



# **Agricultural Policy Effects on Land Allocation**

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# Background

- Trade and other agricultural policy discussions focus on distortions that arise
- The distortions come about if the decision making process of farmers is distorted by policy
- This can cause excess supply or conversely limited supply
- Brazil's concern with U.S. sugar policy
- Canada's concern with regards to soybean policy




# Recent research

- Are “Decoupled” Farm Program Payments Really Decoupled? (Goodwin and Mishra, *American Journal of Agricultural Economics*, February 2006)
- Effect of decoupled policy on output mean and variability (Serra, Zilberman, Goodwin, and Featherstone, *European Review of Agricultural Economics*, September 2006)
- Effect of decoupled policy on land allocation (Serra, Zilberman, Gil, and Featherstone, *Applied Economics*, in press 2007)



# Goodwin and Mishra

- Concern regarding whether decoupled payments affect land allocation decision
- Uses USDA ARMS and USDA NASS data from 1998 to 2001 for the Heartland area
- Estimates an acreage response model for corn, soybeans, and wheat
- Concluded that decoupled payments may lead to increased production of corn, soybeans, and wheat though the amount was small
- Found the response of corn to market loss payments was small
- Only cross sectional effects were observed, no time observations of the same farm over time



## **Serra, Zilberman, Goodwin, and Featherstone**

- Concern regarding whether decoupled payments affect expected output and output variability
- Used a panel of 596 Kansas Farm Management farms from 1998 through 2001, county-wide policy variables from USDA, country-wide price indices from NASS, and futures price data (BRIDGE)
- Estimated a structural model accounting for price and yield risk
- Found that decoupling may result in a decline in the mean and variance of output through a reduction of risk increasing inputs
- The effect is relatively small



## **Serra, T., D. Zilberman, J.M. Gil, and A.M. Featherstone**

- Concern regarding whether decoupled payments affect land allocation decision
- Used a panel of Kansas Farm Management farms from 1998 through 2001, county-wide policy variables from USDA, and country-wide price indices from NASS
- Found that decoupling motivated a change in crop mix away from program crops though the effect was relatively small
- Decoupled payments increase crop acres by less than 0.2% and idle land is reduced by 1.3%



# Purpose Statement

- Empirically examine the effects of the 1996 shift in Agricultural Programs on land allocation in Kansas



# Hypotheses tested

- Hypothesis 1: The crop mix has changed with the elimination of acreage restrictions
- Hypothesis 2: There is more year to year shift in the crop mix post 1996 than previous to 1996
- Hypothesis 3: The crop mix is more responsive to price post 1996

