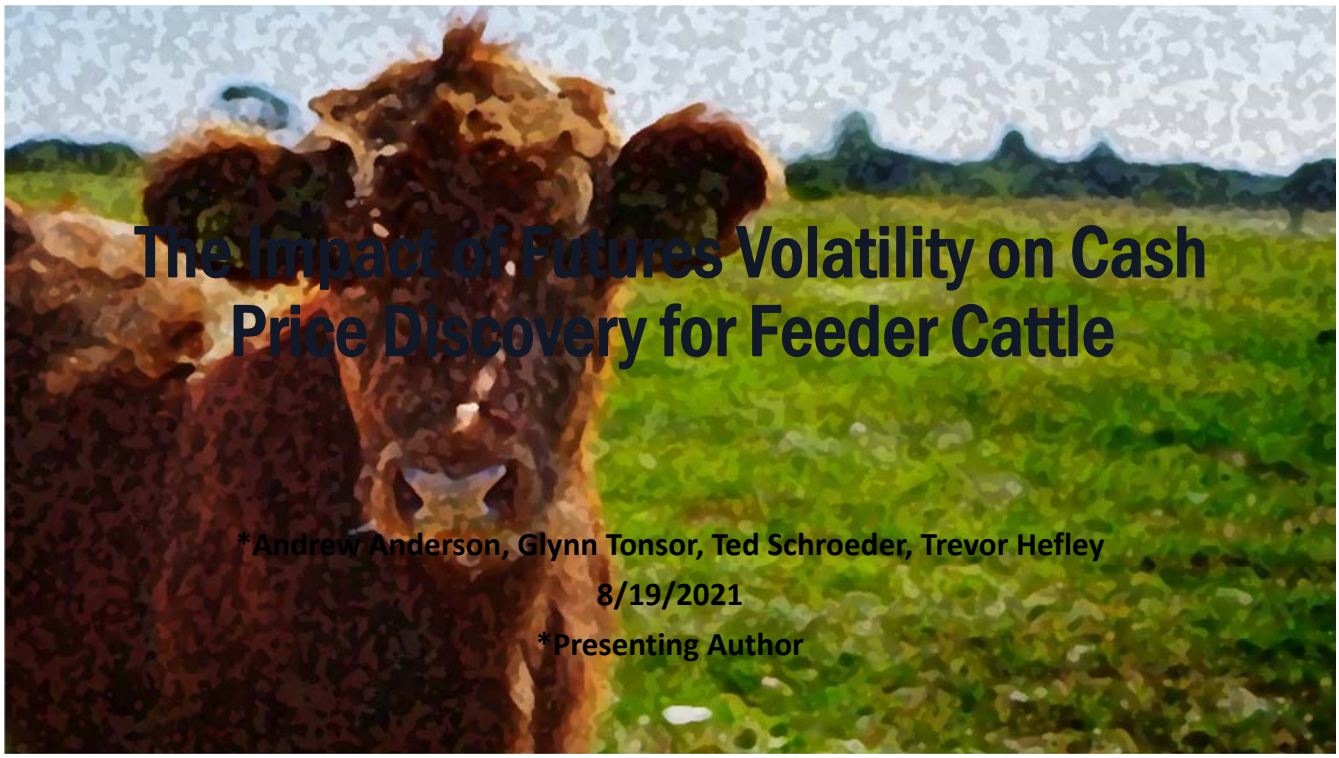

The Impact of Futures Volatility on Cash Price Discovery for Feeder Cattle

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*Presenting Author

Introduction

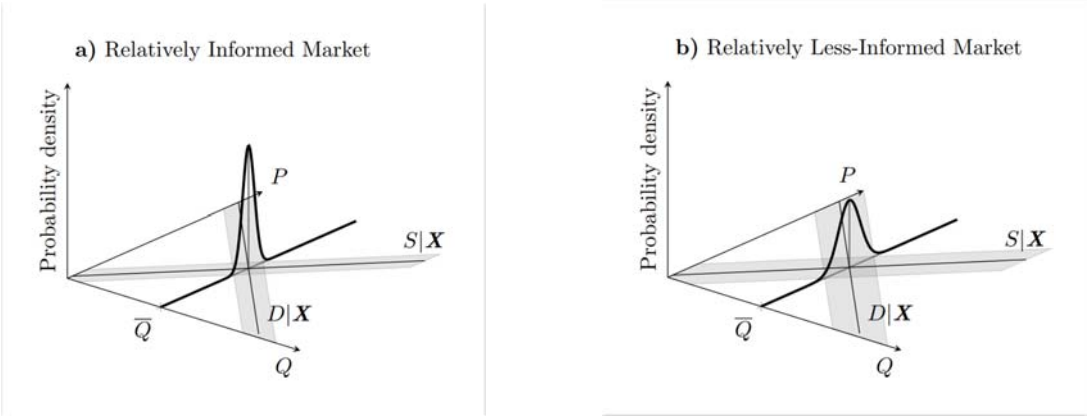
- Volatile feeder cattle futures markets over the last decade have prompted questions about potential effects of volatility on cash markets.
- The futures price for feeder cattle is a source of information. Volatility could disrupt the flow of information. Less information leads to less precise price discovery.
- The objective of this study is to determine the extent to which feeder cattle futures volatility impacts cash price dispersion and thus the precision of spot market price discovery.

What is Price Discovery?

- "**Price determination** is the interaction of the broad forces of supply and demand which determine the market price level." On the other hand, "**Price discovery** is the process of buyers and sellers arriving at a transaction price for a given quality and quantity of a product at a given time and place… Price discovery begins with the market price level. Because buyers and sellers discover prices on the basis of ***uncertain expectations***, ***transaction prices fluctuate around that market price level.***" (Schroeder et al., 1998)

Price Discovery and Market Information

According to Stigler, (1961) "price dispersion is a manifestation—and, indeed, ***it is the measure***—of ignorance in the market."



What Role Does the Futures Market Play?

- Futures markets absorb, synthesize, and communicate market information through price signals. Market participants use this information to facilitate price discovery in the cash market.
- Buyer's expectations regarding future prices could consist of futures prices, expected basis, and some uncertainty.

