

14. Relative Efficiency of Kansas Wheat Farms

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Michael Langemeier is a professor of Agricultural Economics at KSU. He has been on the faculty since 1990. Extension and research interests include benchmarking of technical and financial performance, strategic positioning, and economies of size. In addition to his extension and research program, Michael teaches courses in Farm Management, Production Economics, and Managerial Economics.

Abstract/Summary

This presentation will document changes in wheat acreage in Kansas over the last 35 years, will compare trends in wheat yields to trends in feed grain yields, and will examine the technical and cost efficiency of farms with particular emphasis on how this efficiency relates to the proportion of farm income derived from wheat. Differences in wheat enterprise profitability and the importance of economies of size will also be discussed.

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Outline

- Introduction
- Data and Methods
- Results
 - Yields
 - Prices
 - Whole-Farm Efficiency
 - Enterprise Efficiency and Profitability
- Summary and Conclusions

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Introduction

- **Wheat Acres**
 - 1973 to 1979 12,157,000
 - 2000 to 2009 9,890,000
- **Corn Acres**
 - 1973 to 1979 1,966,000
 - 2000 to 2009 3,470,000
- **Soybean Acres**
 - 1973 to 1979 1,199,000
 - 2000 to 2009 2,950,000

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Introduction

- Factors that have potentially contributed to the decline in wheat acres include the following:
 - Relative growth rates in yields
 - Relative prices
 - Cropping practices and other technologies

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Introduction

- Objectives:
 - Examine relative growth rates in yields for major crops
 - Examine relative prices of major crops
 - Examine technical and cost efficiency of farms with particular emphasis on how this efficiency relates to the proportion of income derived from wheat production
 - Discuss differences in wheat enterprise efficiency and net returns

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Data and Methods

- Yields and Prices
 - Growth rates computed using state averages
- Efficiency Definitions
 - Technical Efficiency
 - Farms that are technically efficient are producing the highest level of output for a given level of inputs
 - Cost Efficiency
 - Farms that are cost efficient are producing at the lowest cost for a given level of output

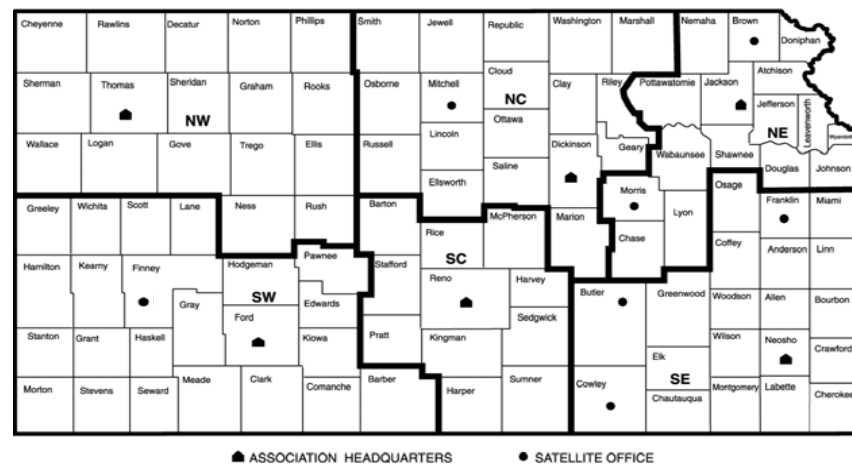
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Data and Methods

- Whole-Farm Efficiency
 - Data from KFMA farms with continuous whole-farm data from 2004 to 2008
 - 92 farms in western Kansas
 - 327 farms in central Kansas
 - 387 farms in eastern Kansas
- Enterprise Efficiency and Profitability
 - Enterprise data for 185 KFMA farms with continuous wheat enterprise data from 2004 to 2008

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Kansas Farm Management Associations