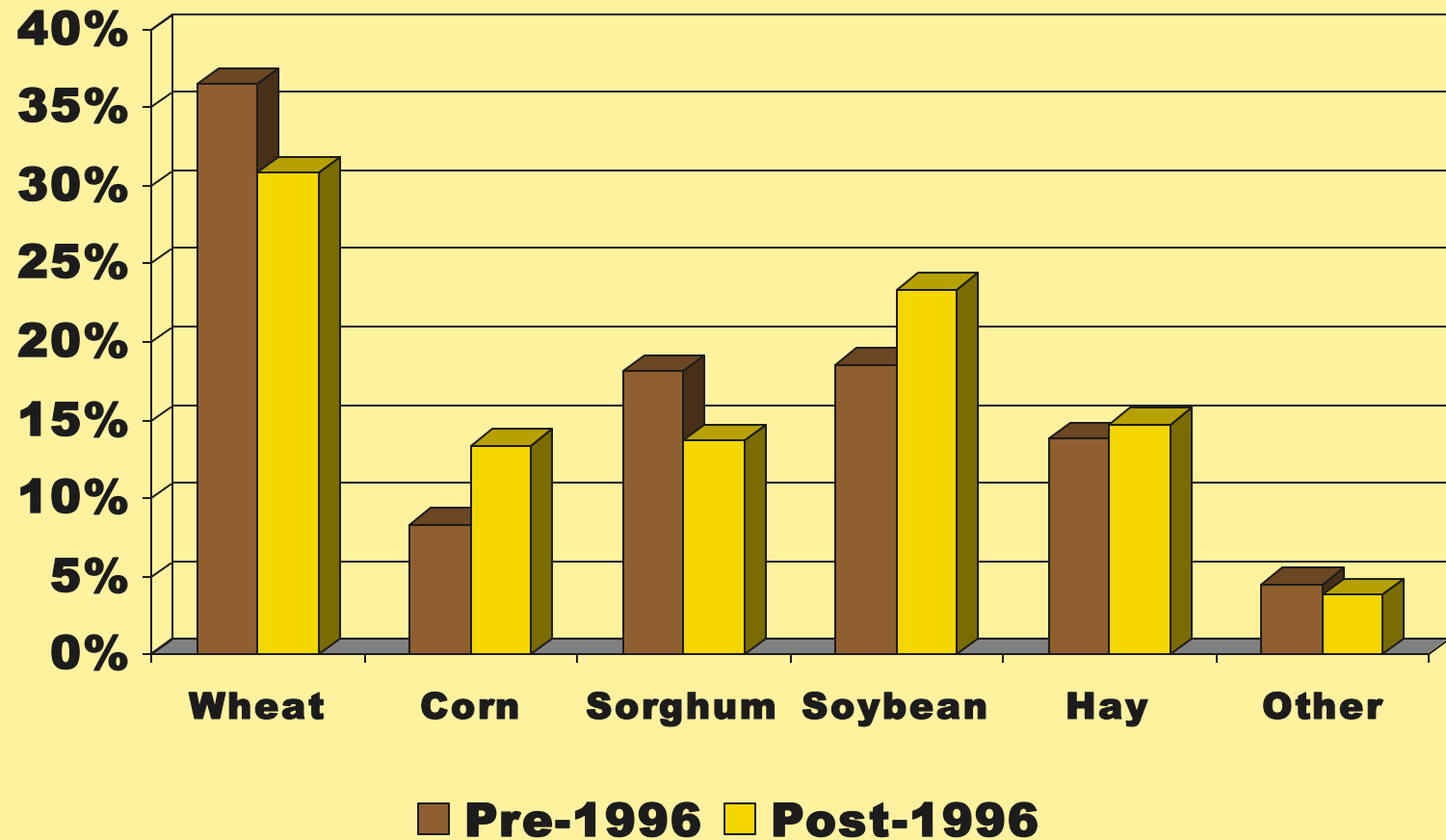




# Data Available

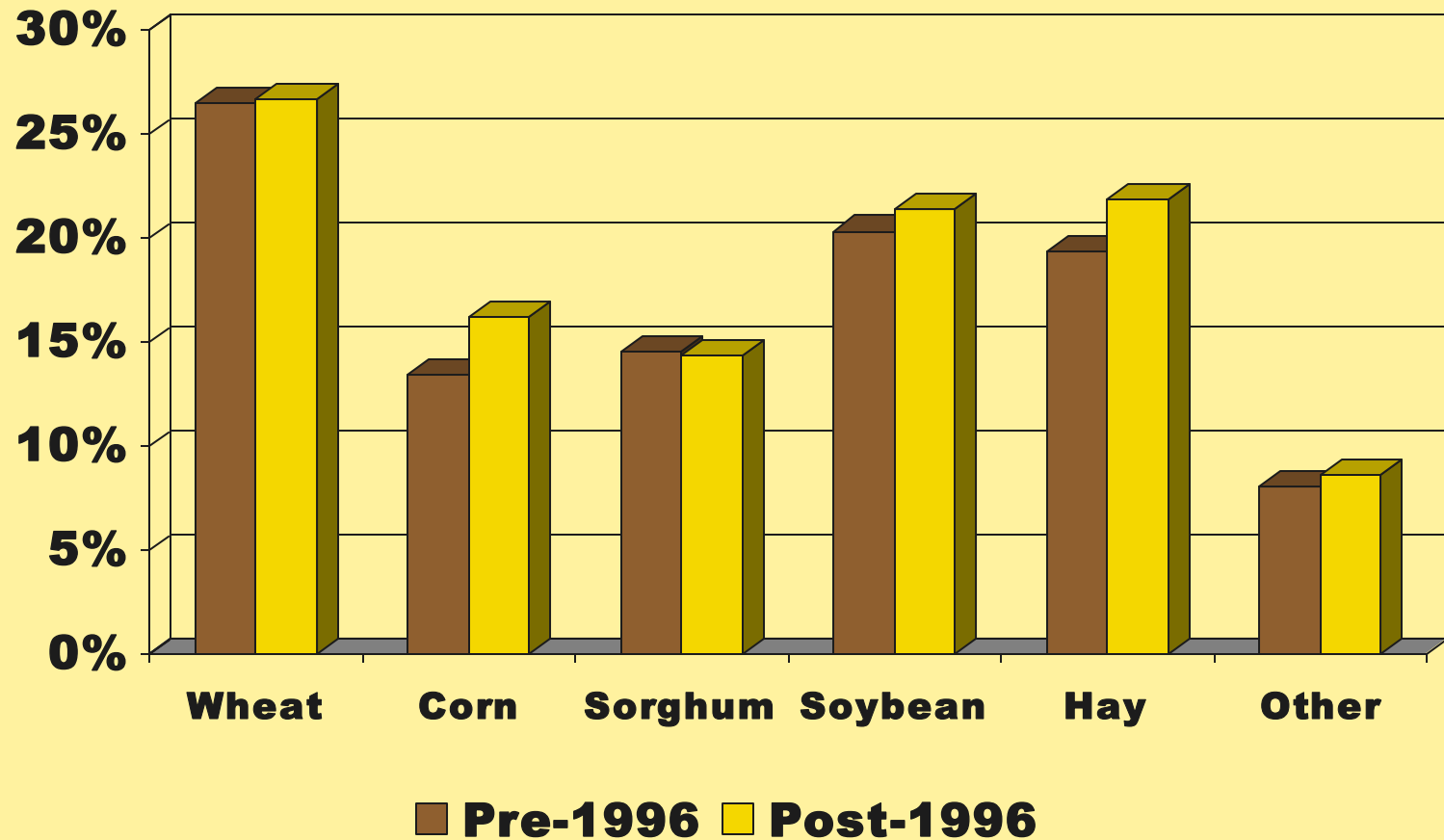
- 20 years of data (1987-2006) on 410 Kansas Farms from the Kansas Farm Management Associations
- 20 years of crop production data from Kansas Agricultural Statistics – USDA –NASS
- 20 years of expected planting price data