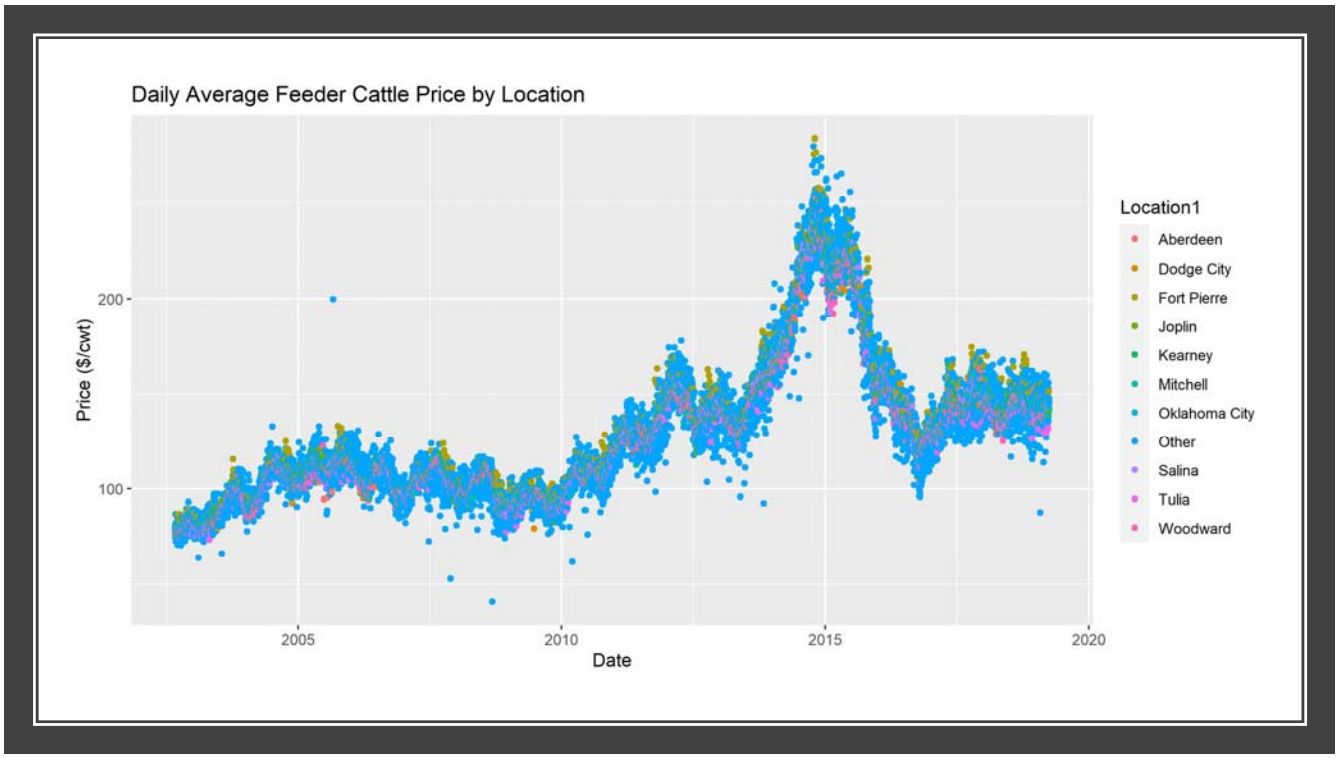
Derived Demand Model

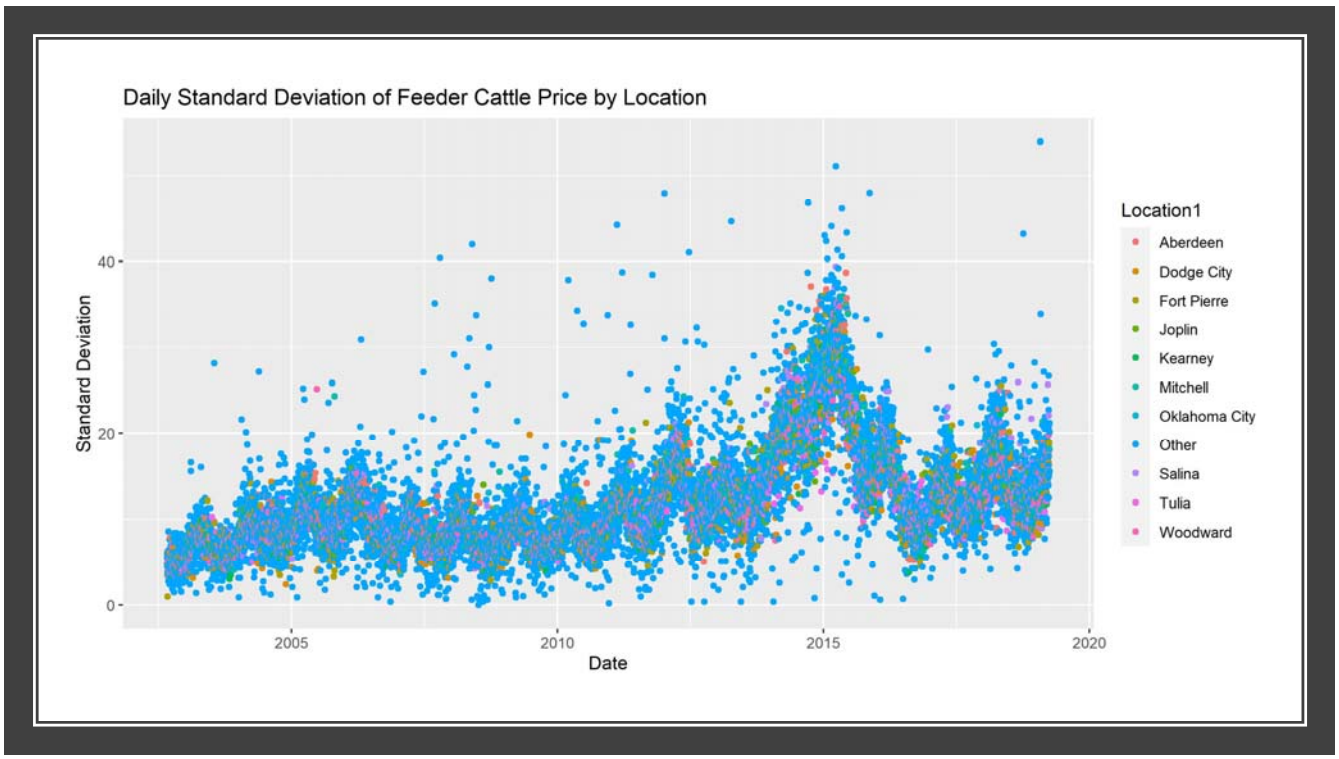
- Carlberg & Ward (2003) specify a model of derived demand for price discovery in fed cattle. We take a similar approach for feeder cattle.
- In the profit function, prices are expectations for the future at time *t* when the placement decision is made.
- Price expectations are substituted for the component parts and the function is maximized to find the cash price.
- Since price expectations include a random component, we derive the mean and standard deviation parameters for the conditional distribution of feeder cattle cash prices.

