Examining Price Differences Between Fed Steers and Heifers

Brogan C. Horton, David P. Anderson, Joe L. Outlaw, Charley C. Martinez

Texas A&M University

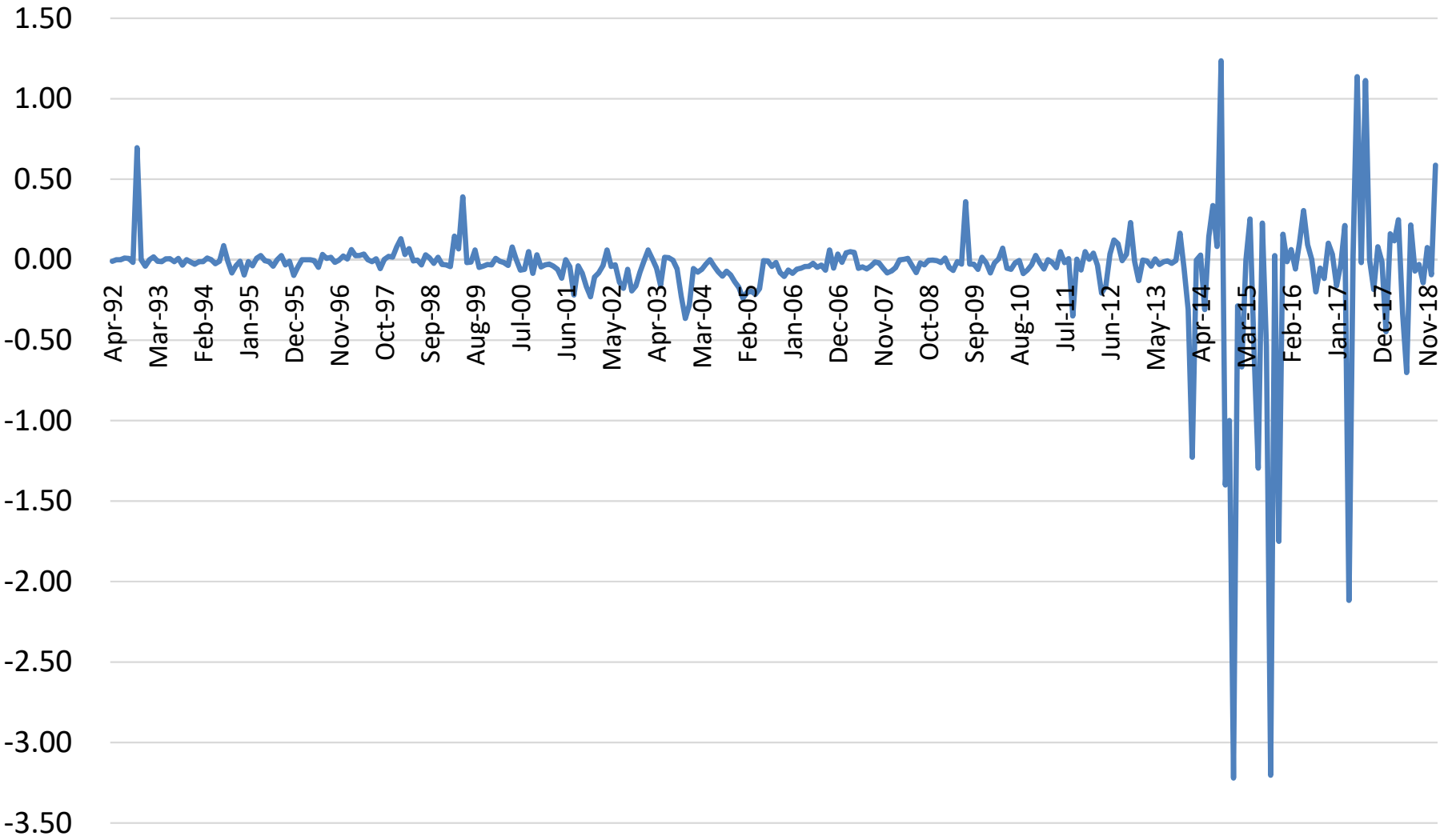
Hypothesis

Fed heifers are selling at a premium to fed steers, due to steer weights being too large.

