

Volatility of Kansas Farm Incomes

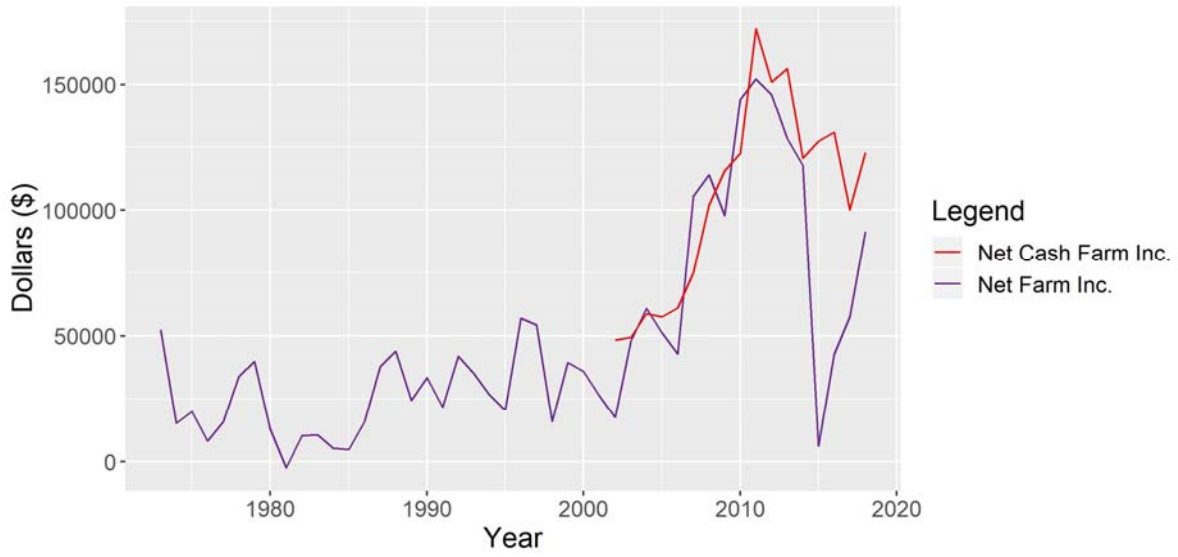
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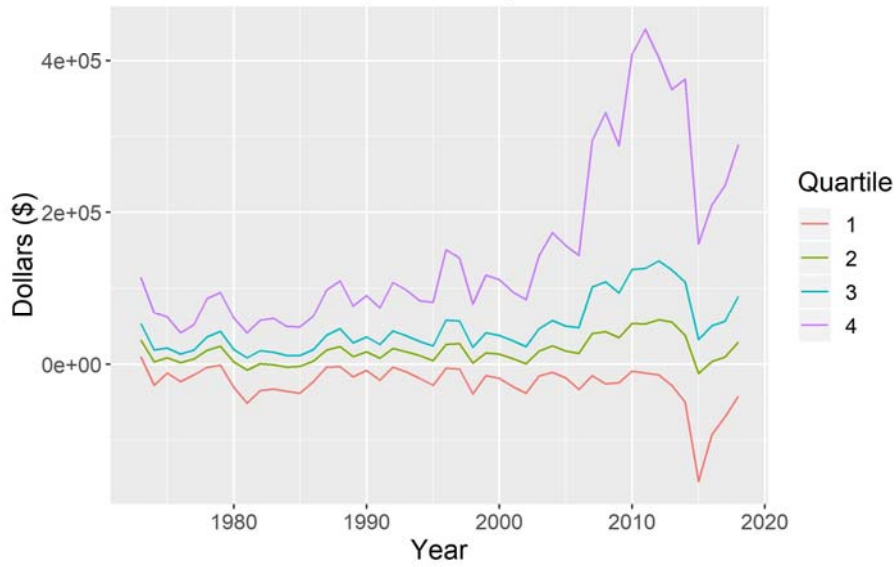
Motivation

- Farms face volatile weather and prices
- Many government program seek to reduce income volatility
- Volatility can affect ability to repay loans

