



The Value of Irrigation Groundwater Right Attributes

Nathan Hendricks, Gabe Sampson, and Eric Edwards

2023 Governor's Conference on the Future of Water in
Kansas

KANSAS STATE
UNIVERSITY



Groundwater Rights in Kansas

- 1945 Water Appropriation Act established prior appropriation doctrine
- “first in time, first in right”

KANSAS STATE
UNIVERSITY



Three Aspects of Groundwater Rights

1. Access – must have a water right to irrigate
2. Allocation – authorized an annual maximum quantity
3. Seniority – more secure right if more senior water right



Research Questions

- What is the value of each aspect of a groundwater right?
- How large of a transfer occurs from new allocation systems (e.g., a LEMA) ignoring authorized quantity and seniority?



Should access have value?

- Clear that irrigated land values are greater than nonirrigated land values.
- But if water rights don't reduce water use, then the land value premium will equal cost of drilling well and installing irrigation system.



Should authorized quantity have value?

- Only if authorized quantity affects water use.



Should seniority have value?

- Depends on expectation that priority could impact water use at some point in the future.



Overview of Method

- Regression of land transaction data to estimate how each of the 3 water right attributes affect the price per acre.
- Hold constant
 - Hydrology
 - Soils
 - Climate
 - Distance to urban areas
- Account for different changes in land values over time within each GMD.



Land Value Data

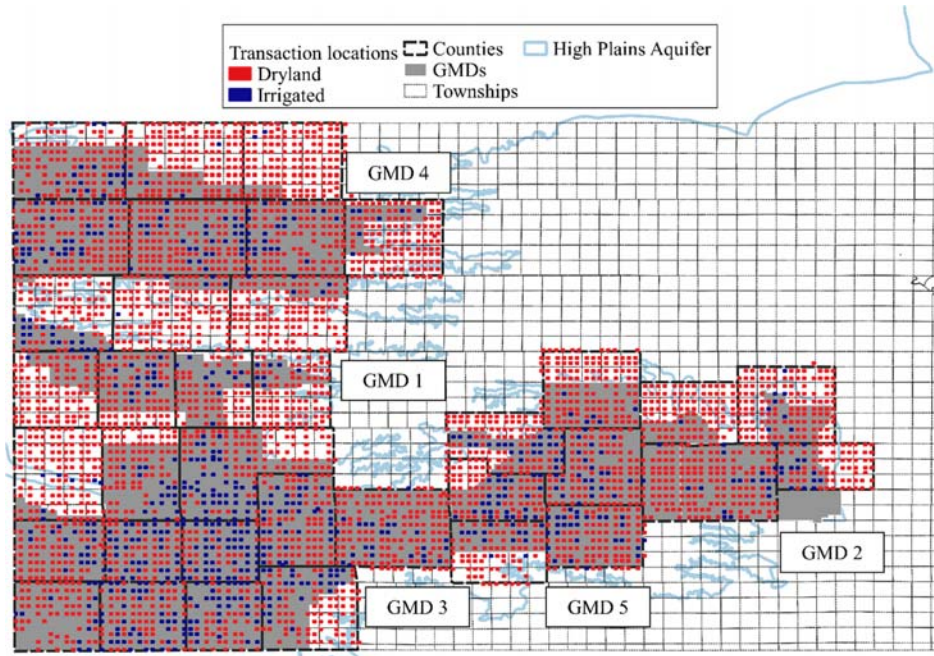
- Ag land transaction of 40 acres or more from Property Valuation Division of KDR (1990-2019)
- Arms-length transactions
- Remove outliers
- Only transactions over High Plains Aquifer
- About 16,000 transactions



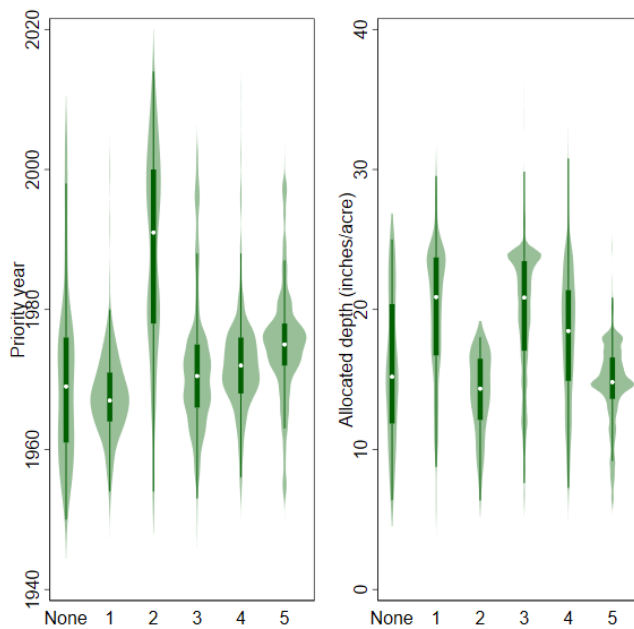
Water Right Data

- Use parcel boundary data for each transaction to determine water rights with an authorized place of use within the parcel boundary.
- Water Right information from Water Information and Analysis System (WIMAS)

Location of transactions



Priority and Authorized Quantity by GMD





Results – Value of Access

- Average value of access to irrigation is \$1,443/acre (2019 value)
- Larger than estimate of cost to drill well and install center pivot for 130 acres (\$1,023/acre)
- Premium in excess of cost to install irrigation indicates water rights have reduced use



Total Value of Access to Aquifer

- Total capitalized value of access to irrigation in Kansas is \$3.5 billion
- Subtracting value of irrigation capital indicates at least \$761 million of capitalized value of access rights.



