7. An Examination Of Machinery Costs And Machinery Investment In Kansas

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Gregg Ibendahl joined the faculty in fall 2012 as an associate professor of agricultural economics with a major appointment in extension. Prior to joining the K-State faculty, he served as an associate extension professor at Mississippi State University. His specialty areas are farm management and agricultural finance. Ibendahl earned his Ph.D. from the University of Illinois in agricultural economics. He also has an MBA from Northern Illinois University. His undergraduate degree is from Southern Illinois University, where he majored in agricultural mechanization and earned a minor in computer science.

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Dr. Terry Griffin is the cropping systems economist specializing in precision agriculture since joining Kansas State University in February 2015. He earned his bachelor's degree in agronomy and master's degree in agricultural economics from the University of Arkansas and his Ph.D. in Agricultural Economics with emphases in spatial technologies and farm management from Purdue University. He developed methods to analyze site-specific yield monitor data from field-scale experiments using spatial statistical techniques. Terry is a charter member of the International Society of Precision Agriculture. He received the 2014 Pierre C. Robert International Precision Agriculture Young Scientist Award for his work in data utilization. He has also received the 2012 Conservation Systems Precision Ag Researcher of the Year and the 2010 PrecisionAg Awards of Excellence for Research.

Abstract/Summary

Machinery is an important asset class on grain farms with the typical Kansas farm owning $400,000 of machinery. Because farm machinery is expensive and costly to operate, farms have incentives to monitor and control their machinery purchases. However, farm incomes nearly doubled in 2007 and have remained high through 2013. This paper examines whether farmers used that extra income to purchase more and newer equipment and, if they did, whether equipment costs increased significantly. We find that equipment levels (either more or newer equipment) did increase slightly over 20 years and substantially since 2007. However, the added equipment did not significantly affect production costs as the operating costs of the machinery is over six times the management depreciation cost.

AN EXAMINATION OF MACHINERY COSTS AND MACHINERY INVESTMENT IN KANSAS

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Asset classes of farms

- Land and machinery are typically the 2 largest asset classes on most grain farms
  - Typical KFMA Kansas farm has $4M in assets
  - Machinery amounts to 10% of total capital managed (assets + rented ground)
    - $400,000 in machinery assets

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Machinery is expensive to operate

- Cost include depreciation, repairs, fuel and oil, plus an opportunity cost on the capital
- KFMA Kansas farm has $120,000 in costs
- Amounts to 25% of the Value of Farm Production

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Issue

- Since farm equipment is expensive, farmers have incentives to minimize equipment costs
- However, Net Farm Income over the last several years provides other incentives
  - Tax avoidance (179 expensing)
  - Windfall = new toys!

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Historical NFI

NFI – year_4d

Filter Settings
All records 72 thru 14-useable only
- year_4d: (1993 <= year_4d <= 2014)

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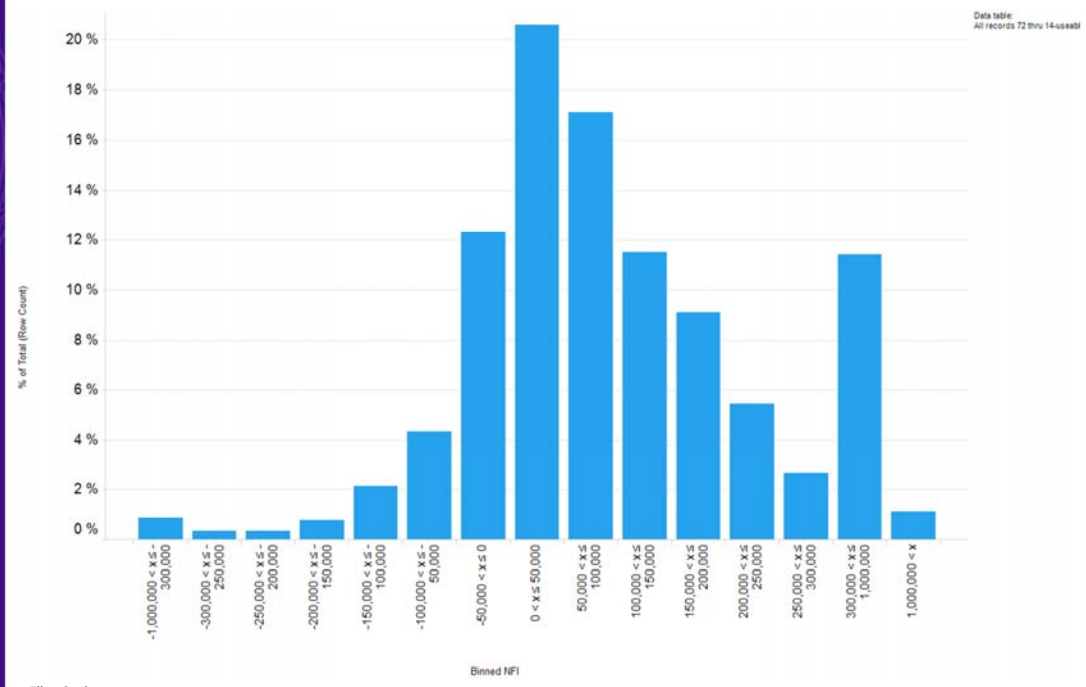
Histogram of NFI for 2014