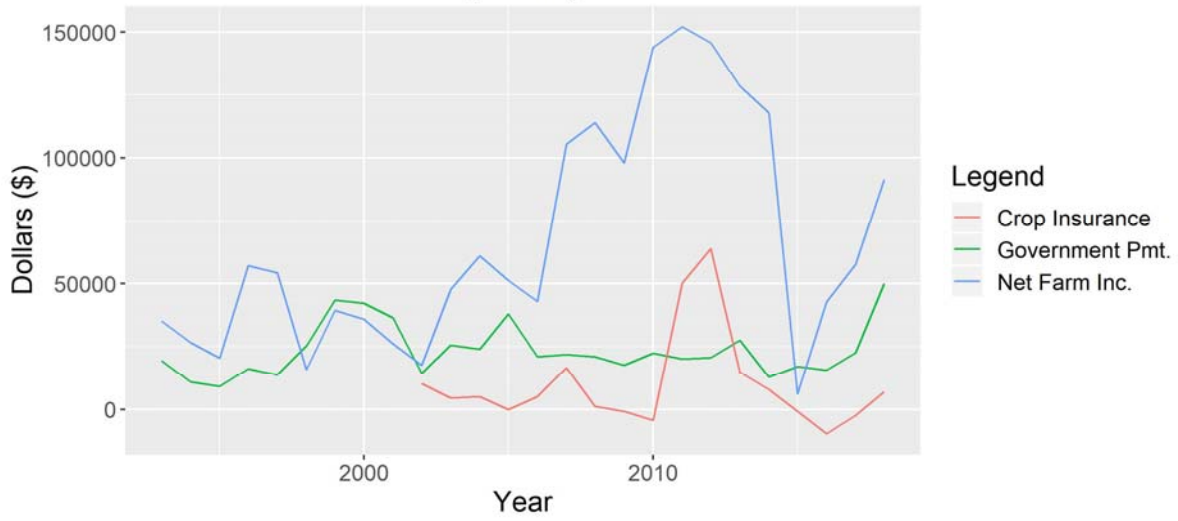
Farm Income



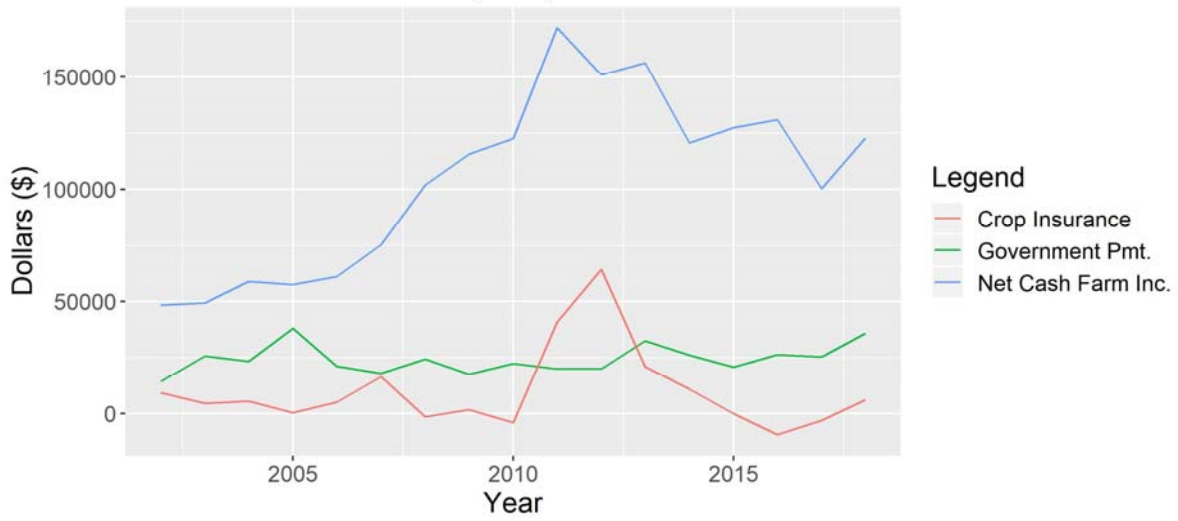
Net Farm Income (Percentiles)



Income, Crop Insurance, Government Payments
(Accrual)



Income, Crop Insurance, Government Payments
(Cash)



Correlation over time within farms

- Net insurance and government payments are negatively correlated with net farm income excluding insurance and government payments
- Net insurance and government payments are positively correlated with net farm income

