Economic Fundamentals of Groundwater Conservation Policy

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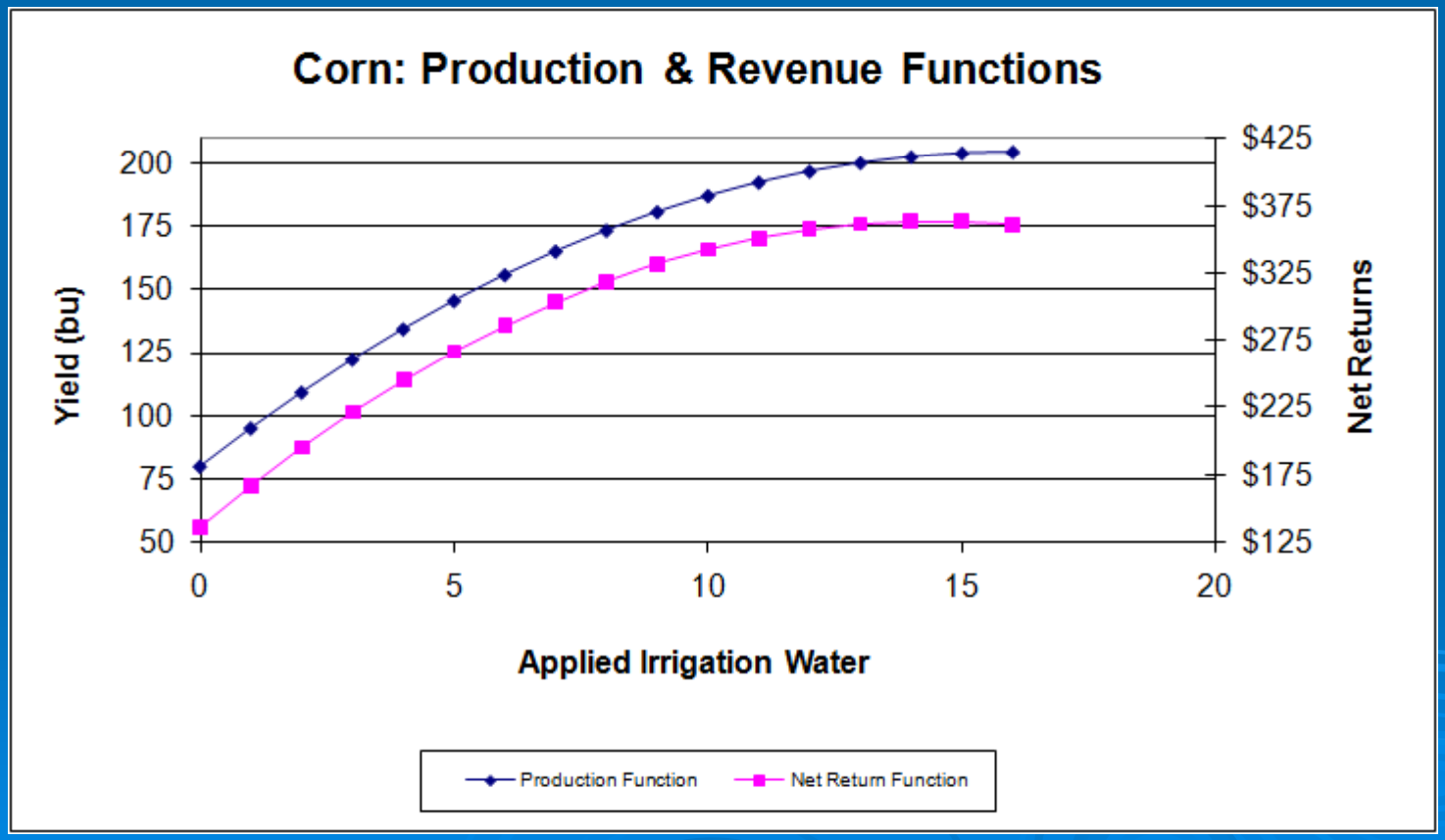
Conclusions From Multiple Studies

- Some form of long term water use restriction is necessary in order to achieve any meaningful water savings.
- Accelerated adoption of improved biotechnology or irrigation technology without restrictions will not save water and, in fact, could increase water use lowering water availability in the future – however using these strategies in combination with a water use restriction policy can help negate the negative impacts to producer income and the regional economy.
- Water use reductions are preferable to acreage reductions
- Phasing in water use reductions may reduce the economic impacts

