positions and other relevant variables. These variables provide interesting results. In all the models the relationship between

the dependent variable and the lagged dependent variable weakened between the two modeling sample periods. These results indicate a leveling off in growth trend. The results on the long-reporting speculation positions and the aggregate, long-reporting positions suggests in the latter modeling period that the positions in the last period are not related to positions in the current period.

The Rel. Vol. variable was created to account for the impact of the growth in alternative futures contracts on the CME. Previously it was noted this variable had been decreasing consistently since the mid 1970s. In the correlation analysis, the only commitments data that were positively related to this variable was long-reporting speculative positions and total reporting speculative positions. The regression analysis confirms the above relationship between Rel. Vol. and the two commitments variables. For the long-reporting speculative positions and the total reporting speculative positions variable, the Rel. Vol. coefficient suggests a strengthening of the positive relationship with greater statistical significance. The implication of this is that as cattle futures become a small portion of total futures volume, the large speculators leave this contract.

Conclusions

This study has sought to shed additional light on the trends, behavior, and relationships affecting the composition of traders in the live-cattle futures contract. The trends and relationships provide a base for examining issues of performance of live-cattle futures contracts. These performance issues relate to price discovery, use of markets for hedging purposes, hedging behavior, and the applicability of the market efficiency hypothesis to this contract. These are all relevant criteria beyond volume and contract durability to measure the success of a futures contract. These criteria though rely upon an understanding of who the players are in the market and what has been and is expected to happen with them.

In terms of measuring success by volume, the live-cattle futures contract has been successful. All of the evidence in this study points to the live-cattle contract having gone from a growth phase into a mature, stable trade level. The composition of traders has only shifted significantly in long-reporting positions. Long-reporting positions have shifted from being speculative positions to being hedge positions. The trends evident in the live-cattle contract suggest that there may be a life cycle to futures contracts similar to those present for product markets. Relative to this suggestion is that we may expect to find a different composition of traders building contracts from those that sustain the contract. Those factors which influence different types of traders could be expected to change relative to the stage of the lifecycle a contract is in.

The results of this research provided evidence of structural change in the live-cattle contract. The analysis of trends, correlation, and structural stability tested on our estimated models all pointed to a movement away of large-reporting speculative interest from live cattle. Evidence was not found that any single innovations made to the live-cattle contracts has had a statistically significant effect on the composition of trader positions.

It is interesting to note that while no relationship was identified with the regression analysis, 1981 changed contract specifications, the introduction of the certificate-of-delivery and long-reporting hedge positions. Long hedging was what these innovations sought to foster. During the 1981 through 1987 period, our analysis of trends indicates long-reporting hedge positions became the dominate long-reporting category of positions.

Implied by the conclusion of this paper is the need for further research. The concept of market lifecycle to a futures contract needs to be more fully developed and tested. The impact of competing futures contracts on the speculative interest needs to be addressed. This brings forth the question - Is there a pool of speculative capital that all futures contracts must compete for? If certain players leave a market what impact does this have on the performance of the contract? Underlying these issues is the need to develop an understanding of the role different types of traders play in the performance of the live-cattle contract.

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Appendix - Definition of Variables

