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


• Effect of decoupled policy on output mean and variability (Serra, Zilberman, Goodwin, and Featherstone, *European Review of Agricultural Economics*, September 2006)

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
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
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

Pre-1996 Post-1996
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?