Distribution – Binned NFI



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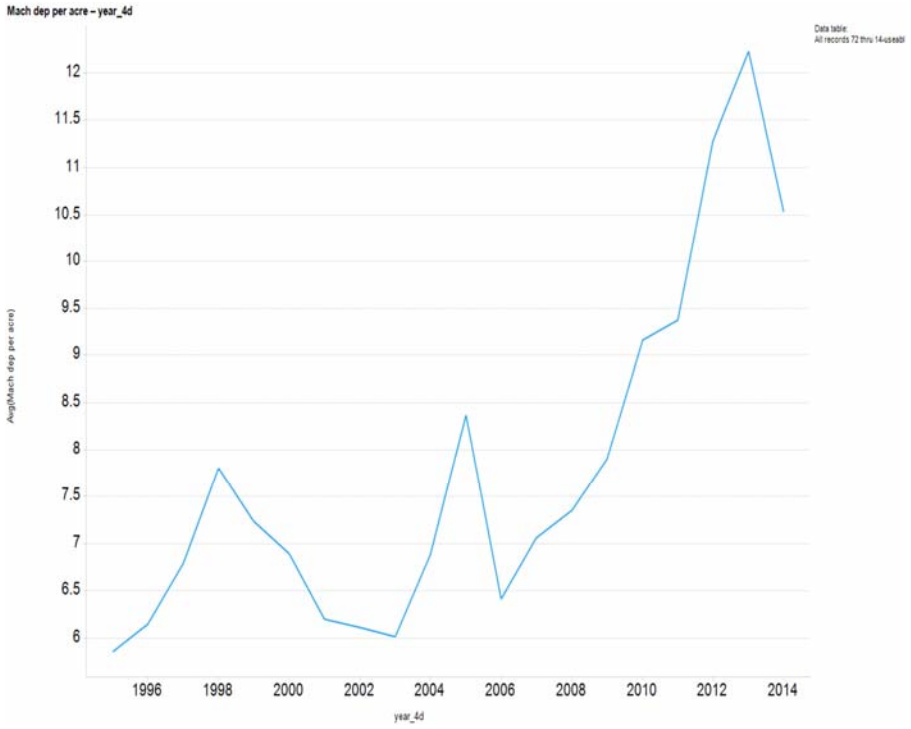
Ave Machinery Depreciation per Acre – all farms



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- Age_group: (Eighties, Fifties, Forties, Seventies, Sixties, Thirties, Twenties)