- LRS - Long-Reporting Speculative Positions, Mean Values; 1970-87 7690, 1970-80 8400, 1981-87 6330.
- SRS - Short-Reporting Speculative Positions, Mean Values; 1970-87 3300, 1970-80 2960, 1981-87 3940.
- LRH - Long-Reporting Hedge Positions, Mean Values; 1970-87 5820, 1970-80 3240, 1981-87 10685.
- SRH - Short-Reporting Hedge Positions, Mean Values; 1970-87 16900, 1970-80 14700, 1981-87 21000.
- LNR - Long, Non-reporting Positions, Mean Values; 1970-87 28280, 1970-80 23940, 1981-87 36460.
- SNR - Short, Non-reporting Positions, Mean Values; 1970-87 21580, 1970-80 17920, 1981-87 28490.
- LRP - Total Long-Reporting Positions, Mean Values; 1970-87 16560, 1970-80 15130, 1981-87 19260.
- SRP - Total Short-Reporting Positions, Mean Values; 1970-87 23250, 1970-80 21150, 1981-87 27230.
- RH - Total Reporting Hedge Positions, Mean Values; 1970-87 22740, 1970-80 17970, 1981-87 31740.
- RS - Total Reporting Speculative Positions, Mean Values; 1970-87 17073, 1970-80 18300, 1981-87 14750.
- COF - Cattle on Feed, 1,000 Head, 13-State, Quarterly, Mean Values; 1970-87 9500, 1970-80 9750, 1981-87 9050.
- PLACE - Placements in Feedlots, 1,000 Head, 13-State, Quarterly, Mean Values; 1970-87 5800, 1970-80 5780, 1981-87 5890.
- CATSL - Cattle Slaughtered, 1,000 hd., Mean Values; 1970-87 3100, 1970-80 3100, 1981-87 3030.
- OI - Total Open Interest, All Contracts, Mean Values; 1970-87 44800, 1970-80 39000, 1970-87 55700.
- VOL - Monthly Volume, All Contracts, Mean Values; 1970-87 297000, 1970-80 260000, 1981-87 367550.
- RELVOL - Monthly Volume in Live Cattle/Monthly Volume in all CME and IMM Futures Contracts, Mean Values; 1970-87 0.26, 1970-80 0.34, 1981-87 0.096.
- PRICE - Average Monthly Close Price for Nearby Futures Contract, Mean Values; 1970-87 51.70, 1970-80 45.61, 1981-87 63.15.
- Prime i - Prime Interest Rate, Mean Values; 1970-87 9.7%, 1970-80 8.7%, 1981-87 11.4%.
- Rel. Max. - Nearby Futures Price Relative to Maximum Price for Year [Price/Max Price], Mean Values; 1970-87 0.90, 1970-80 0.90, 1981-87 0.93.
- Rel. Min. - Nearby Futures Price Relative to Minimum Price of year [1-Price/Min Price], Mean Values; 1970-87 -0.12, 1970-80 -0.13, 1981-87 -0.095.
- Data Dummy - Dummy Variable for 1982 and 1983 Data Interruption

Table A-1. Regression Results
Dependent Variable, LRS - Long-Reporting Speculative Position

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	7206.43	11070.66	-23987.90
LRS_{t-1}	.48 (8.37)	.36 (5.26)	.18 (1.48)
Price	-166.58 (6.74)	-199.04 (7.24)	46.19 (0.42)
Rel. Max.	-8452.33 (2.62)	-12305.54 (3.95)	22722.09 (1.37)
Rel. Min.	-5312.8 (2.15)	-10305.58 (4.05)	24393.37 (2.10)
COF	.29 (1.50)	.46 (2.37)	-0.75 (1.57)
OI	.21 (9.31)	.27 (10.04)	.21 (5.00)
Rel. Vol.	2226.21 (1.16)	-5471.35 (2.16)	28881.81 (3.12)
Data Dummy	-308.51	-	-560.42
Summary Statistics			
F-Stat	126.0	166.68	8.78
Adj. R-SQ	.83	.90	.48
N	201.0	131.0	70.0

*t-values reported in ().

Table A-2. Regression Results
Dependent Variable, SRS - Short-Reporting Speculative Position

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	-1308.42	-1126.47	-2213.23
SRS_{t-1}	.46 (7.43)	.50 (6.87)	.35 (3.00)
Price	20.12 (1.62)	25.69 (1.88)	-7.84 (.13)
Place	0.12 (0.96)	.06 (.52)	.23 (.61)
OI	.03 (3.16)	.02 (2.34)	.07 (2.75)
Rel. Vol.	986.79 (1.310)	1095.29 (1.00)	3513.18 (.62)
Data Dummy	-435.47	-	-776.28
Summary Statistics			
F-Stat	40.66	48.04	5.23
Adj. R-SQ	.55	.64	.27
N	201.0	131.0	70.0

*t-values reported in ().