Value of Authorized Quantity

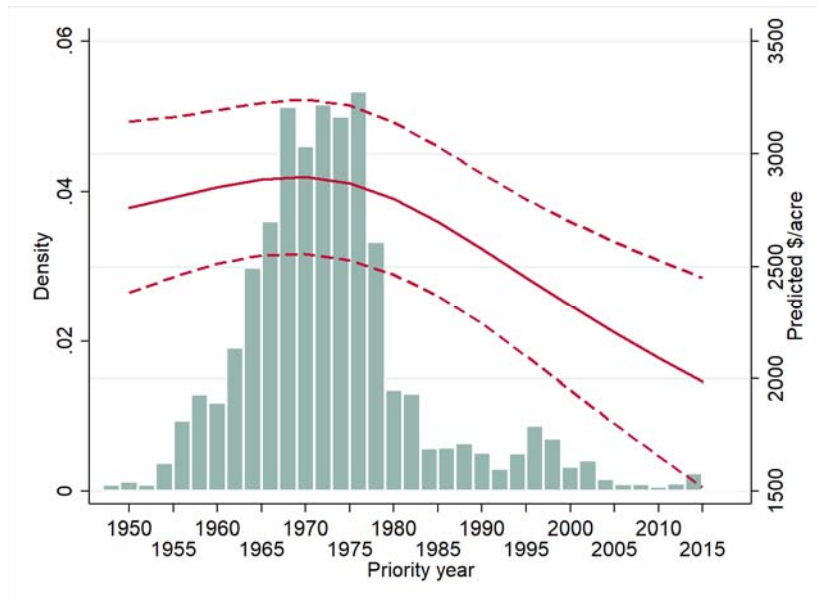
- An additional inch of authorized depth increases value of right by \$10/acre
- Highest values in GMD 4 (NW) and GMD 1 (WC)
- Uniform allocations that ignore authorized quantity redistribute \$78 million (only 2.2% of total gross value).



Value of Seniority

- One year increase in seniority increases land value by \$8/acre
- Highest valued in GMD 5 and GMD 2 (SC) and then GMD 3 (SW)

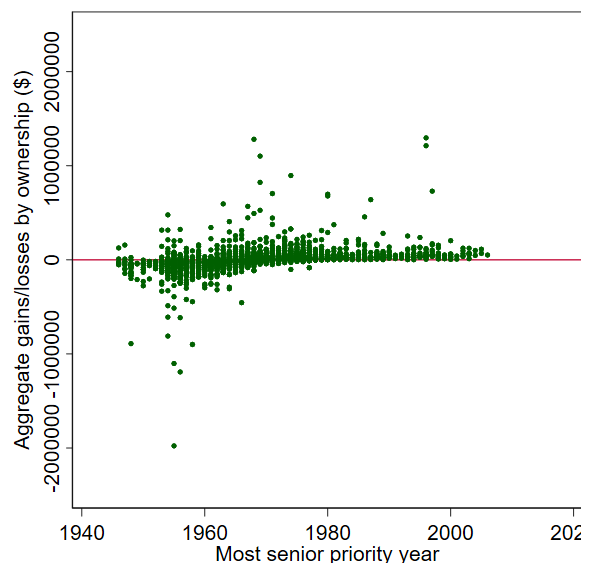
Predicted Irrigated Land Value for Different Priority Years



KANSAS STATE UNIVERSITY

Distributions of gains and losses from ignoring seniority

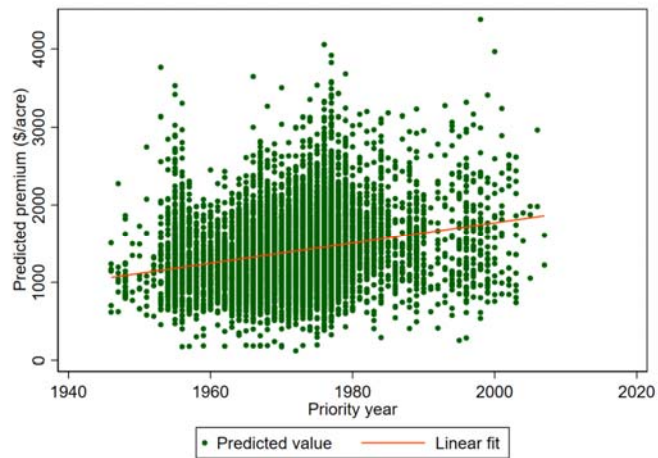
- Ignoring seniority causes a redistribution of \$92 million across irrigators



KANSAS STATE UNIVERSITY

Seniority and land quality

- No evidence that irrigation was developed on higher quality land first.



KANSAS STATE
UNIVERSITY

Value of Authorized Quantity versus Seniority

- One standard deviation increase
 - \$48/acre for authorized depth
 - \$58/acre for seniority
- Variability in seniority has slightly larger impact on value

KANSAS STATE
UNIVERSITY



Impact of Ignoring Priority

- LEMAs that ignore priority effectively redistribute, but the redistribution is small
 - 2.6% of value for seniority
 - 1.9% of value for authorized quantity
- Many owners are diversified across senior and junior rights
- Would prefer more uniform cutbacks than larger cutback on junior right



Conclusion

- Total capitalized value of access to irrigation in Kansas is \$3.5 billion
- Seniority and authorized quantity are capitalized into land values
- But many owners have diverse rights and LEMAs that ignore seniority are likely preferred to avoid costly cuts on junior rights