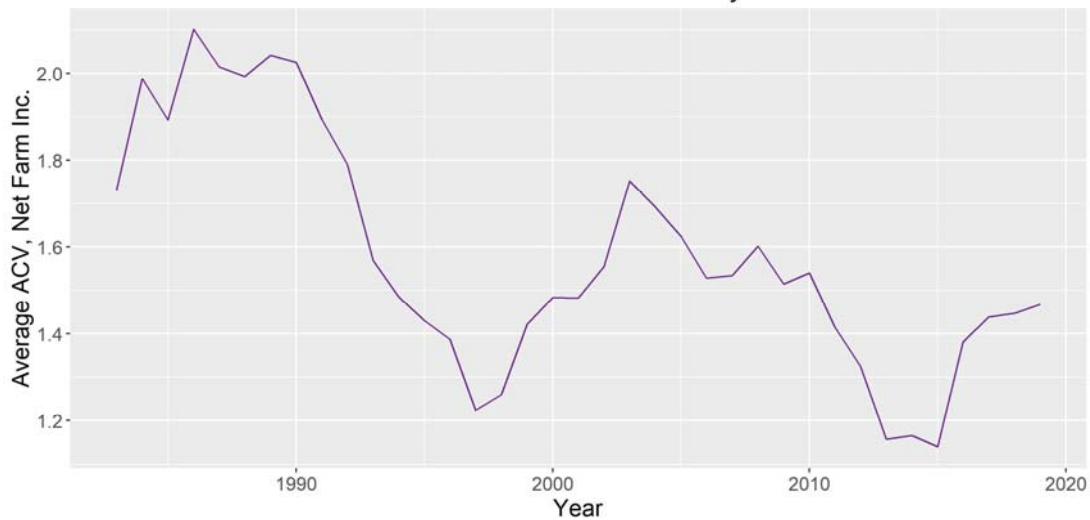
Farm Income Volatility

Measuring Income Volatility

$$\bullet ACV_i = \left| \frac{\text{Standard Deviation of NFI}}{\text{Average NFI}} \right|$$

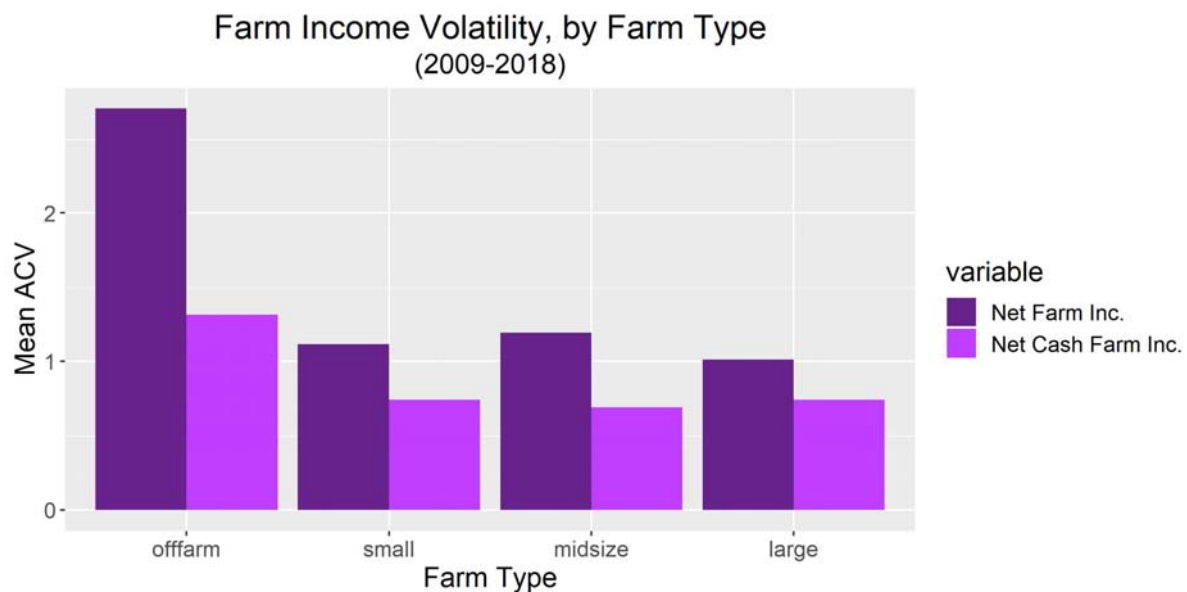
- Absolute value of the standard deviation, divided by the average
- Smaller ACV means less risk relative to average return
- If ACV equals 2...
 - The standard deviation of farm income is *twice as large* as the farm's average income