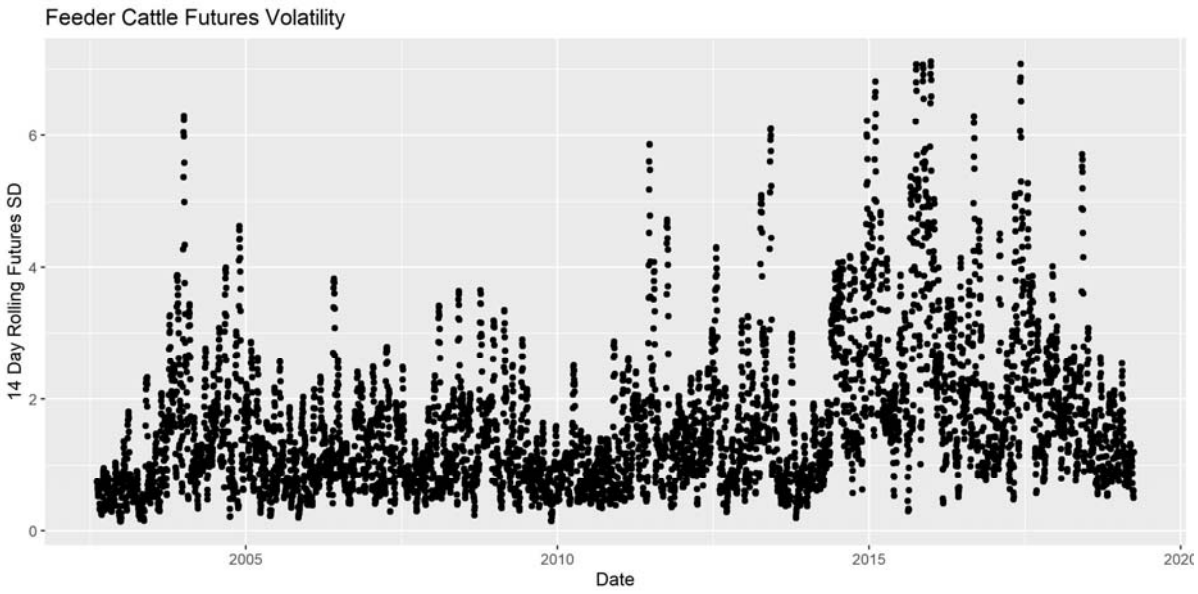
Data

- Data for auction markets at 27 locations from 2002-2019 (mix of transactions and grouped transactions), futures prices for feeder cattle, live cattle, and corn.
- Inter-market price variation
- Cash price dispersion and futures volatility line-up over time—apparent positive relationship
- Created rolling average and standard deviation for futures price

Markets by Location and Size (size=head sold)


Daily Average Feeder Cattle Price by Location
Price ($/cwt)
200
100
2005
2010
2015
2020
Date
Location1
Aberdeen
Dodge City
Fort Pierre
Joplin
Kearney
Mitchell
Oklahoma City
Other
Salina
Tulia
Woodward


Daily Standard Deviation of Feeder Cattle Price by Location
Standard Deviation
40
20
0
2005
2010
2015
2020
Date
Location1
Aberdeen
Dodge City
Fort Pierre
Joplin
Kearney
Mitchell
Oklahoma City
Other
Salina
Tulia
Woodward