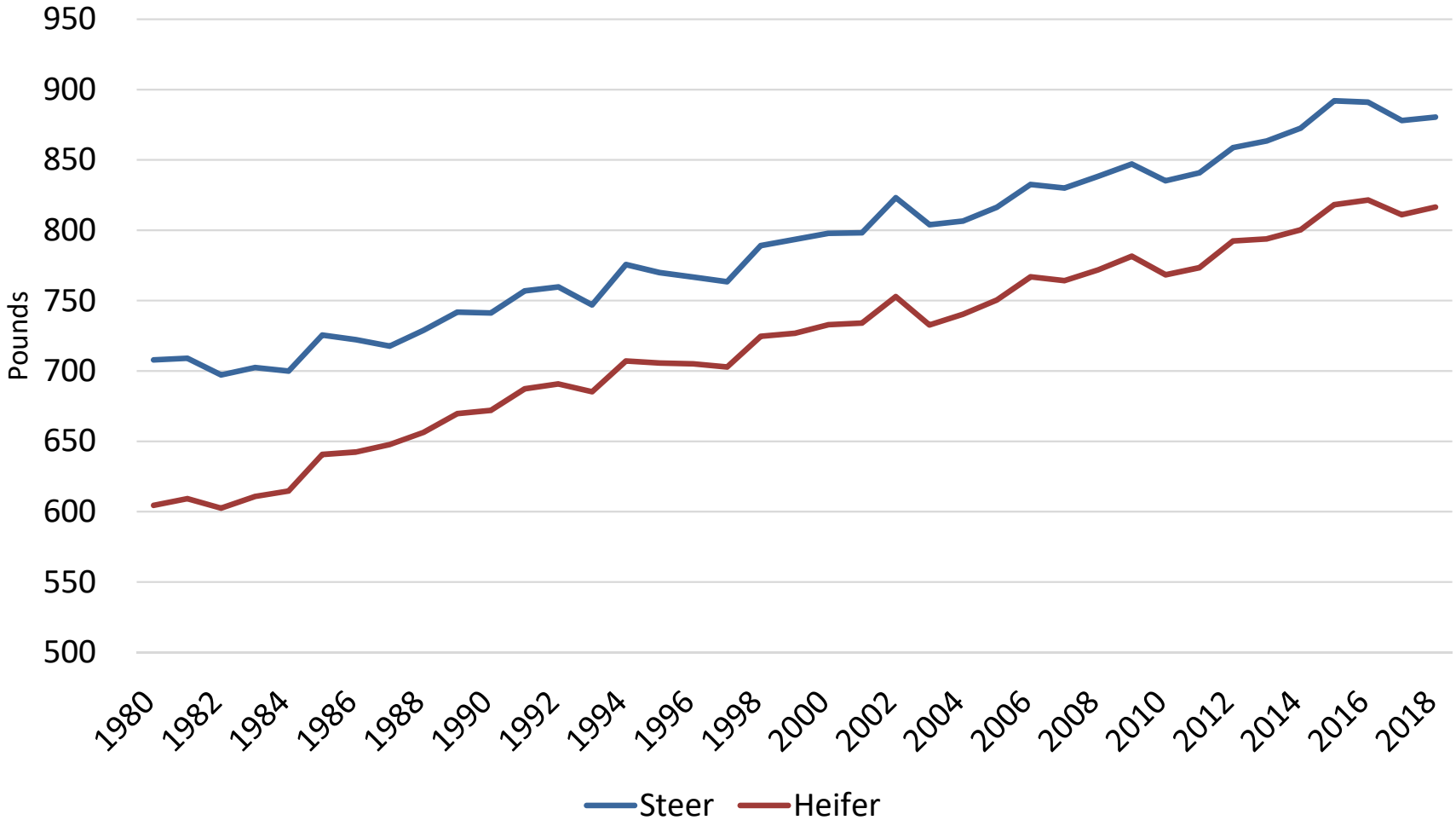
Steers used to be a premium to heifers.