Net Farm Income Volatility

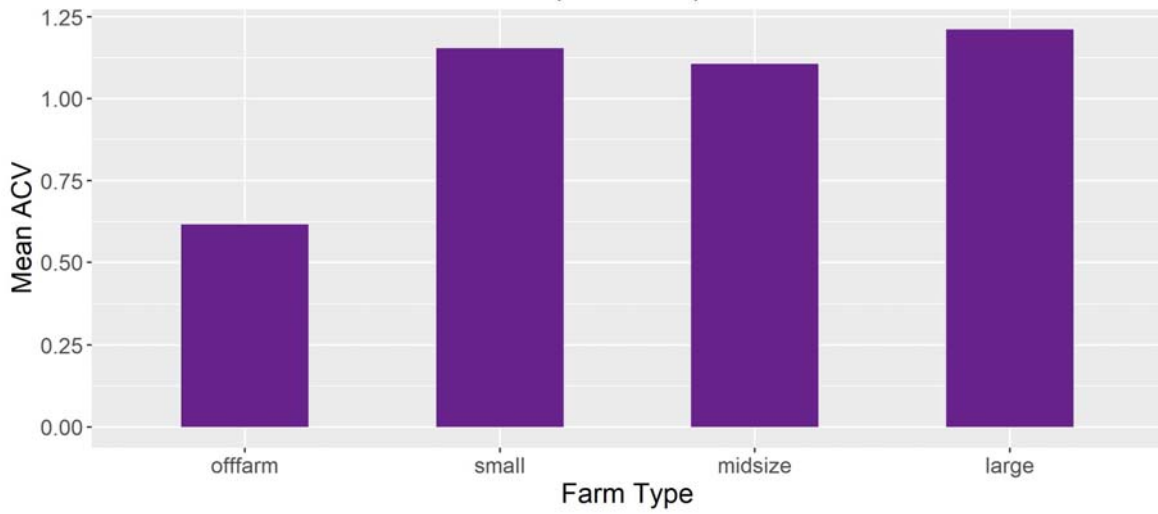


Farm Types

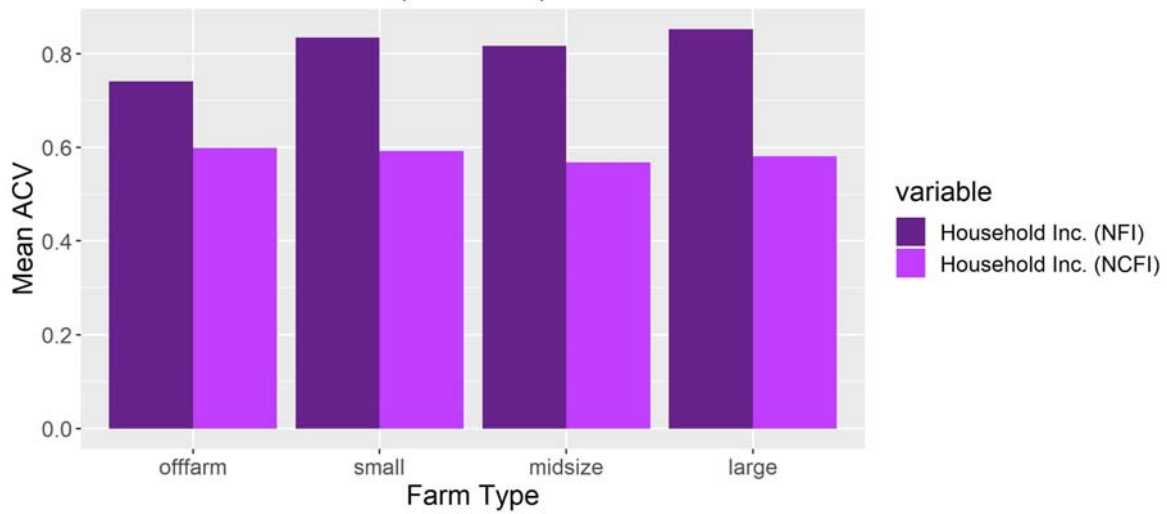
- Off-farm Occupation: gross cash farm income <\$350,000 and primary occupation other than farming
- Small: gross cash farm income <\$350,000 and primary occupation farming
- Midsize: gross cash farm income between \$350,000 and \$999,999
- Large: gross cash farm income >\$1,000,000