# Crop mix has changed?



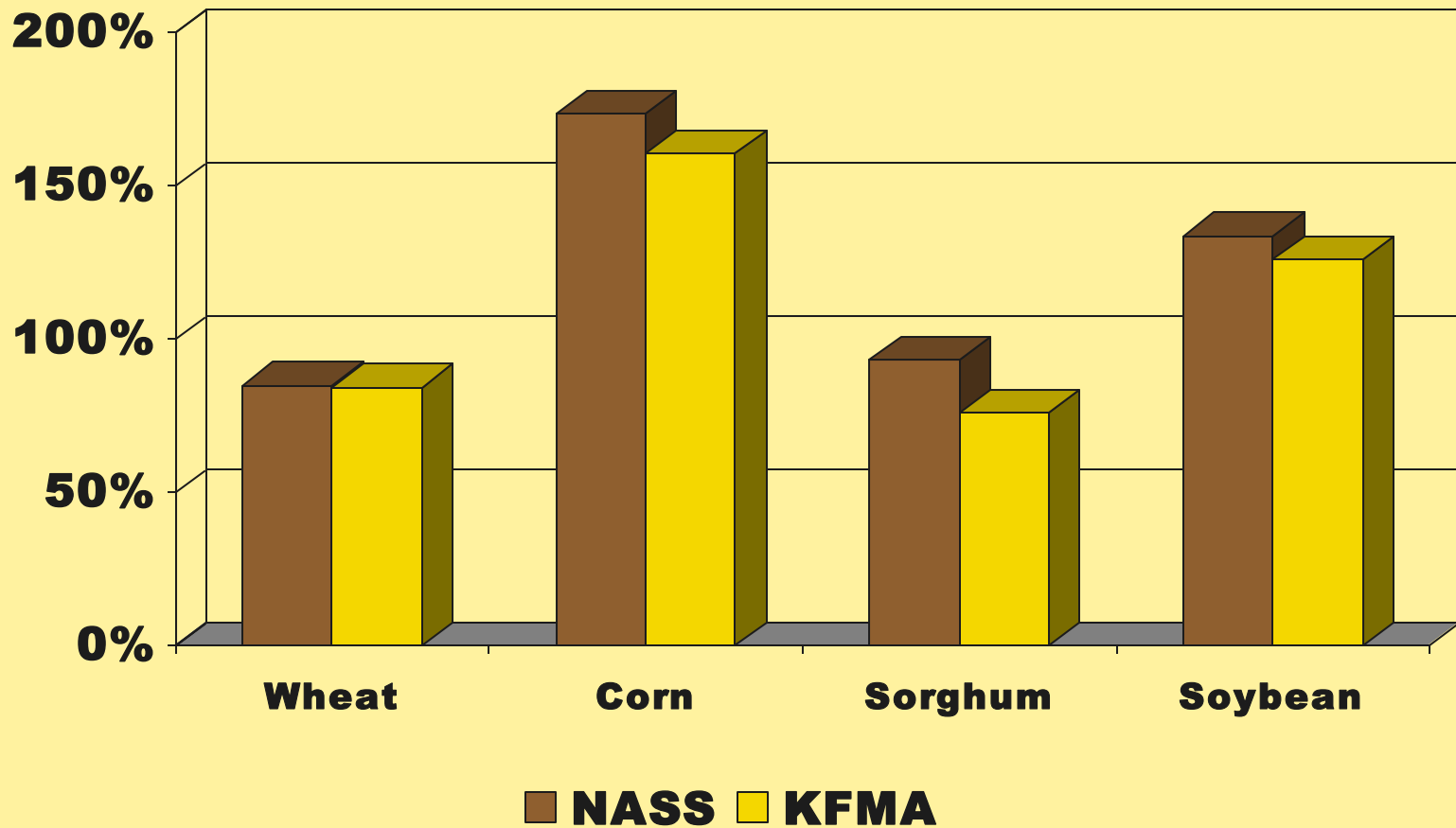
Average crop mix

# Crop mix has changed?



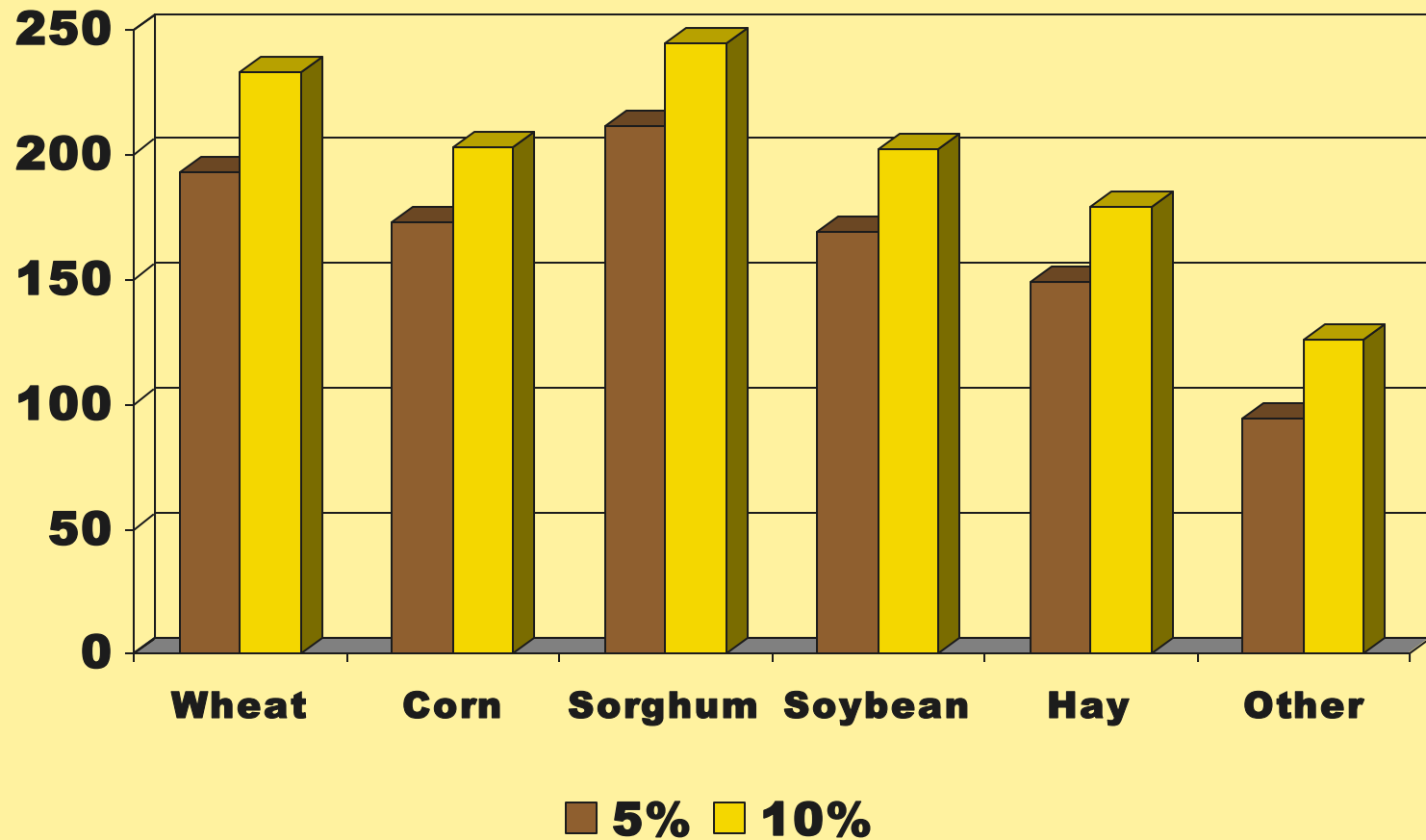
Average standard deviation

# Crop mix has changed?



Comparison of all farms with sample farms

# Crop mix has changed?



Number of farms with statistically different crop mix (out of 410)