We examined weights to explain why this price change has occurred to see if lighter weights, smaller animals were rewarded in the market.

Steer-Heifer Price Difference, 1992-2019, $/cwt



National Average Monthly Steer and Heifer Dressed Weights



Factors Influencing Carcass Composition

- ADG: average daily gain; number of pounds the animal gains each day
  - Heifers have lower ADG than steers
- External fat thickness on the carcass: subcutaneous fat
  - Heifers have more subcutaneous fat than steers
- Time on feed vs. maturity >>> quality grade, marbling
  - Heifers mature quicker than steers
  - On feed for shorter time
  - Reach optimal quality grade sooner
  - Marbling is last fat deposition

Carcass Composition and Yield Grades

Beef Yield Grade Equation Factors:

- 12th rib/external fat thickness
- Hot carcass weight
- KPH (kidney, pelvic, heart fat)
- Ribeye area

More external fat drives yield grade up, resulting in discounts

Other Factors

DP: dressing percentage; carcass weight as a percentage of the live weight of the animal, or the percent that remains after slaughter

- includes only the lean (meat), fat, and bone; the hide, viscera, feet, and head are not included, as they are removed during slaughter
- 62-65% of the live weight
- Lower yields result in lower DP

NBQA: National Beef Quality Audit

1991, 1995, 2000, 2005, 2011, 2016

1991: **External Fat**, Seam Fat, Overall Palatability, Tenderness, Overall Cutability

1995: **Overall Uniformity**, Overall Palatability, Marbling, Tenderness, **External & Seam Fat**

2000: **Overall Uniformity**, Carcass Weights, Tenderness, Marbling, Reduced Quality Due to Use of Implants

2005: Traceability, **Overall Uniformity**, Instrument Grading, Market Signals, and Segmentation

2011: Food Safety, Eating Satisfaction, How and Where Cattle Were Raised, **Lean Fat and Bone**, **Weight and Size**

2016: Food Safety, Eating Satisfaction, **Lean Fat and Bone**, **Weight and Size**, How and Where Cattle Were Raised

NBQA Continued

- Sixty-six percent of further processors that took place in the NBQA in 2016 stated that they would be willing to pay a premium for guaranteed weight and size of carcasses and cuts
- From a consumer standpoint, it was found that consumers are facing an increase in total package price due to larger dimensions of cuts
- Steer and heifer producers ranked Weight and Size as the most important attribute to their sector of the industry

Maples et. al showed evidence that cut sizes are a significant problem in food service, hindering beef demand.

Model

(Steer price – heifer price)$_t$ = f(steer price – heifer price$_{t-n}$, D2014-2017, ≥1296, steer sltr., heifer sltr., steer wt., heifer wt.)

Data

- USDA monthly average data, Compiled by LMIC
- Steer, heifer prices
- TX/OK
- Steer, heifer weights
- January 2009-January 2019

Descriptive Statistics

	Steer-Heifer Price	Steer Sltr	Heifer Sltr	Steer Wt	Heifer Wt
Min	-3.220	1055.1	557.8	1219	1118
Max	1.235	1595.8	903.7	1384	1242
Mean	-0.117	1351.88	743.453	1289	1166
Std.	0.581	113.58	82.752	37	30

Analysis

- Identified structural break over the 2014-2017 period - Wald test
- Explored steer weight threshold – 1296 lbs
  - Weight from the beginning of structural break period
- STATA
  - For analysis

Table #1 OLS Regression Statistics for Steer-Heifer Difference

F-test	2.10				
R^2	0.19				
	Intercept	D2014-17	>=1296.8	Steer Sltr	Heifer Sltr
Beta	(0.526)	(0.498)*	0.118	(0.000)	0.003*
S.E.	1.347	0.202	0.139	0.001	0.002
t-test	(0.390)	(2.467)	0.851	(0.056)	1.803
Prob(t)	0.697	0.015	0.397	0.956	0.074

