**Could Packers Manipulate Cash Markets by Linking Contract and Futures Prices?**

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## Introduction

Two important features in fed cattle procurement

1. Increase in Market Concentration

- Beef packing is one of the most concentrated processing sectors in the U.S.
- The 4-packer concentration ratio increased from 25 to 80 percent from 1976-2007.
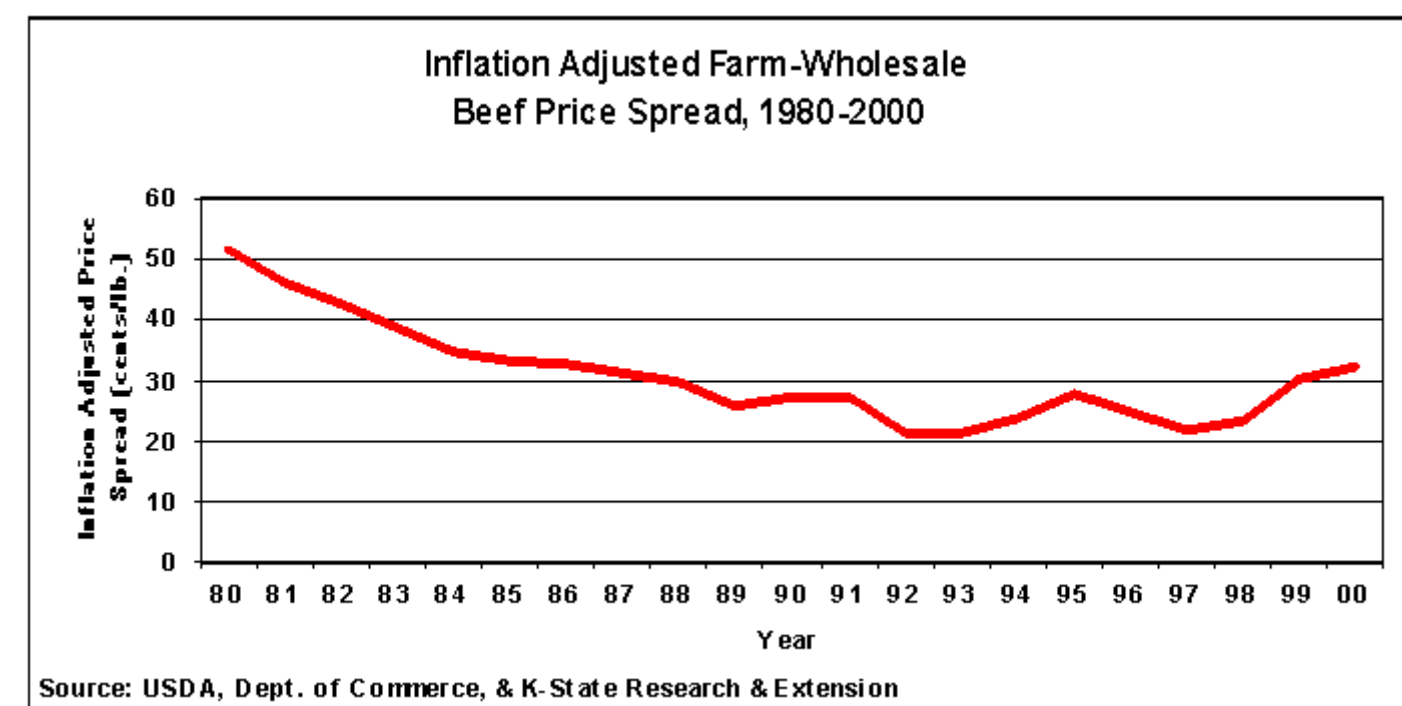- A large number of cattle producers.

2. Captive Supplies

- Cattle procured through various forms of vertical coordination:
    - --- Forward contracts
    - --- Marketing agreements
    - --- Packer-fed cattle.
- Increasing over time.