Table A-3. Regression Results
Dependent Variable, LRH - Long-Reporting Hedge Position

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	1040.77	610.57	682.91
LRH_{t-1}	0.78 (17.15)	.68 (10.06)	.62 (6.79)
Price	9.78 (.75)	8.16 (6.87)	-12.99 (.18)
OI	.02 (9.31)	.02 (2.54)	.09 (5.00)
Rel. Vol.	-4029.72 (3.52)	-152.56 (1.76)	-7750.99 (1.05)
Data Dummy	-270.08	-	865.47
Summary Statistics			
F-Stat	313.69	96.92	28.61
Adj. R-SQ	.89	.75	.67
N	201.0	131.0	70.0

*t-values reported in ().

Table A-4. Regression Results
Dependent Variable, SRH - Short-Reporting Hedge Position

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	-15833.57	-11535.20	-13416.92
SRH_{t-1}	.40 (7.52)	.44 (7.13)	.15 (1.46)
Price	-79.29 (3.04)	-132.34 (3.88)	-188.22 (1.74)
Basis	-179.70 (1.67)	-226.68 (1.29)	-138.11 (1.01)
Place	.69 (1.65)##(.65)	.32 (3.00)	3.30
CATSL	4.07 (4.99)	3.45 (3.80)	.05 (.03)
OI	.27 (9.82)	.27 (8.17)	.35 (6.74)
Rel. Vol.	-1420.20 (.95)	4570.16 (1.78)	-2984.10 (.28)
Data Dummy	-67.06	-	-820.33
Q1 Dummy	1920.15	1058.14	5471.26
Q2 Dummy	3270.80	2267.09	6793.37
Q3 Dummy	2559.78	2016.27	5191.71
Summary Statistics			
F-Stat	200.0	200.0	20.70
Adj. R-SQ	.92	.94	.76
N	201.0	131.0	70.0

*t-values reported in ().

Table A-5. Regression Results
Dependent Variable, LNR - Long, Non-Reporting Positions

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	-1456.69	157.88	-6787.55
LNR_{t-1}	.36 (8.40)	.42 (7.66)	.18 (2.46)
Price	146.80 (4.47)	167.87 (3.36)	-241.94 (1.96)
Rel. Max.	9018.51 (2.765)	8098.82 (2.10)	24707.54 (1.53)
Rel. Min.	7353.03 (3.35)	7216.14 (2.73)	7137.76 (.63)
Place	-1.09 (-2.31)	-1.27 (1.84)	.38 (.36)
OI	.32 (13.48)	.29 (9.65)	.47 (9.74)
Prime i	-144.63 (1.75)	-249.45 (1.56)	116.93 (.91)
Data Dummy	-1531.74	-	-1187.93
Q1 Dummy	-2975.20	-2671.14	-289.21
Q2 Dummy	-2440.88	-2626.02	893.90
Q3 Dummy	-2143.97	-2221.14	-360.58
Summary Statistics			
F-Stat	395.03	279.87	37.87
Adj. R-SQ	.96	.96	.85
N	201.0	131.0	70.0

Table A-6. Regression Results
Dependent Variable, SNR - Short, Non-Reporting Positions

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	-4209.72	-7299.46	2577.51
SNR_{t-1}	.31 (5.856)	.35 (5.02)	.12 (1.36)
Price	142.36 (5.12)	160.30 (3.74)	98.19 (1.04)
Rel. Max.	4519.10 (1.50)	552.25 (.16)	3950.08 (.251)
Rel. Min.	4967.12 (2.531)	4395.88 (2.05)	5243.34 (.48)
Place	-.41 (1.00)	.49 (.94)	-1.41 (1.51)
OI	.26 (12.45)	.21 (9.12)	.42 (9.18)
Data Dummy	-185.36	-	209.22
Q1 Dummy	-247.86	1498.89	-904.18
Q2 Dummy	-2229.16	287.58	-3920.79
Q3 Dummy	-1250.64	589.88	-2706.95
Summary Statistics			
F-Stat	331.96	258.94	31.48
Adj. R-SQ	.94	.95	.82
N	201.0	131.0	70.0

*t-values reported in ().