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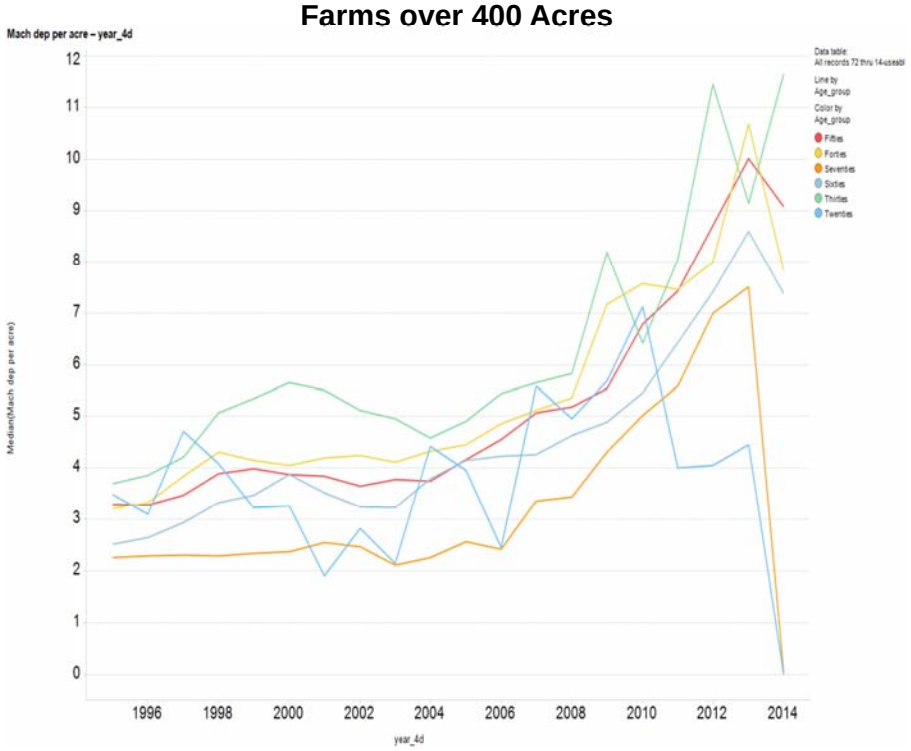
Median Mach Depreciation per Ac

Farms over 400 Acres



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- Age_group: (Fifties, Forties, Seventies, Sixties, Thirties, Twenties)

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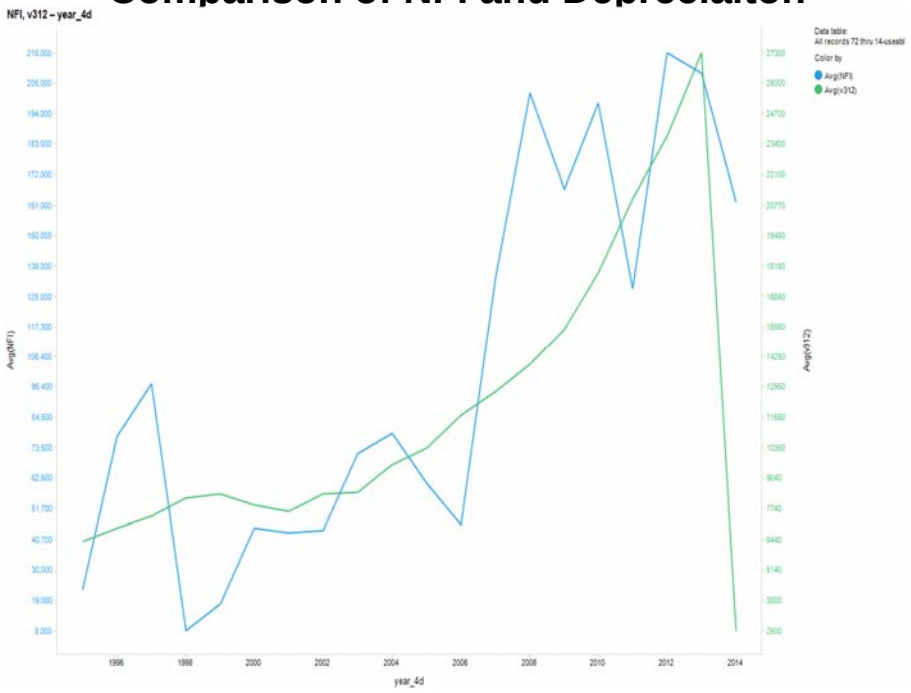
Comparison of NFI and Depreciaiton



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- Age_group: (Fifties, Forties, Seventies, Sixties, Thirties, Twenties)