# Crop mix has changed

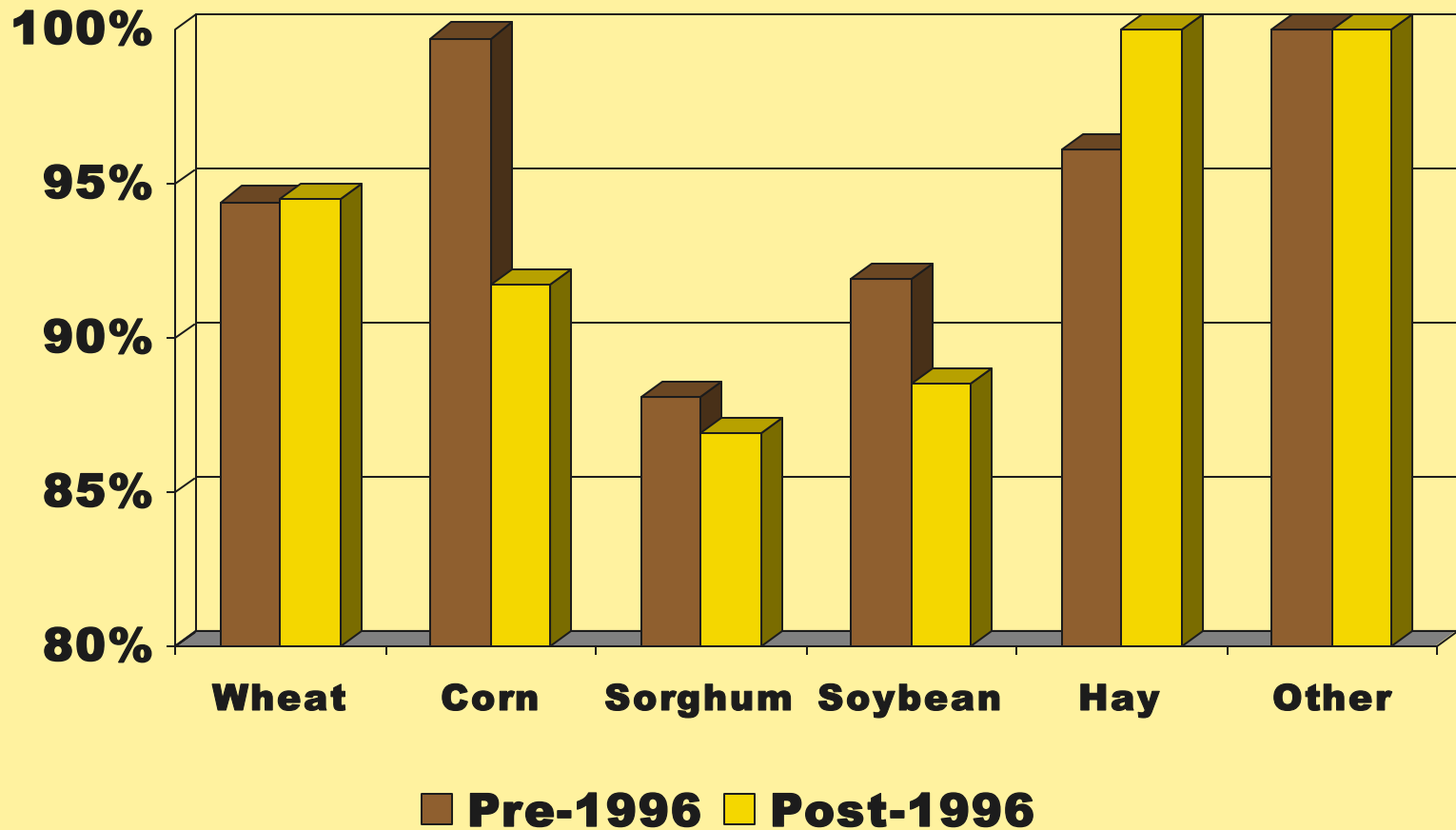
- Several tests of change of distribution were conducted on the farm data pre and post change in policy.
- Each of the tests indicated a statistically significant difference for each of the crops at the 5% level of statistical significance.
- More of the change is in the mean than the variability of crop mix
- In excess to 50% of the farms have a statistically distinct crop mix pre and post 1996



## **Crop mix more variable?**

- Previous analysis indicated that there was not much change in variability of crop mix.
- Estimate a Markov probability matrix.
- Examines the probability of the crop mix changing
- Statistically significant difference in the probability matrices