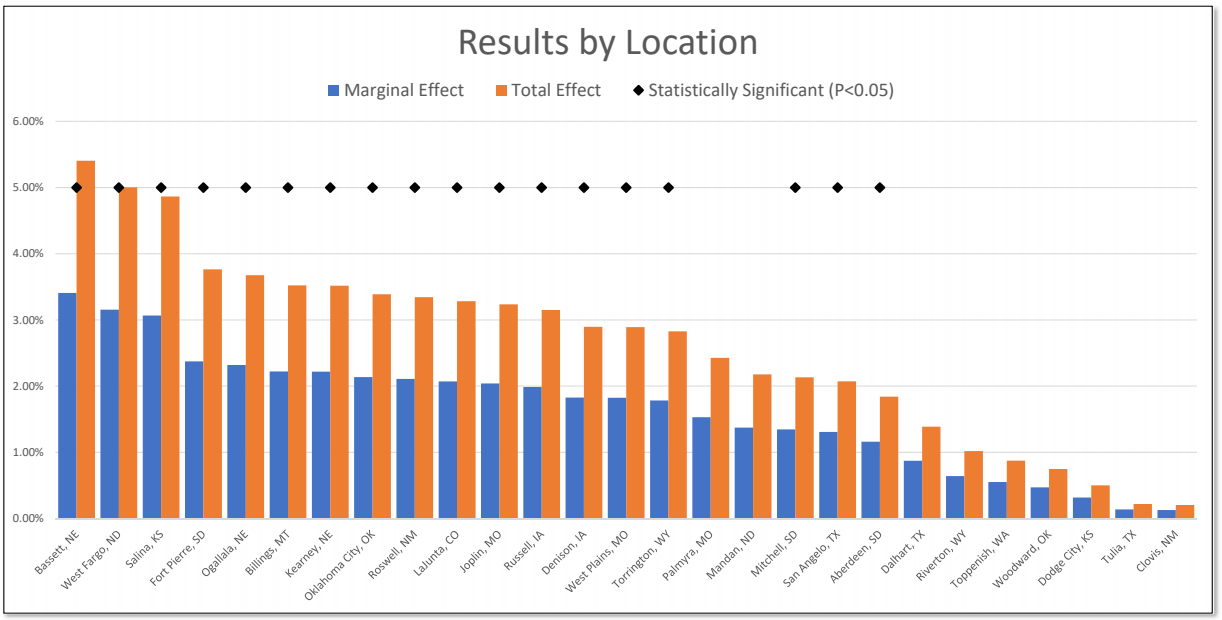


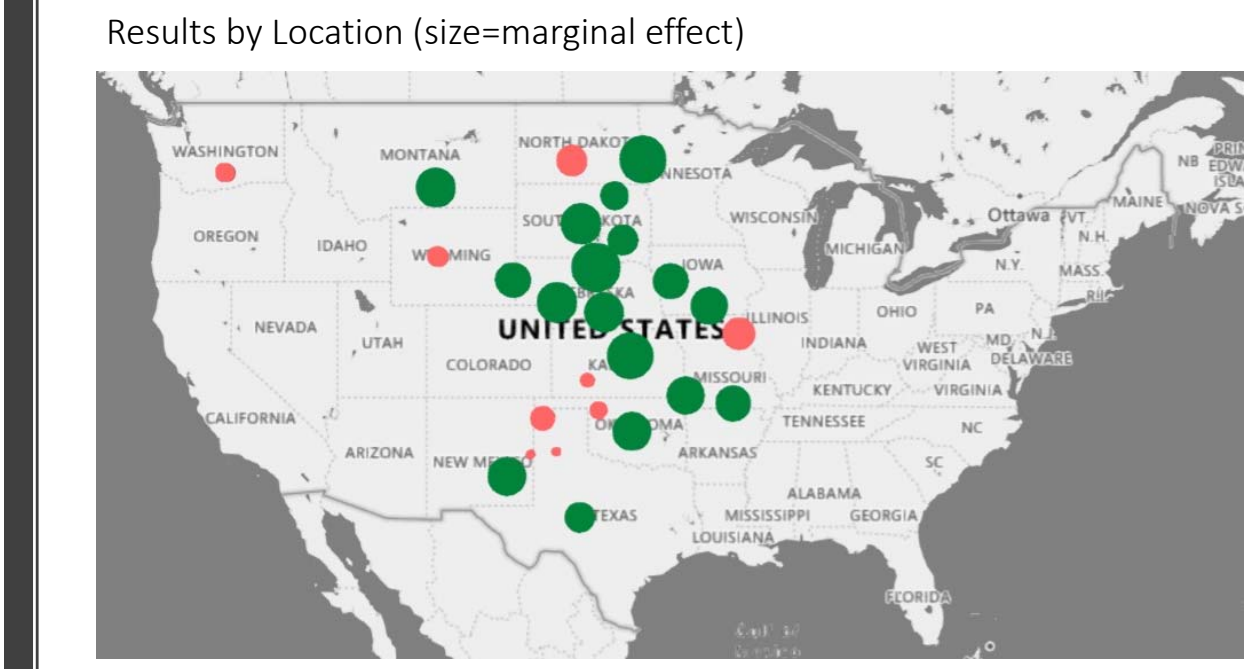
Empirical Model and Fitting Procedure

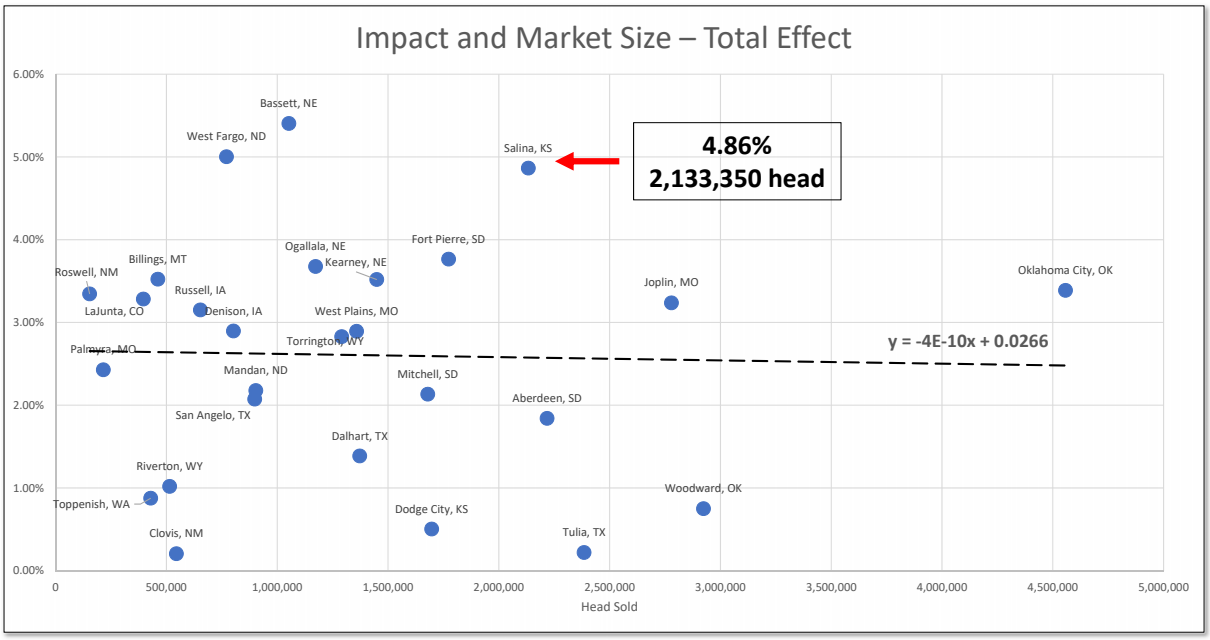