Results

- Little/no evidence that steer weights contribute to changing price relationship
- Evidence that heifer slaughter (volume) did contribute to heifer premium
- Explain very little of variation in steer-heifer price relationship
- Lagged independent variable, lagged slaughter rates, and steer weight threshold were statistically insignificant

Potential Solutions

- Sorting carcasses by ribeye area size would allow for more consistent cut size; differentiate and direct product to Hotel, Restaurant, and Institutional (HRI) trade by ribeye size
- Ribeye size dictates size of:
  - ribeye steaks, New York strip steaks, T-bone steaks, and porterhouse steaks, as it is all from the same muscle

Potential Solutions

- Since heifers are generally smaller in size it can be inferred that they have smaller ribeye sizes, therefore, would fall into the category of smaller cut size to better serve foodservice product specifications

- In a study by Griffin et al., heifers showed a higher percentage yield of strip loins, top sirloin butts, and gooseneck rounds than steers of the same USDA Yield Grade, thought to be caused by increased fat deposition in heifers

Conclusions

- Adapting to consumer, restaurant portions may happen at processor
- Little price signal back to producer
- But, heifers do carry premium to steers but not explained by weight
- Profit for making animals larger is more than for making smaller cuts.

Want to also examine …

- Other markets: NE, KS, IA/MN
- Formula, grid, other pricing than cash
- Quality grade

References

Berg, R. T., Jones, S. D. M., Price, M. A., Fukuhara, R., Butterfield, R. M., and Hardin, R. T. 1979. Patterns of carcass fat deposition in heifers, steers and bulls. Can. J. Anim. Sci. 59: 359_366

Cahill, V.R.. 1970. Effects of Sex Differences in Beef Carcasses Relative to Cutability and Palatability. The Ohio State University.

Garrett, W. N. 1970 . Comparative performance and carcass characteristics of heifers and steers under identical management practices. Tenth Annual California Feeder's Day address. Department of Animal Science , University of California.

Griffin, D. B., Savell, J.W., Morgan, J.B., Garrett, R.P., Cross, H.R., 1992. Estimates of Subprimal Yields from Beef Carcasses as Affected by USDA Grades, Subcutaneous Fat Trim Level, and Carcass Sex Class and Type. Journal of Animal Science 70:2411-2430. March 2019.

Lusk, J. L. 2013. "Role of Technology in the Global Economic Importance and Viability of Animal Protein Production." *Animal Frontiers 3.* (3):20-27.

Maples, J.G., J.L. Lusk, and D.S. Peel. "When Bigger Isn't Better:Steak Size and Consumer Preferences." Presented Paper. Agricultural and Applied Economics Association annual meeting. 2016.

Murphey, C. E., D. D. Johnson, G. C. Smith, H. C. Abraham, H. R. Cross. 1985. Effects of sex-related differences in externalfat deposition on subjective carcass fatness evaluations - steer versus heifer. J. Anim. Sci. 60:686.

National Cattlemen's Beef Association. *National Beef Quality Audit 2016 – Steer and Heifer: Navigating Pathways to Success.* 2016.

Rahnefeld, G.W., Fredeen, H.M., Weiss, G.M., Lawson, J.E., Newman, J.A.. 1983. Sex and Year Effects on Carcass Characteristics of Three-way Cross Beef Cattle Reared at Two Locations. Canadian Journal of Animal Science 63: 285-298. 28 January 2019.

Schultz, R.W., Marsh, J.M.. 1985. Steer and Heifer Price Differences in the Live Cattle and Carcass Markets. Western Journal of Agricultural Economics 10: 77-92. 28 January 2019.

Sorensen, Duane. 1972. An Economic Analysis of Feeding Steers Versus Heifers. All Graduate Theses and Dissertations. 3066. https://digitalcommons.usu.edu/etd/3066

Questions?