# Crop mix more variable?



Probability of Acreage Remaining in same crop





## **Crop mix more variable**

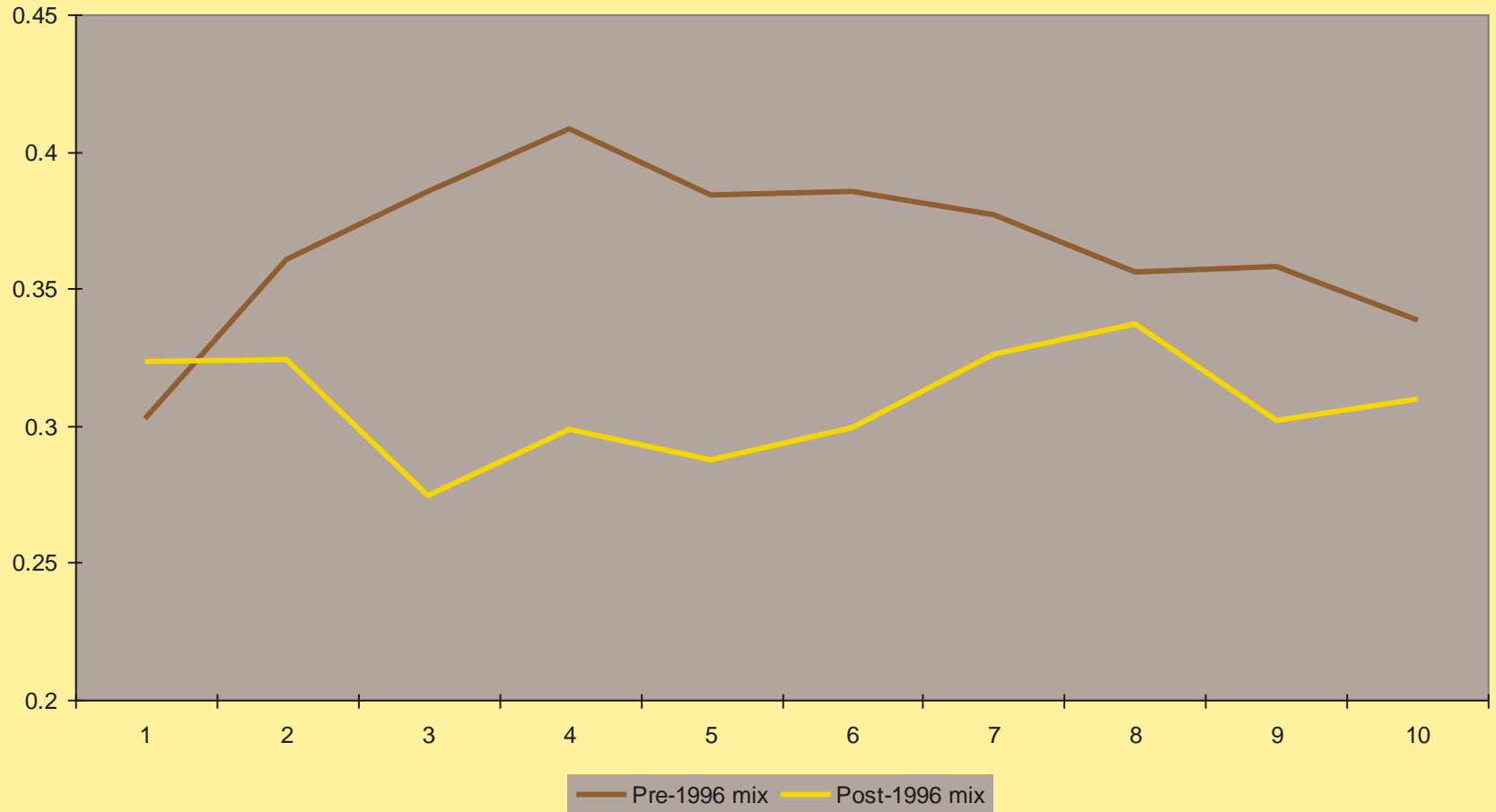
- Less probability of corn, sorghum, and soybean percentage in mix remaining the same
- Corn more likely to go to soybean or other acres
- Sorghum more likely to go to other and less likely to go to wheat
- Soybeans more likely to go to corn



