SUBJECT: Texas Panhandle Fed Cattle Investigation
Peer Review

DATE: May 6, 1999

TO: Warren Preston
Chief, Competition Branch
GIPSA

FROM: Dayton Lehman

This peer review was undertaken by Dayton Lehman[1] at the request of the Grain Inspection, Packers and Stockyards Administration (GIPSA) of the United States Department of Agriculture to review its investigation of fed cattle procurement in the Texas Panhandle for the period February 6, 1995, through May 18, 1996. More specifically, the subject of the review is the investigation processes and data compiled during GIPSA's investigation and the draft report "Captive Supplies and Spot Market Prices for Fed Cattle in the Texas Panhandle" submitted by John Schroeter and Azzeddine Azzam (draft report). Since the undersigned reviewer is not an econometrician by training, my personal observations are limited to the investigative processes utilized by GIPSA and the information sought in its investigation.[2]

[1] The reviewer is Deputy Assistant General Counsel for Aviation Enforcement & Proceedings, United States Department of Transportation. The Enforcement Office is responsible for, among other things, investigation and prosecution of unfair and deceptive practices and unfair methods of competition in air transportation.

[2] In order to obtain a better understanding of the econometric study here, however, I consulted David Richards, an analyst on staff at the Department of Transportation, who has in the past performed similar analyses for me in matters where regression analyses were used. I have attached Mr. Richards' observations regarding the regression model.

SUMMARY

GIPSA staff are to be praised for compiling a large and very broad data base covering an extended period of time, which was used to conduct an econometric analysis. That data base included extensive analysis of sales transactions and slaughter figures as well as an explanation of the workings of the pricing formulas used by each packer for formula purchases. However, more direct and thorough questioning of the packers' conduct and their motives surrounding their respective pricing policies may assist the econometric analysis itself, or the analysis of the results of the model.

COMMENTS

The Investigative Process

The objective of the investigation was to "measure the use and effects of noncash purchases on prices paid for fed cattle" during the period under review. The draft report established that "there is a negative relationship between captive supplies and spot market cattle prices," but posits that this finding in and of itself is insufficient to permit the conclusion that "higher levels of captive supply usage will cause lower spot market cattle prices" or to constitute evidence of "manipulative behavior" by packers.[3] Draft Report at 33. The draft report next concludes that in order to investigate this issue, the market must be carefully examined " for situations in which the packer would have the opportunity and incentive to engage in such behavior. In examining this question, the draft report reviews the formulas used by each packer and concludes through regression analysis that packers do not try to manipulate formula prices through their pricing strategies in spot market purchases. *Id.* at 38.

[3] I note that section 202(e) of the Packers and Stockyards Act, 1921, as amended, prohibits packers from engaging in conduct "for the purpose or with the effect" of manipulating or controlling prices, which I read to prohibit any conduct, whether or not intentional, which manipulates prices.

A more complete review of the issue of pricing and specifically of price manipulation might be obtained through a comprehensive request for specific information (as opposed to the raw data collected) from the packers regarding the how and why of pricing, both spot and formula. This additional information might be of use both in establishing assumptions upon which an econometric analysis is undertaken and in reaching conclusions regarding the results of such analysis. The following questions are illustrative:

- When did the decision to use formula pricing originate and how has formula pricing and its use changed over the years?
- As a general matter, what set of economic and other factors leads to a packer's decision to use formula pricing and to the formula itself, including price, quality, and scheduling of cattle to be killed?
- With respect to each feedlot that has used formula pricing, what set of economic and other factors led to the packer's decision to permit use of formula pricing, including price, quality, and scheduling of cattle to be killed?
- Is formula pricing offered by the packer (and offered to every feeder) or must the feeder request it?
- Are feeder requests for formula pricing ever turned down and, if so, for what reason?
- Do you demand volume commitments from feedyards desiring to sell cattle on a formula basis? If so, describe that requirement and the reasons behind that requirement and whether it applies to all feedyards equally.
- What information about the formula is provided to feedyards who use formula sales? Is this information provided voluntarily or only upon request?
- What information is provided feedyards to substantiate the ultimate price paid for each delivery of formula cattle? Is more detailed

information ever requested and, if so, is that information always provided?