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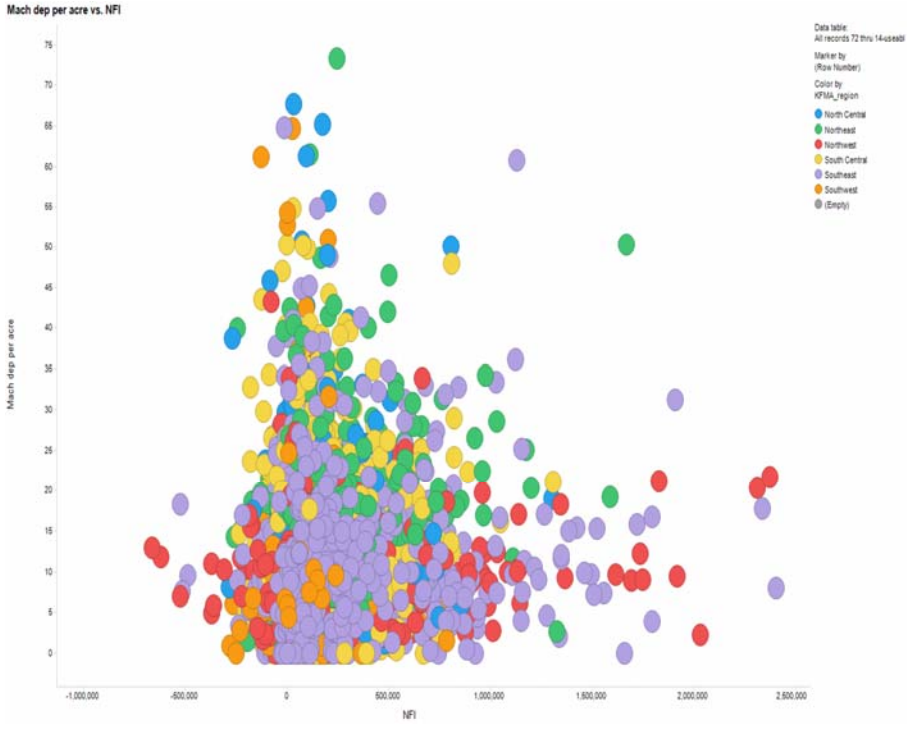
Scatter Plot – Depreciation per ac vs NFI



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- Age_group: (Fifties, Forties, Seventies, Sixties, Thirties, Twenties)

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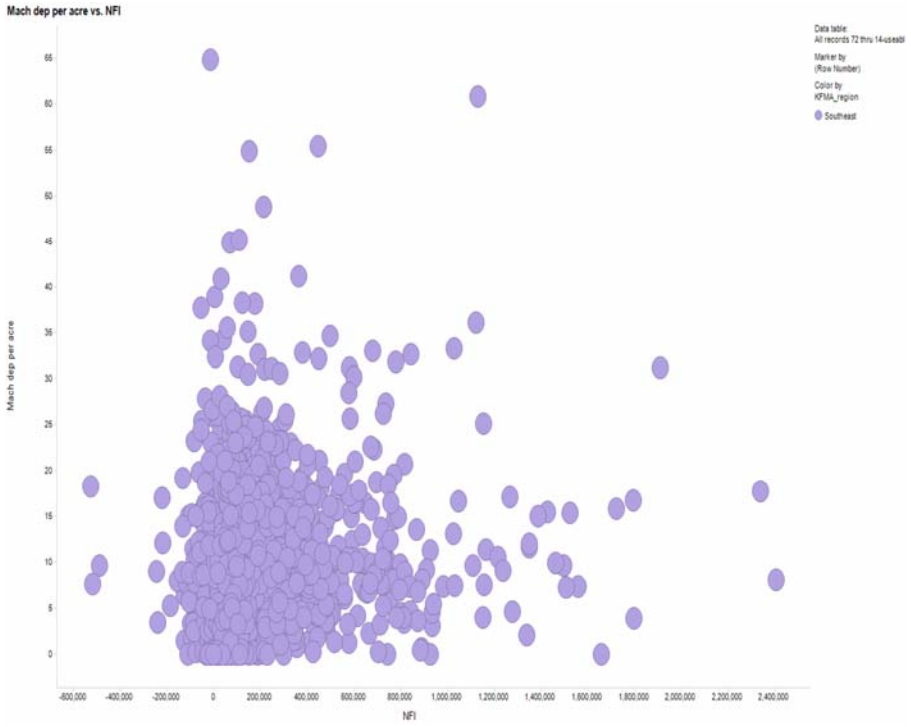
Scatter Plot – Depreciation per ac vs NFI (SouthEast)