**Fed Cattle Prices vs. Packer Mkt Share.**
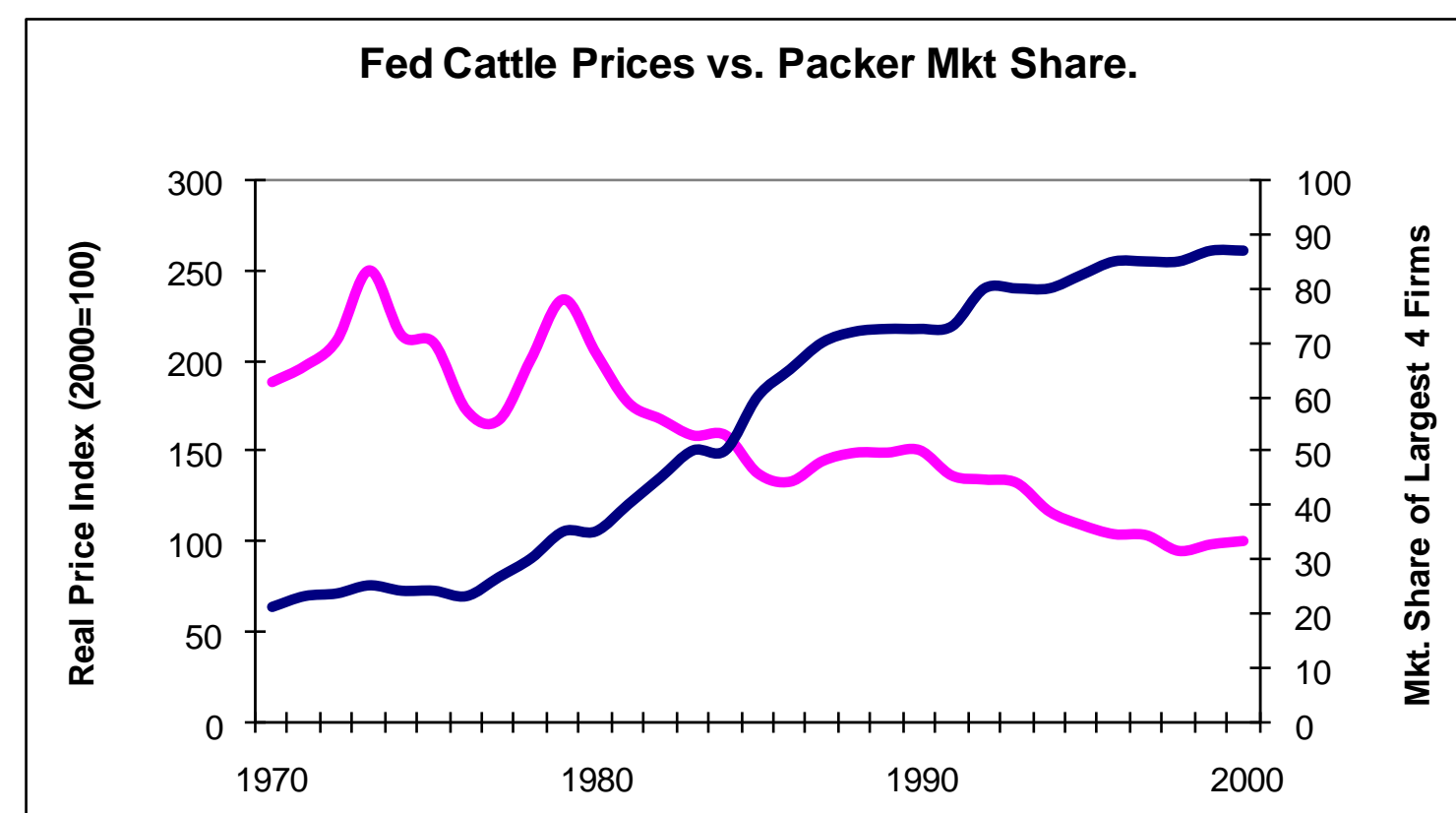
## Objectives

- ➢ Develop a simple framework to study the competitive effects of contracts with price terms linked to a futures price, such as the price terms in basis contracts

- ➢ Conduct an empirical estimation of the effects of those contracts on the cash cattle price.



**Inflation Adjusted Farm-Wholesale Beef Price Spread, 1980-2000**

Source: USDA, Dept. of Commerce, & K-State Research & Extension

## Literature

- ➢ Empirical studies have found a modest negative relationship between captive supplies and cash market price (Elam, Schroeder et al.; Schroeter and Azzam; Ward, Koontz, and Schroeder).

- ➢ A few theoretical studies use models of imperfect competition to study captive supplies (Love and Burton; Azzam; Zhang and Sexton; Xia and Sexton).

- ➢ No rigorous theoretical model for the effects of contracts that tie contract prices to a cattle futures price.

- ➢ A growing literature suggests "bidirectional causality" (or a "feedback effect") between spot and futures prices whereby each price change influences the other's.

## Methods

### The Theoretical Model

- ➢ Several (N) oligopsony beef packers and a large number of price-taking cattle producers.

- ➢ Two markets, contract and cash market, evolve sequentially in time.

- ➢ Individual cattle producer's supply function: $q = f(P,V,Z)$,
    where P: the price received by the producer
    V: the fed cattle futures price
    Z: feeding and other variable costs.

- ➢ The fed cattle futures price V is modeled as a function, $V = g(P_a, Y)$, where $P_a$ is the cash price and Y is a vector of other factors.

- ➢ Packers' per-unit gross profit is R.

- ➢ Two cases: A benchmark case when contract prices are fixed and the case when contract price terms are linked to a futures price.

- ➢ Assume quantity (Cournot-Nash) competition among beef packers.

### The Empirical Model

$$P_{a,t} = \beta_0 + \beta_1 R_t + \beta_2 \left[ \sigma / 1 - \sigma \right] q_c + \beta_3 Z_t + \beta_4 y_t + \beta_5 x_t + \varepsilon_t,$$

Data: monthly data on U.S. cattle supplies and prices from 1988 to 2006 (228 observations).

$P_t$ : USDA/AMS price for steers ($ per CWT)

$R_t$ : average boxed-beef prices minus processing costs

$Z_t$ : a break-even price that covers a cattle producer's costs of production.

$\sigma_t$: the share of cattle purchased by the largest 4 packers under marketing agreements.

$y_t$: current boxed beef price.

$x_t$: the average carcass weight for steers and heifers slaughtered.

## Results

- ➢ When contract price terms are linked to a futures price, the cash-market price of cattle is lower than the cash price in the case when contract prices are fixed.

- ➢ The magnitude of this negative effect of the contract price terms on the cash price is increasing in
    - the share of contract cattle in all cattle procured
    - the degree of packers' market power in cattle procurement.

- ➢ Main parameter/function of interest in the empirical estimation:

    $\beta_2 = -0.485* < 0$ is statistically significant.

    This is consistent with the conceptual result.

- ➢ The signs of all estimated parameters are as predicted by the theoretical model.

## Conclusions

- ➢ In essence, contracts with price linked to a futures price cause packers to compete less aggressively in the cash market. Thus, the cash cattle price is lower.

- ➢ Preliminary empirical model does provide evidence for the conceptual results.

- ➢ Cattle producers have long argued and researchers suggested that packers may influence their cash purchases by their positions in the futures markets.

    The analysis in this paper shows that packers could manipulate cash cattle markets not through positions in the futures market directly but by their usage of contract formulas tied to those futures.