- For those forward contract cattle whose slaughter timing is within the control of the packer, what are the packer's standards for determining when to schedule delivery?
- What are the packer's standards for determining how many spot cattle to purchase, what price to pay for such cattle, what feedlot(s) from which to bid for such purchases, and how to engage in the bidding process?
- What is the packer's opinion for the cause and the effect of the "30 minute window" for cash purchases?
- Is price reporting on individual transactions discussed with a feeder?
- What use is made by the packer of reported information on a daily basis, weekly basis, and for forecasting purposes.

Such questions should be accompanied by a document request, an illustration of which is as follows:

- Provide all [packer] corporate documents prepared at or received by [packer] headquarters or [packer] plants dated within [time period] that discuss or analyze the following:
  - The desirability, practicality, or profitability (or lack of profitability) of purchasing cattle on a formula basis;
  - The standards for determining whether to purchase cattle from any particular feedyard on a formula basis, including whether or not to require a volume commitment from a feedyard before such purchases are permitted;
  - The standards for determining whether to purchase cash cattle, including market conditions and availability of cash and forward contract cattle;
  - The standards for determining the price to pay for cash cattle, including market conditions and availability of cash and forward contract cattle;

- The bidding system presently in place for cash cattle; and
- The reporting of data and the use of reported data.

As noted above, the above lists are illustrative and do not take into account any burden on the industry of compliance with such requests nor the GIPSA resources that would be required for such a review. Appropriate GIPSA employees should meet to discuss the details of questions and document requests to be made of individual companies/packing plants. I note that GIPSA appears to have followed this process regarding questions to be asked during interviews with feedlot owners. *See* Exh. 17, where questions to be asked are written out for the interviewer.

There seems to be some question about whether comparable data requests were made of each of the packers and whether comparable or consistent data was received from each firm. *See* Exh. 18, March 18, 1997, Memo from Jimmy Wortham to Jay Johnson and Carl Galopin. I agree with the suggestions stated in the memo to attempt to obviate such problems in the future: (1) obtain basic information from the respective plants; and (2) discuss such information among the analysts and investigators to determine what information to request. A further step that might help would be for the analysts and investigators to meet again after the material is received and reviewed to determine what, if any, supplemental information requests may be needed.

Finally, further information and analysis from industry experts could be obtained by publishing and requesting public comments on preliminary conclusions.

ADDITIONAL QUESTIONS SUGGESTED FOR FOLLOW-UP

The items below are general areas of investigation this reviewer felt might be examined in more depth, some of which are covered from the packer perspective in the specific questions and document request outlined above.

- The thrust of the investigation is to examine the effects of non-cash purchases on spot prices. This examination may be aided by a more detailed review of why certain feedyards sell virtually all of their cattle on a formula basis and others almost never sell on formula. Exh. 17, at 3. In addition, if indeed packers can manipulate spot prices through the use of non-cash purchases, one might expect that packers would have an incentive to move feeders to sell cattle on a formula basis; however, contrary to this apparent incentive, it was concluded that formula pricing generally was not forced on feeders by packers. *Id.; but see* Investigation Report, Seller Interviews, Exh. F, at 61. This apparent discrepancy is not explained.

- Why did packers formerly outbid each other on the spot market, perhaps by .10/cwt, but no longer engage in the practice? *See* Exh. 17 at 2.

- Some persons believe that information promotes effective competition, that is, the ability of buyers and sellers to know the "market price" provides each party the knowledge to form a competitive reaction. However, the summary of feeder interviews implies that buyers and sellers having current, reliable pricing information is detrimental to the cash bidding process. Exh. 17, at 2-3. Is reliable, "instantaneous" pricing information available and, if so, what is its effect on bidding?[4] Is there unlawful signaling occurring between or among packers? Related to the information issue, is there any unlawful price manipulation occurring as a result of packer involvement with futures traders?

[4] I note that an analysis of this issue may be complicated because price reporting is voluntary and the investigation indicates that not all transactions are reported. (See Investigation Report, Exh. V) I note that

- There was some mention in the investigation materials of alliances between packers and feeders (e.g., IBP/Cactus and Excel/Caprock) and certain feeders expressed concern about the effect of such alliances on cash prices. Exh. 17, at 4. What is the nature and extent of such alliances? What is their effect, if any, on the relationship between captive market purchases and spot purchases – both for alliance members and non-alliance members? Do the alliances foreclose competition in any sense?