## **Crop mix more price responsive?**

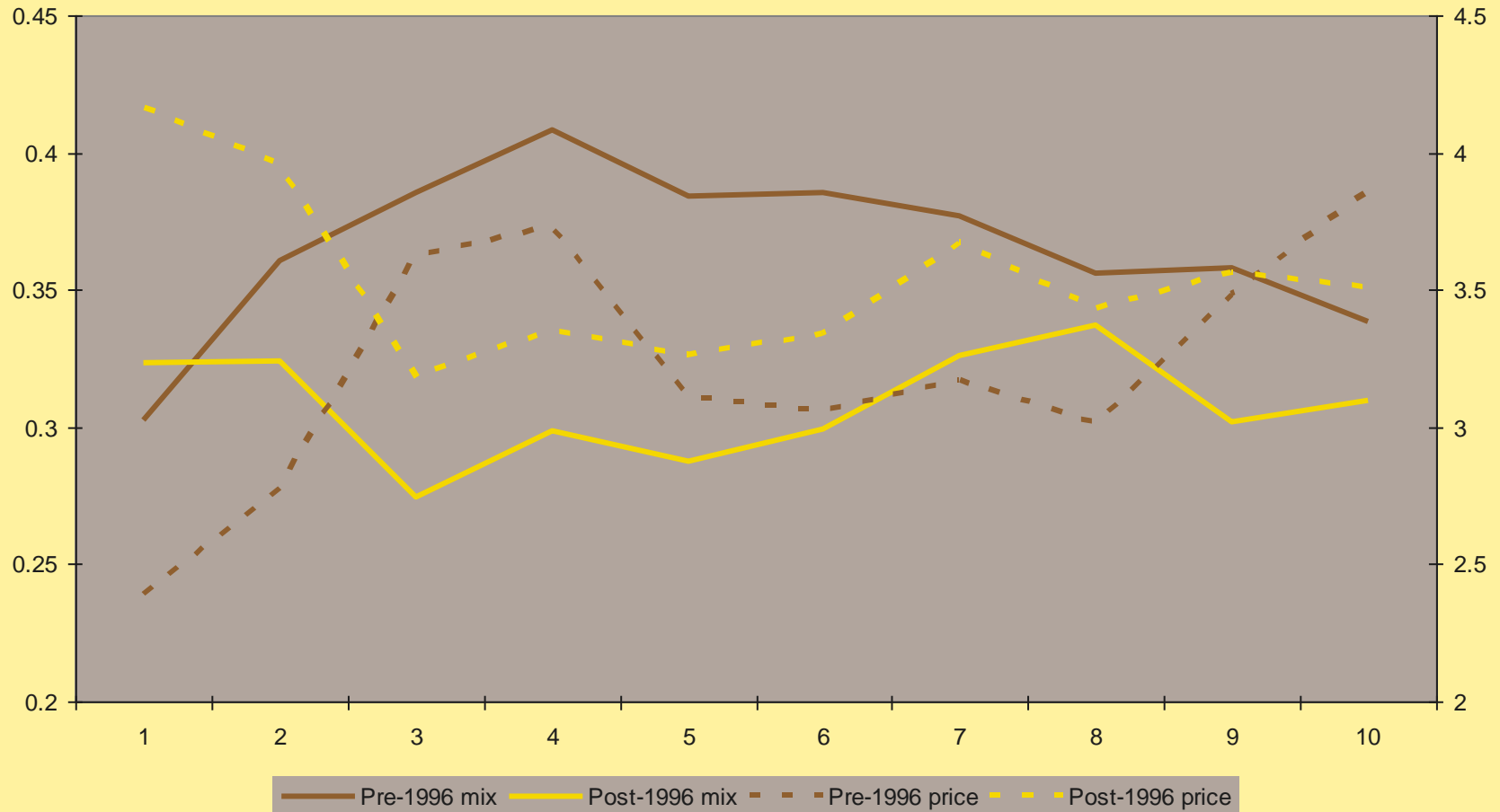
- Previous analysis indicated that it was more likely that the crop mix would change post 1996
- Why does it change?
- Is it more price responsive?
- Estimated an acreage response function for each of the crops that included an intercept and planting prices of wheat, corn, sorghum, and soybeans

# Crop mix more price responsive?



Wheat crop mix overtime

# Crop mix more price responsive?



Wheat response to wheat price



## Crop mix more price responsive

- The own price coefficient for wheat was less responsive following the shift
  - The responsiveness of wheat was less to all prices except the soybean price
- The own price coefficient for corn was more responsive following the shift
  - Corn was more responsive to wheat price (substitute)
  - Corn changed sign for soybean price (from complement to substitute)



## Crop mix more price responsive

- The own price coefficient for sorghum was more responsive following the shift
  - Sorghum was more responsive to wheat price and changed from a complement to a substitute
  - Sorghum was more responsive to corn price (complement)
  - Sorghum was more responsive to soybean price and changed from substitute to a complement)
- The own price coefficient for soybean was more responsive following the shift
  - Soybean was more responsive to wheat price (complement)



# Conclusions

- While theoretical arguments can be made that decoupled payments affect acreage allocation decisions, the empirical evidence suggests that these effects are small
- The change in direction in agricultural policy in 1996 resulted in:
  - a substantial change in land allocation,
  - a change in allocation from year to year,
  - and has made the allocation decision more responsive to price.



# Policy Implications

- In designing policy, policy makers must realize the acreage response has become more sensitive to price changes
- Small shifts in price ratios are likely to bring about larger acreage
- Policy induced price effects are likely more distorting than in the past
- Baseline estimates from policy models likely have higher forecast errors if not shifted elasticities
- It was argued that the impact for trade was oversold. Are we overselling the impact on production?