Off-farm Income Volatility, by Farm Type
(2009-2018)



Household Income Volatility, by Farm Type
(2009-2018)



Share of Farms with Negative Income

- Net Farm Income:
 - Share negative 1 year
 - Off-farm occupation farms: 89%
 - Small, midsize, large farms: ~67%
 - Share negative 5 years:
 - Off-farm occupation farms: 29%

Share of Farms with Negative Income

- | | |
|---|--|
| <ul style="list-style-type: none">• Net Farm Income:<ul style="list-style-type: none">• Share negative 1 year<ul style="list-style-type: none">• Off-farm occupation farms: 89%• Small, midsize, large farms: ~67%• Share negative 5 years:<ul style="list-style-type: none">• Off-farm occupation farms: 29% | <ul style="list-style-type: none">• Net Cash Farm Income:<ul style="list-style-type: none">• Share negative 1 year<ul style="list-style-type: none">• Off-farm occupation farms: 54%• Small, large farms: ~32%• Midsize farms: 23%• Share negative 5 years:<ul style="list-style-type: none">• Off-farm occupation farms: 10% |
|---|--|

Share of Farms with Negative Income

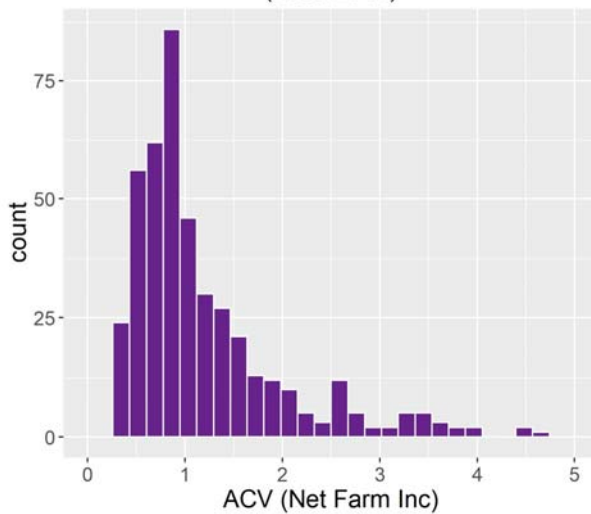
- Household Net Accrual Income:

- Share negative 1 year
 - Off-farm occupation farms: 30%
 - Small, midsize, large farms: ~50%

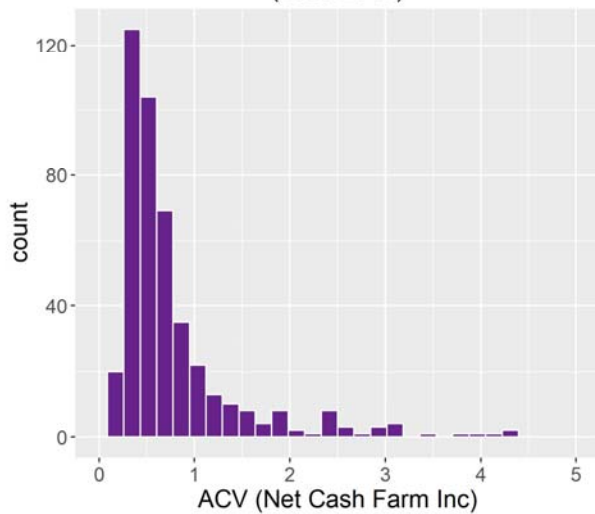
- Household Net Cash Income:

- Share negative 1 year
 - Off-farm occupation farms: 9%
 - Small, midsize farms: 24%
 - Large farms: 15%