From “Economic Impacts of Selected Water Conservation Policies in the Ogallala Aquifer” available at http://www.agmanager.info/policy/water/default.asp

The Producer's Decision

- Maximize Profits



Example based on Southwest Kansas. Production functions are based on the KSU Crop Water Allocator, Revenue functions are based on the 2010 KSU Farm Management Guides

The Producer's Decision & Groundwater Policy

- ## Goal: Maximize Profit
  - Total Irrigated Expenses = $774 per acre
  - Fuel cost = $3.93 per acre-inch
  - Average Value of Water = $15.55 per inch
  - Value of first inch = $30.49
  - Value of last inch = $1.98
  - Profit Maximizing → 14 - 15 inches

- ## Policy Implications
  - It is more economically efficient to reduce groundwater consumption by reducing water-use per acre (reduce 1" on 15 acres) as opposed to reducing irrigated acres (reduce 15" on 1 acre) .

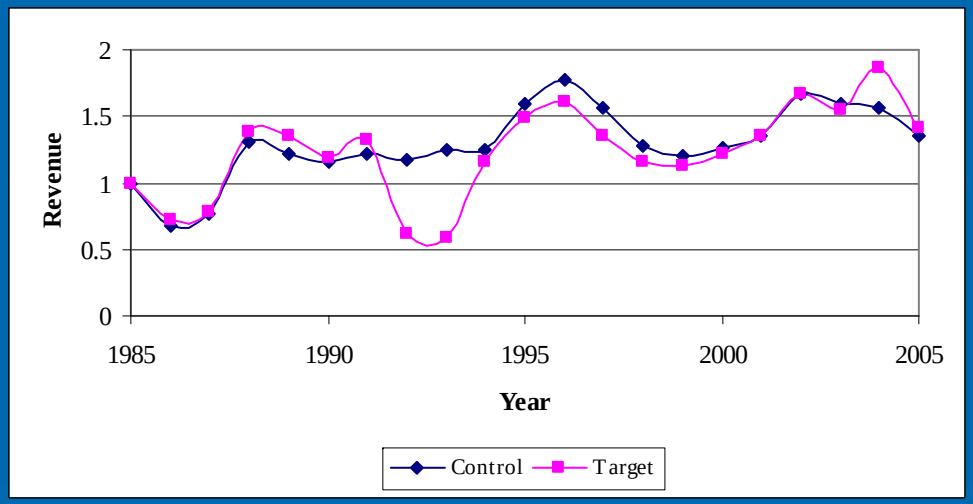
Applied Water	Yield	Total Net Returns	Incremental Returns
0	80.0	$136.12	
1	95.1	$166.61	$30.49
2	109.3	$194.91	$28.30
3	122.5	$221.02	$26.11
4	134.7	$244.93	$23.91
5	145.9	$266.65	$21.72
6	156.2	$286.18	$19.53
7	165.4	$303.51	$17.33
8	173.8	$318.65	$15.14
9	181.1	$331.60	$12.95
10	187.4	$342.36	$10.75
11	192.8	$350.92	$8.56
12	197.2	$357.29	$6.37
13	200.6	$361.46	$4.18
14	203.0	$363.44	$1.98
15	204.5	$363.23	($0.21)
16	205.0	$360.83	($2.40)

Barriers to Adoption of Limited Irrigation

- Fear of the unknown
- Cost of adopting new technology
- Current water law
- RMA crop insurance

Can Economies Recover from Water-Use Reductions?

Figure 6. Time Series Comparison of the Indexed Values of Irrigated Crop Revenue



- Statistically significant short-run and a statistically insignificant long-run reduction in annual irrigated crop revenue.

From “Impact Analysis of the Walnut Creek Intensive Groundwater Use Control Area” available at http://www.agmanager.info/policy/water/default.asp

Alternative Uses of Water

- Per acre-foot of water-use in ethanol production generates 277 times as much ‘Total Industry Output’ and 87 times as much ‘Value Added’ as compared to the same per acre-foot of water-use in irrigated corn production.

- Similar values have been found for the dairy, feedlot, coal fired electricity industries. The final reports for these industries are forth coming.

From “The Impact of Ethanol in Western Kansas” available at http://www.agmanager.info/policy/energydefault.asp

Thank You