$$Feeder\ cattle\ cash\ price = f(cattle\ attributes, fed\ cattle\ futures\ price, corn\ futures\ price)$$

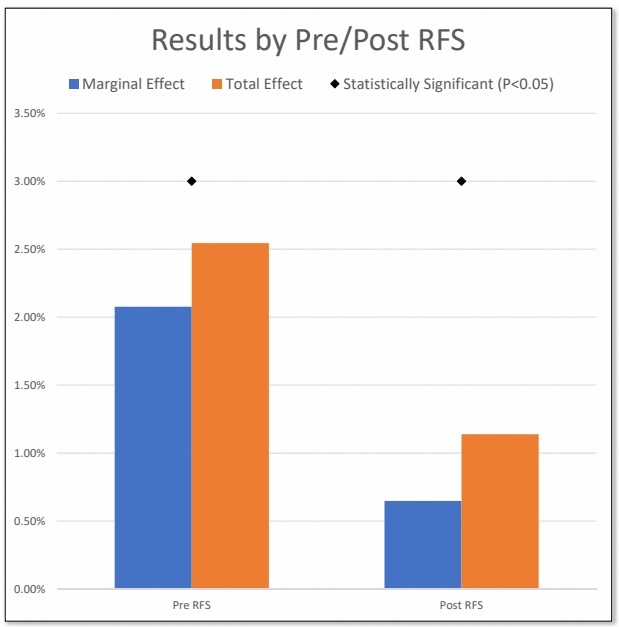
$$Price\ dispersion = f(feeder\ cattle\ futures\ volatility, \dots)$$