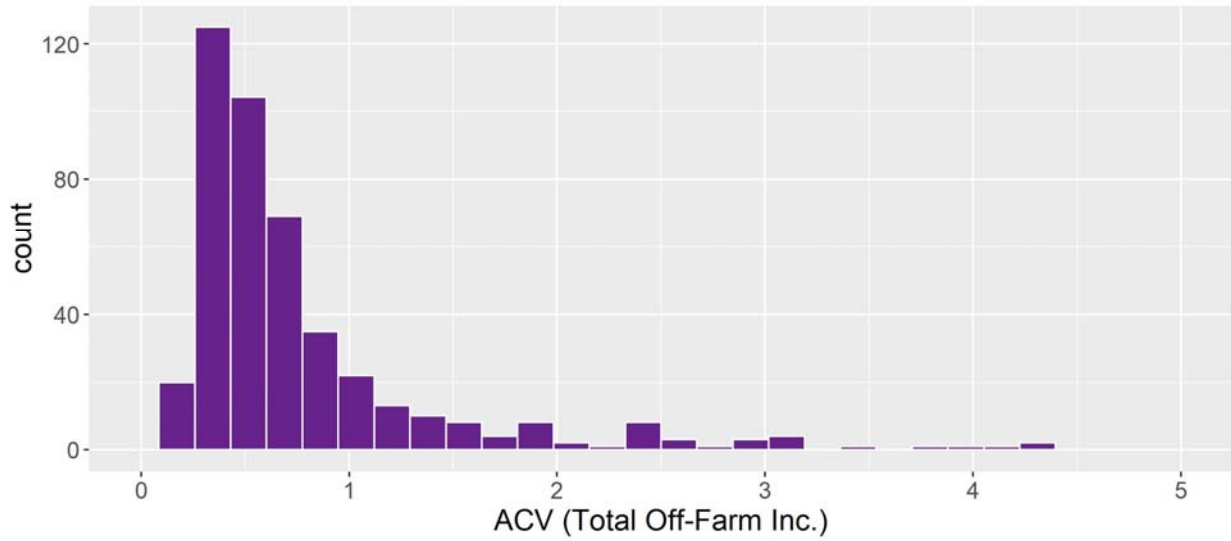
Net Farm Income Volatility (ACV)
(2009-2018)



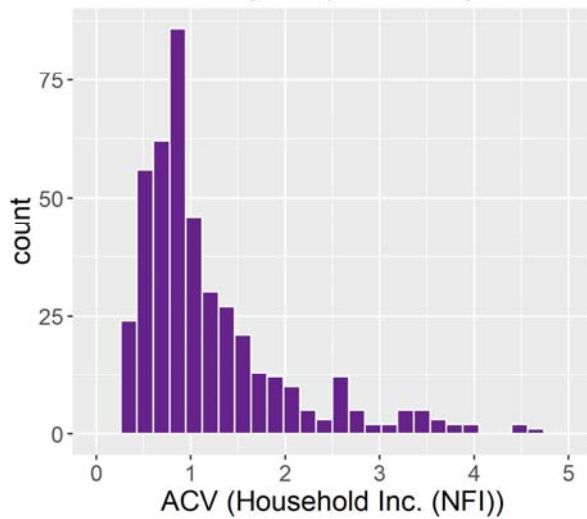
Net Cash Farm Income Volatility (ACV)
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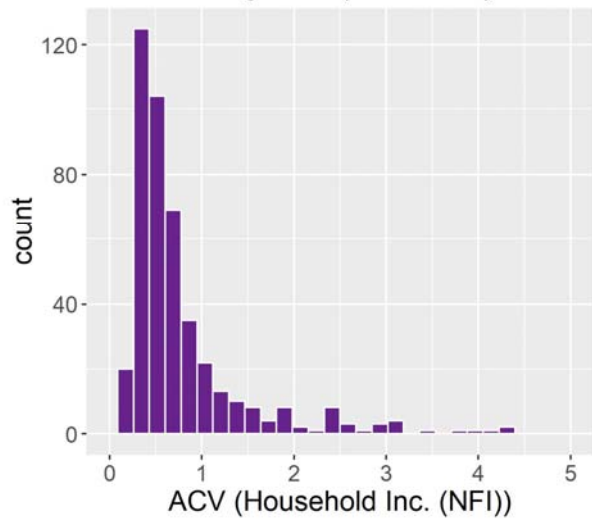
Total Off-Farm Income Volatility (ACV)
(2009-2018)