Table A-7. Regression Results
Dependent Variable, LRP - Total Long-Reporting Position

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	15053.87	18069.94	2386.80
LRP_{t-1}	.44 (9.30)	.49 (9.80)	.001 (.01)
Price	-199.30 (8.30)	-222.26 (8.18)	249.79 (2.39)
Rel. Max.	-11518.95 (3.59)	-12955.98 (4.14)	-27637.60 (1.80)
Rel. Min.	-7830.91 (3.20)	-9081.22 (3.78)	-6540.66 (.58)
OI	.34 (12.99)	.34 (11.51)	.48 (10.09)
Rel. Vol.	-4319.99 (2.52)	-8581.06 (3.35)	-3584.11 (.41)
Data Dummy	-683.33	-	100.18
Summary Statistics			
F-Stat	370.81	458.85	37.12
Adj. R-SQ	.93	.95	.79
N	201.0	131.0	70.0

*t-values reported in ().

Table A-8. Regression Results
Dependent Variable, SRP - Total, Short-Reporting Position

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	-2976.22	-294.63	-10524.83
SRP_{t-1}	.31 (7.75)	.33 (7.54)	.08 (1.09)
Price	-190.81 (-7.00)	-267.33 (8.08)	-183.31 (1.87)
Place	.85 (2.28)	.39 (.78)	1.99 (2.14)
Prime i	98.27 (1.45)	139.56 (1.23)	421.60 (2.68)
OI	.46 (16.80)	.48 (15.11)	.55 (11.18)
Rel. Vol.	4517.85 (3.48)	11247.45 (5.38)	-27205.91 (2.33)
Data Dummy	-1308.83	-	-796.28
Q1 Dummy	1025.21	617.94	2425.52
Q2 Dummy	2236.59	1161.62	4948.21
Q3 Dummy	1936.28	1507.66	3236.65
Summary Statistics			
F-Stat	557.45	695.20	52.47
Adj. R-SQ	.97	.98	.88
N	201.0	131.0	70.0

*t-values reported in ().

Table A-9. Regression Results
Dependent Variable, RH - Total Reporting Hedge Position

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	4679.25	3507.79	5318.61
RH_{t-1}	.59 (12.74)	.56 (10.24)	.25 (2.75)
Price	-32.64 (.86)	-153.46 (3.61)	12.94 (.11)
Prime i	-199.78 (2.15)	-27.55 (.24)	-353.87 (1.69)
OI	.23 (8.10)	.26 (7.89)	.42 (6.61)
Rel. Vol.	-7561.76 (3.89)	4673.91 (1.89)	-16587.29 (1.15)
Data Dummy	-1631.96	-	-2922.11
Summary Statistics			
F-Stat	425.12	429.90	51.06
Adj. R-SQ	.93	.94	.81
N	201.0	131.0	70.0

*t-values reported in ().

Table A-10. Regression Results
Dependent Variable, RS - Total Reporting Speculative Position

Explanatory Variables	Parameter Estimates*		
	1970-87	1970-80	1981-87
Intercept	9686.73	12896.58	-22343.78
RS_{t-1}	.67 (16.79)	.54 (11.68)	.29 (2.95)
Price	-213.16 (7.51)	-240.99 (7.77)	245.21 (2.09)
Rel. Max.	-11964.85 (3.12)	-16749.02 (4.58)	8333.79 (.49)
Rel. Min.	-5435.22 (1.88)	-11489.47 (4.05)	28132.90 (2.32)
COF	.45 (1.94)	.80 (3.45)	-1.11 (2.28)
OI	.28 (10.28)	.38 (11.71)	.34 (7.23)
Rel. Vol.	2316.54 (.96)	-8088.53 (2.70)	36558.0 (3.71)
Data Dummy	-1188.79	-	-753.82
Summary Statistics			
F-Stat	359.11	485.37	24.25
Adj. R-SQ	.93	.96	.73
N	201.0	131.0	70.0

*t-values reported in ().