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Issue to examine

- This paper examines machinery investment and costs over the last 20 years to determine if Kansas farmers did buy more equipment as incomes increased in order to determine if farm equipment costs were too high.
  - Normal replacement is fine
  - Purchasing equipment just to lower taxes or as a way to spend money is questionable
  - Examination of machinery costs as a percentage of total crop costs

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Data

- From the Kansas Farm Management Association (KFMA)
  - Panel data of farms with 20 years of data
  - Only used farms with 400 acres of land to minimize part-time farmers
  - 318 farms
- Variables
  - NFI, VFP, depreciation, machinery investment, total capital, crop acres, age, and farm location
  - Adjusted by an inflation factor

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Methods

- Farm descriptive variables divided into groups
  - Farm expansion rate -> 4 groups
    - No growth 0 to 30% growth
    - 30 to 60% growth Over 60% growth
  - Geographic location within the state -> 3 groups
    - East, Central, and West based on CRD
  - Operator age in 1994
    - Younger – less than 42
    - Middle aged – 42 to 50
    - Older – 50 or older

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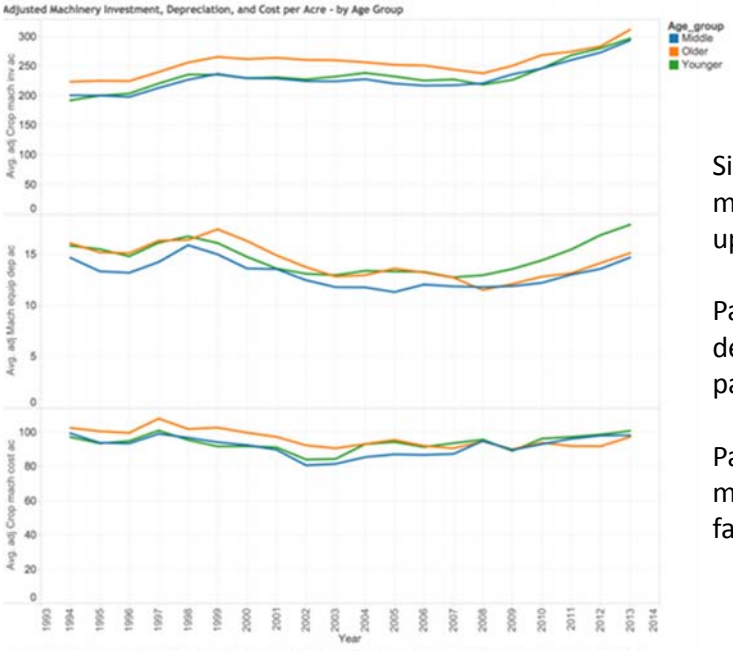
Results – by age group



Significant crop machinery investment – up to $300 per acre

Partial significant depreciation – unique pattern

Partial significant crop machinery cost – older farmers $1.53

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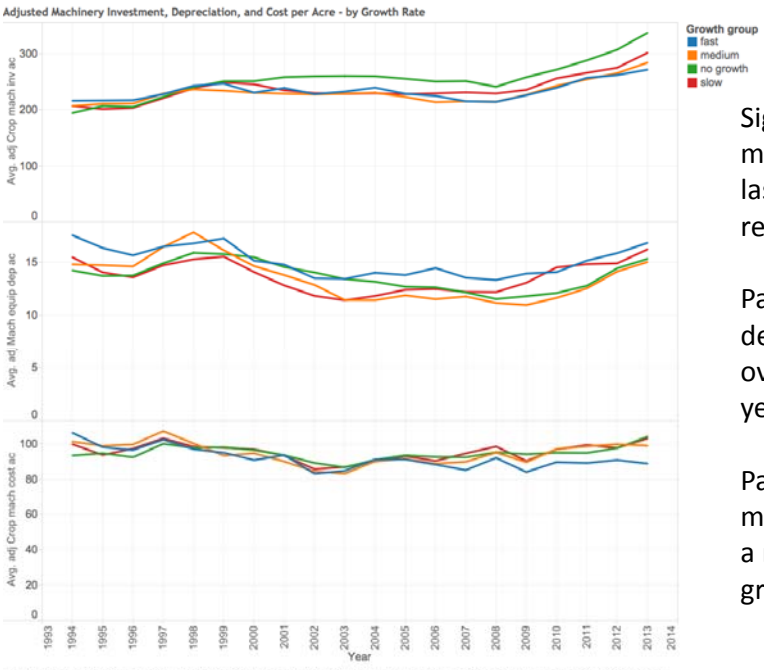
Results – by growth rate