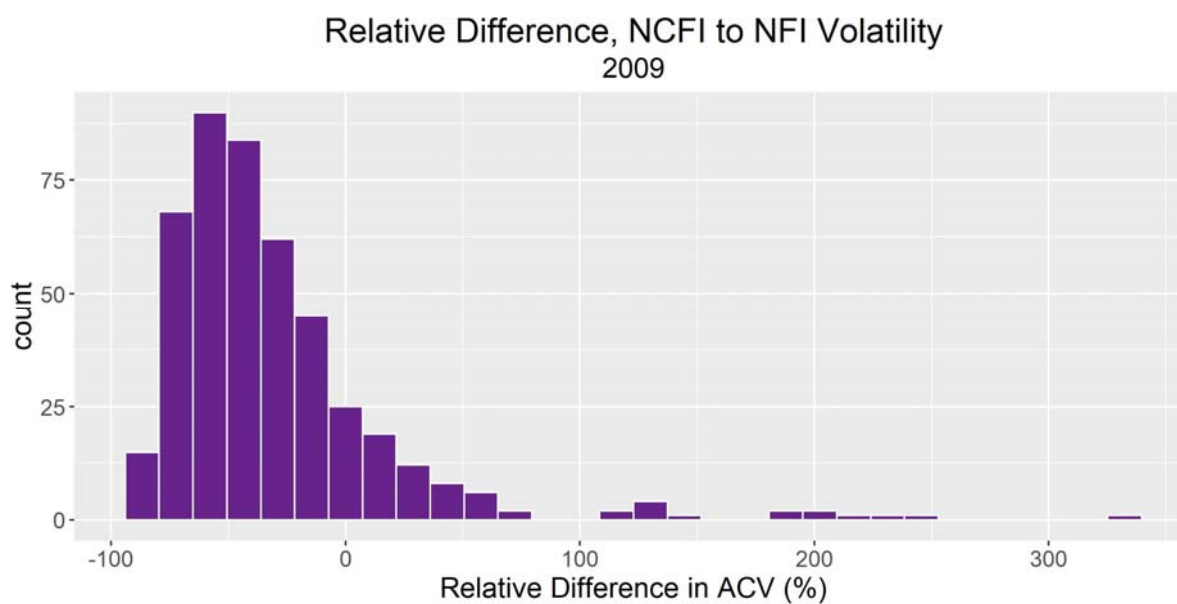
Household Income Volatility (ACV)
Using NFI (2009-2018)



Household Income Volatility (ACV)
Using NCFI (2009-2018)