- Has there been any change over the years in the relationship of captive prices to spot prices as the use of captive cattle has increased? For example, when captive cattle accounted for only 10 percent of the total cattle killed, was the captive/spot relationship the same as it is today when captive cattle account for nearly 30 percent of the market?[5]

- The econometric study stated that it addressed only the effect that intertemporal fluctuations in price would have on packers' and feeders' marketing conduct, but not how that conduct might feed back into the price determination. (Schroeter Study, at 32, n.9) Isn't this latter issue also important when trying to determine whether anyone engaged in an unfair method of competition?

Attachment

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[5] It may be that historical information is no longer available. Moreover, knowing the time and effort that has gone into the present study, I recognize that an historical analysis may not be feasible or worthwhile.

Subject: Observations on Regression Model Of Cattle Price Submitted to GIPSA

May 5, 1999

From: David Richards

To: Dayton Lehman

Generally, econometric models can be examined in three stages: - theory, selection of variables, and final results. Comments on the model submitted to the USDA, "Captive Supplies and Spot Market Prices for Fed Cattle in the Texas Panhandle", will be limited to comments on the theory and selection of variables alone.

The model examined, the base model for the study, is presented on page 44 of the study. The dependent variable, PRICE, is the price per hundredweight of live-weight cattle. The independent variables presented are numbered 1-15, their number determined by location in the regression. Variables will be addressed in turn except where they may be grouped with other variables for emphasis.

Theoretical/Statistical Questions

1. The model includes a surrogate independent price variable, AMSPRICE. AMSPRICE is the weighted average steer price for all lots. The dependent variable is the price per hundredweight of live weight cattle per lot. It appears that the model is using the mean value of all observations as an independent variable in estimating the value of individual observations. Since the purpose of the model is to estimate the effects of independent variables on the dependent variable, the variable AMSPRICE may be an inappropriate dependent variable.

It is likely there will be significant coefficient changes in independent variables with the removal of AMSPRICE. Since examination of the independent variable coefficients in the model is crucial in determining whether captive supplies affect spot market prices, it is likely the change in those coefficients would result in the re-examination of the model.

2. Multicollinearity is no doubt present between some of the variables. Multicollinearity between variables affects their coefficients. Presentation of a correlation matrix would serve as a test of which variables are likely to have misleading coefficients.

Dependent Variables

1. RATIO (proportion of steer/heifer slaughter from captive supplies)

This variable was to be a key determinant of whether prices were subject to manipulation. A negative coefficient would support the hypothesis that use of captive supplies could depress price. (P.15) The coefficient has a negative coefficient, and is statistically valid.

2. AMSPRICE (Weighted average steer price for day of purchase-AMS)

11. ACW (Lot's average carcass weight)

12. ACW2 (Lot's average carcass weight, squared)

As noted above, a question exists as to whether there may be a theoretical problem with these variables. The model uses as independent variables an average steer price and an average carcass weight. Dividing the two gives one an average price per pound, which is the independent variable. Is it appropriate, therefore, to include the average steer price in the equation? If you know AMSPRICE, you pretty much know the PRICE. The use of regression is to separate the independent effects of unrelated variables on the dependent variable-- average steer price is not unrelated to average price/lb.

The justification for including AMSPRICE was that the regression would thus control for the regional price of cattle. However, if there is no regional difference, the variable is not needed. If there

is a regional difference, should separate regressions be run by region or dummy variables included to separate the effect of regional price? This seems to have been done through the use of dummy variables for packing plants. I wonder, however, whether the "regional price" differences may be illusory, since all data comes from plants in the Texas panhandle area, the furthest of which are no more than 200 miles apart.

Obviously, when one buys something on the basis of weight, the total weight of the item purchased is important. ACW provides the weight. Ideally, the coefficient of ACW should give the price per hundred-weight (since PRICE is $/cwt), with coefficients for the remaining variables reducing the error. However, because of the distortive effects of AMSPRICE in the equation, and assuming the average carcass to weigh 636lbs, the value of ACW would be only $7.70 (636 x 0.01184, the coefficient of ACW). It appears that ACW and AMSPRICE are highly multicollinear.