Significant crop machinery investment - last 6 yrs and inversely related to growth rate

Partial significant depreciation – negative overall but positive last 8 years

Partial significant crop machinery cost – $0.25 to a minus $1.73 for fast growing

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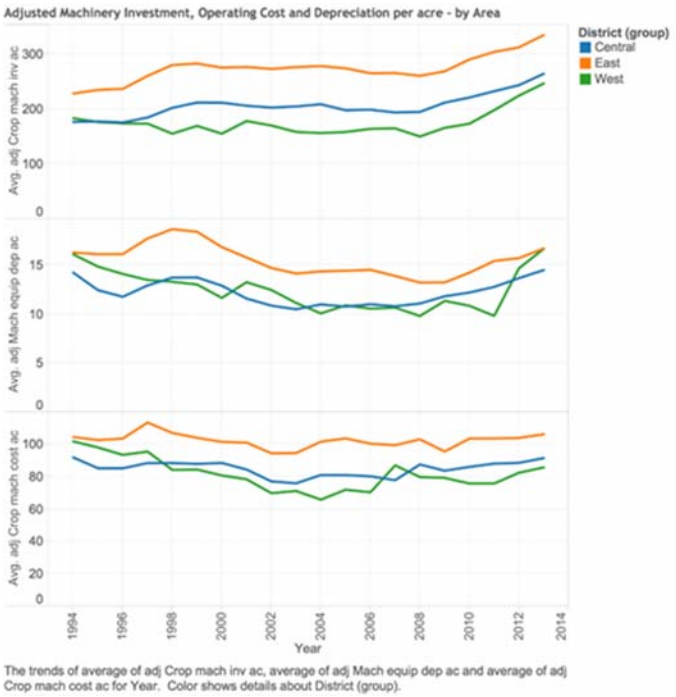
Results – by area



Partial significant crop machinery investment – highest from west to east

Partial significant depreciation – negative overall but positive last 8 years

Partial significant crop machinery cost – $0.12 to a minus $2.20 for western farms

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Discussion

- Specific to the 3 ways of dividing the farms
  - The “no growth” farms had the highest level of machinery investment and “fast growing” the lowest -> as expected
  - With age groups -> not much difference in mach investment among groups
  - Over last 8 years, younger farmers had $7.40 to $12.40 more depreciation per acre

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Discussion (cont)

- Biggest differences between groups when divided by geographical area
  - More machinery investment
  - More depreciation
  - Higher machinery cost when moving from west to east

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Discussion

- General comments
  - Farms with highest level of machinery also had highest machinery cost
  - However, even though machinery investment increased in all cases over the last 8 years, the average machinery cost per hectare did not change very much
    - With depreciation costs of $37 per hectare and machinery cost of $247 per hectare, the machinery investment is not adding that much to total expenses

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Discussion (cont)

- Depreciation cost per hectare follows a U-shaped pattern
  - Until 2008 depreciation decreased while machinery investment was flat
    - Not sure why – farm expansion?
  - From 2008 onward, both depreciation and machinery investment increased
    - Farmers buying more and newer equipment

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Conclusions

- Farmers have taken advantage of higher net farm income to add more and/or newer equipment
- However, because equipment cost (i.e., depreciation) is such a small cost of the total machinery operating expenses, these additional purchases have not really increased a farmer's cost of production very much
  - Farmers can certainly save up to $12 per hectare by really focusing on equipment purchases though

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