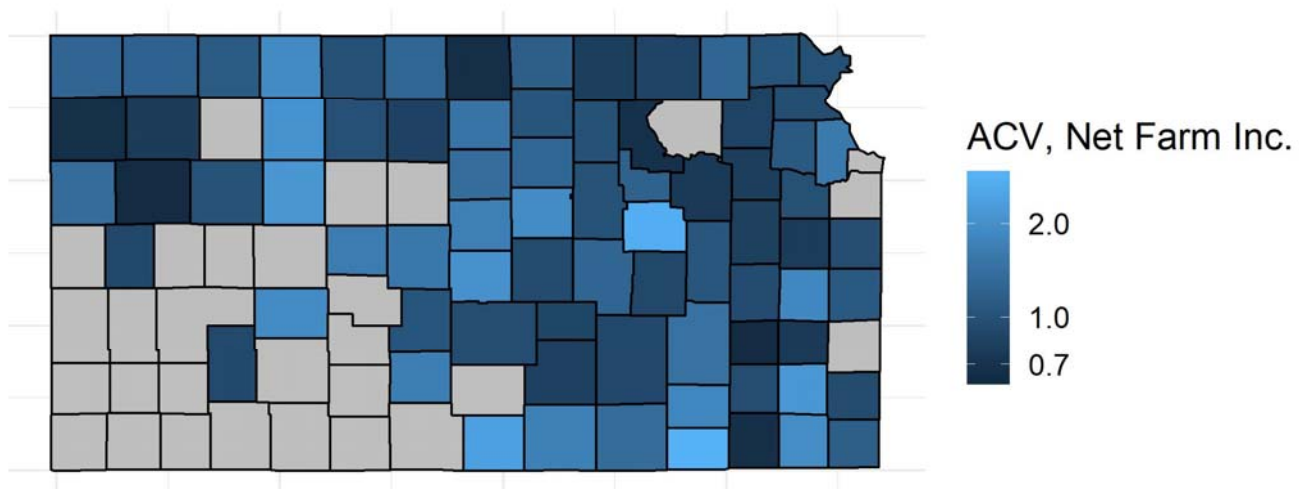


Cash vs. Accrual Income Volatility

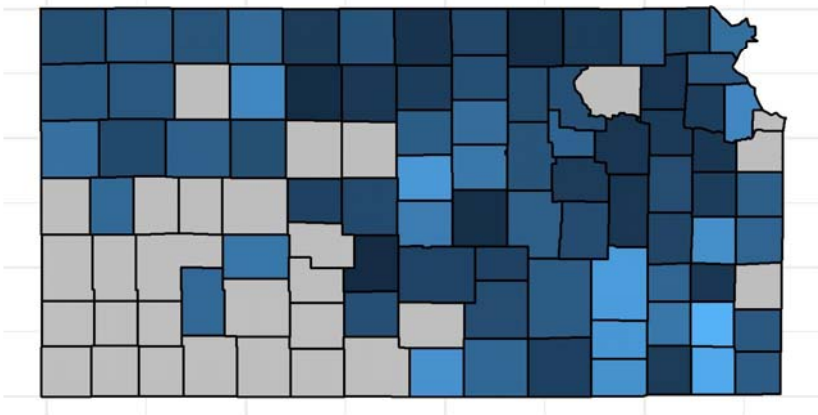


Income Volatility across Kansas

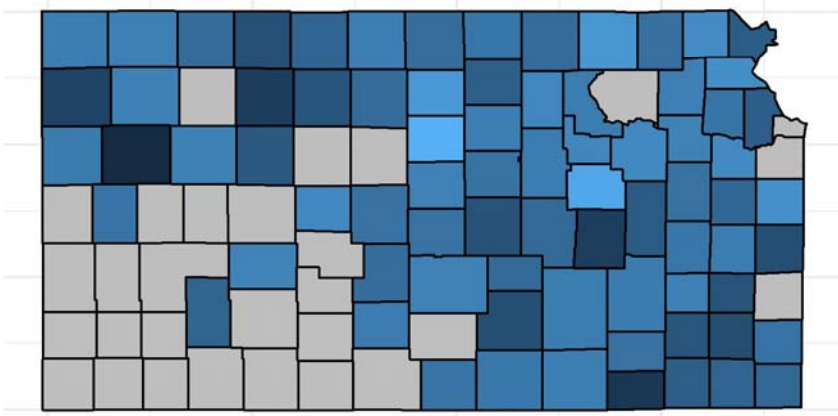
2009



2009



2009



Measuring Volatility by Farm Type, Regression Analysis

Measuring Volatility by Farm Type

- $Volatility_i = \alpha + \gamma Region_i + \beta X_i + \epsilon_i$

- Where X_i include grower and operation characteristics and measures of local economic conditions
 - Specialization: beef, crop
 - Farm type: off-farm occupation, midsize, large
 - Operator age
 - Number of dependents
 - Population Interaction Index

Regression Variables

- Specialization:
 - Livestock: 8%, Crop: 46%, Diversified: 46%
- Farm Type:
 - Off-farm occupation: 21%
 - Small farm: 21%
 - Midsize farm: 47%
 - Large farm: 12%

Regression Variables

- Specialization:
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- Operator age: 58 years
- Number of dependents: 2.7
- PII: 58.7

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 - Large farm: 12%
- Operator age: 58 years
- Number of dependents: 2.7
- PII: 58.7

Observations: 451

Regression Results

- Livestock specialization
 - Associated with 25% more volatile NFI
 - Associated with 29% more volatile NCFI
 - Associated with 29% more volatile off-farm income
 - Associated with more volatile Household Income
 - 18% NFI
 - 31% NCFI

Regression Results

- Crop specialization
 - Associated with 15% less volatile NCFI
 - Associated with 11% less volatile Household Income

Regression Results

- Small farm whose primary occupation was off-farm
 - Associated with 61% more volatile NFI
 - Associated with 68% more volatile NCFI
 - Associated with 42% less volatile off-farm income
- Large farms were associated with 31% more volatile off-farm income

Summary

- Small farms whose primary occupation was off-farm:
 - Larger farm income volatility, smaller off-farm income volatility
- On a cash basis, income volatility was similar among farm types
- Livestock production is associated with more volatile income at farm and household levels
- Some farms are better at reducing volatility on a cash basis

Questions?

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