While there may be a theoretical basis to use ACW2, the square of the average carcass weight, its application is questionable. This is not a gravity model of demand. Using the square not only implies there is an exponential relationship between ACW and price, but its application penalizes underweight cattle the least, negatively affects the cattle weight most sought (since <u>all</u> cattle sales are negatively impacted), and penalizes the higher weight cattle the most. It was indicated that discounts are applied for carcasses weighing less than 550 or more than 945 lbs. (P. 56) Could one use a dummy variable for carcasses above/below these weights?

What is the discount? Does it differ significantly from what the model produces? If so, what does this say about the model?

3. HEAD (Number of cattle in the lot)

The coefficient for this variable is positive, indicating packers pay more for larger lots. While this runs counter to economic theory (bulk purchases should be cheaper), the average lot size was 168 head, while purchases ran many thousands per day. But no indication was given whether they were independent lot sales, or the result of a seller breaking up his herd into smaller lots. This practice exists for other commodities. Should another variable be added indicating whether the lot was independently offered (no more lots offered by the seller), or whether the lot was part of a multi-lot offering?

4. YIELD (Lot's total hot weight/total live weight, in %)

With a positive coefficient, the higher the yield, the higher the price. This may account for packers preferring certain size cattle; underweight/overweight cattle simply don't produce optimum yield.

5. PCTPC (Percentage of the lot graded Prime or Choice)

One would expect this variable to have a positive coefficient. Prime or choice is worth more, but see PCTYG13, below.

6. PCTYG13 (Percentage of the lot grading 1, 2, or 3)

With a positive coefficient, the higher the average rating, the higher the price. A correlation matrix would show whether this is

multicollinear with PCTPC. Would excluding either PCTPC or PCTYG13 from the equation have any effect?

7. MILES (Distance the cattle were shipped to the plant)
The model indicates that the further the distance shipped, the lower the price. The text indicated the average distance shipped was 72 miles, while the standard deviation of the distribution of miles shipped was 89 miles. (P. 55) The distribution of miles shipped is obviously not a normal distribution, but is skewed to the right. Since most cattle need to be shipped short distances to have a mean distance of 72 with a lot standard deviation distance of 89, an obvious question is what is the distribution and price of lots significantly different (higher) than the mean? Here either dummy variables for distance should be employed, or (heaven forbid) a dummy variable employing the square of distance.

8. HEIFER (Dummy variable equal 1 for lot of heifers, otherwise 0)
9. MIXED (Dummy variable equal 1 for mixed steers/heifers, or 0)
Both of these variables are an attempt to account for lot quality, other than through carcass yield. Again, these variables are probably multicollinear. If steer/heifers are a higher quality mix than heifers alone, as indicated, then the coefficients are reversed-- HEIFER should be more strongly negative. It may not be possible to separate the effect of the discount without running separate regressions excluding either HEIFER or MIXED, in turn.

10. CARCASS (Dummy variable equal if priced on carcass-weight, 0 if live weight)

Carcass weight pricing is evidently reserved for lots for which yield estimates may be uncertain. There was no indication how many lots were based on carcass weight.

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otherwise 0)

The three plant variables (the fourth plant in the study cannot have a dummy variable) have coefficients that offset the effect of the MILES variable

Should separate regressions by plant be run? Would such separate regressions have served as a good check against the robustness of the model and shown any differences in the cattle price-captive supply relationship between plants?

Other. The model employed, but did not report the results of, day-of-the-week and purchase month dummy variables.

Summary

The results of the study were generally based on the model discussed above, as shown in Table VI.1.1. I would question whether the use of the independent variable AMSPRICE is appropriate. If the mean price for all transactions is to be taken into account in estimating any particular transaction, what would be the result if the method of estimation presented PRICE as the difference between the price received and the mean price - AMSPRICE? The regression (excluding AMSPRICE) would then be an estimate of what causes differences from the average price.

In addition, a correlation matrix was not presented, which would give insight as to what variable coefficients may be affected by multicollinearity.

Table VI.2.1, on the page following the base model, contains a model of PRICE that contains neither AMSPRICE or RATIO. There are significant changes in some of the variable coefficients that remain-- see the sign and value for PCTPC, and the value for CARCASS and YIELD. It would have been interesting to see the use of RATIO in this equation.