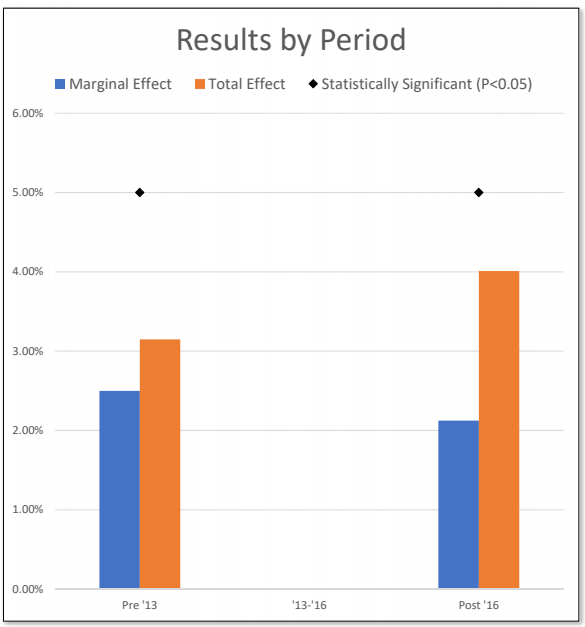
- Fit using GAMLSS package in R. Generalized Additive Models for Location, Scale, and Shape (GAMLSS) are univariate regression models, where the parameters of the assumed distribution are functions of independent variables.


Results by Location
Marginal Effect
Total Effect
Statistically Significant (P<0.05)
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
Bassett, NE
West Fargo, ND
Salina, KS
Fort Pierre, SD
Ogallala, NE
Billings, MT
Kearney, NE
Oklahoma City, OK
Roswell, NM
LaJunta, CO
Joplin, MO
Russell, IA
Denison, IA
West Plains, MO
Torrington, WY
Palmyra, MO
Mandan, ND
Mitchell, SD
San Angelo, TX
Aberdeen, SD
Dalhart, TX
Riverton, WY
Toppenish, WA
Woodward, OK
Dodge City, KS
Tulia, TX
Clovis, NM


Results by Location (size=marginal effect)
WASHINGTON
MONTANA
NORTH DAKOTA
MINNESOTA
OREGON
IDAHO
WISCONSIN
MICHIGAN
Ottawa
MAINE
WYOMING
IOWA
NEBRASKA
ILLINOIS
OHIO
PA
NEVADA
UTAH
UNITED STATES
INDIANA
COLORADO
WEST VIRGINIA
MD
DELAWARE
MISSOURI
KENTUCKY
VIRGINIA
CALIFORNIA
TENNESSEE
NC
ARIZONA
NEW MEXICO
ARKANSAS
SC
ALABAMA
TEXAS
MISSISSIPPI
GEORGIA
LOUISIANA
FLORIDA


Impact and Market Size – Total Effect
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
0
500,000
1,000,000
1,500,000
2,000,000
2,500,000
3,000,000
3,500,000
4,000,000
4,500,000
5,000,000
Head Sold
Bassett, NE
West Fargo, ND
Salina, KS
4.86%
2,133,350 head
Ogallala, NE
Kearney, NE
Fort Pierre, SD
Billings, MT
Roswell, NM
Russell, IA
LaJunta, CO
Denison, IA
West Plains, MO
Joplin, MO
Oklahoma City, OK
Torrington, WY
Palmyra, MO
Mandan, ND
Mitchell, SD
Aberdeen, SD
San Angelo, TX
Dalhart, TX
Riverton, WY
Toppenish, WA
Dodge City, KS
Woodward, OK
Clovis, NM
Tulia, TX
y = -4E-10x + 0.0266


Results by Pre/Post RFS
Marginal Effect
Total Effect
Statistically Significant (P<0.05)
3.50%
3.00%
2.50%
2.00%
1.50%
1.00%
0.50%
0.00%
Pre RFS
Post RFS


Results by Period
Marginal Effect
Total Effect
Statistically Significant (P<0.05)
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
Pre '13
'13-'16
Post '16

Discussion & Conclusion

- Quantifying precision of price discovery.
- The results show a statistically significant positive effect at most markets. Yet the impact is debatably small.
- Market size does not seem to matter, but geography does.
- What this analysis does not answer.
  - Cash price temporal volatility
  - Does not capture all costs and benefits of the feeder cattle futures contract

QUESTIONS?