■ ASSOCIATION HEADQUARTERS ● SATELLITE OFFICE

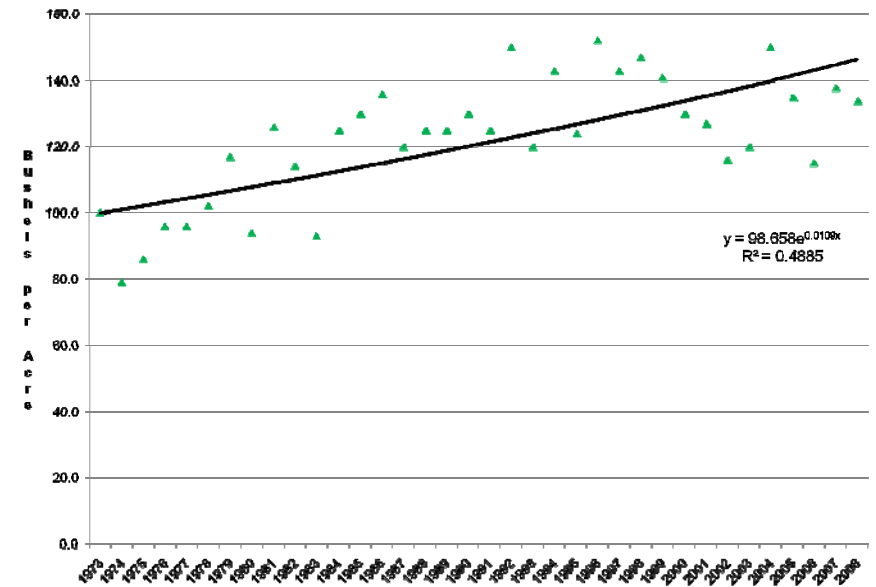
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Results

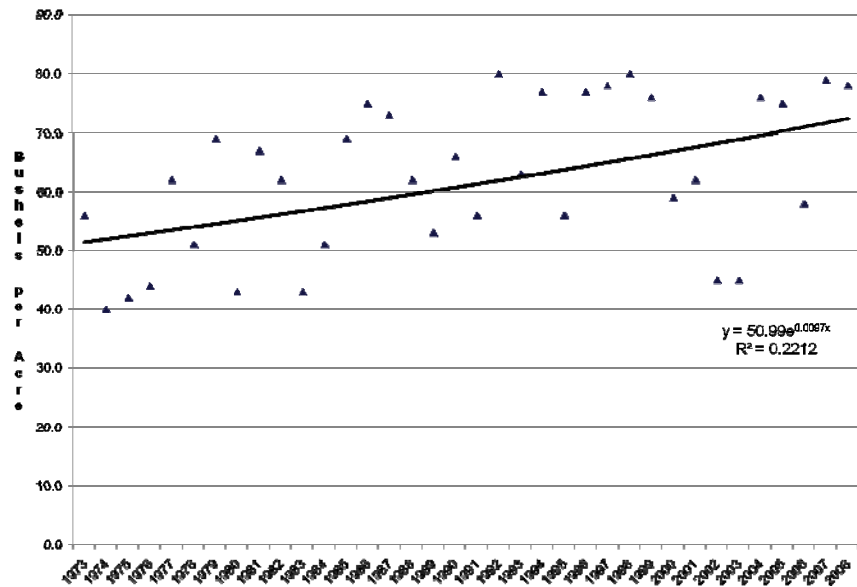
- Relative Growth in Crop Yields, 1973 to 2008**

- Soybeans had the highest growth rate in yields followed by corn, grain sorghum, and wheat
- The relatively low growth rate in wheat yields contributed to the reduction in wheat acres over the 1973 to 2008 period

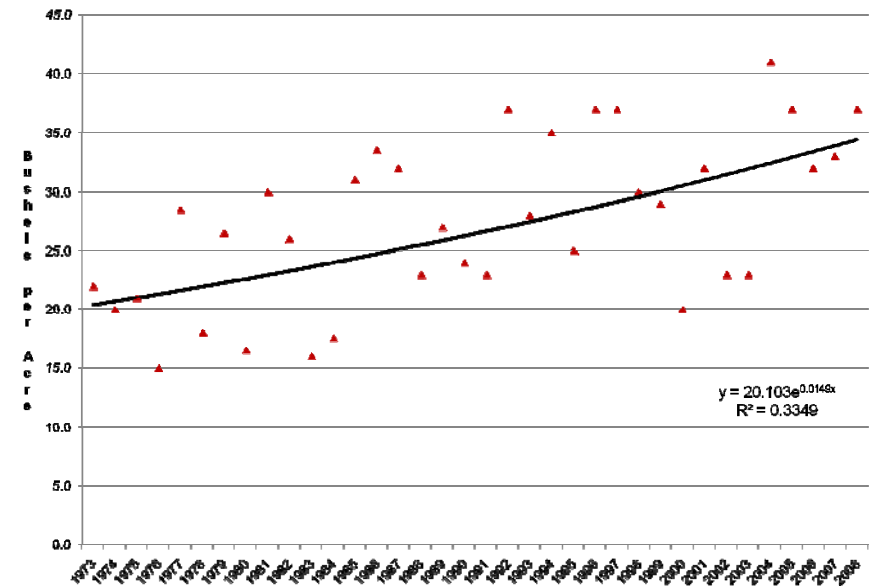
Trend in Corn Yields



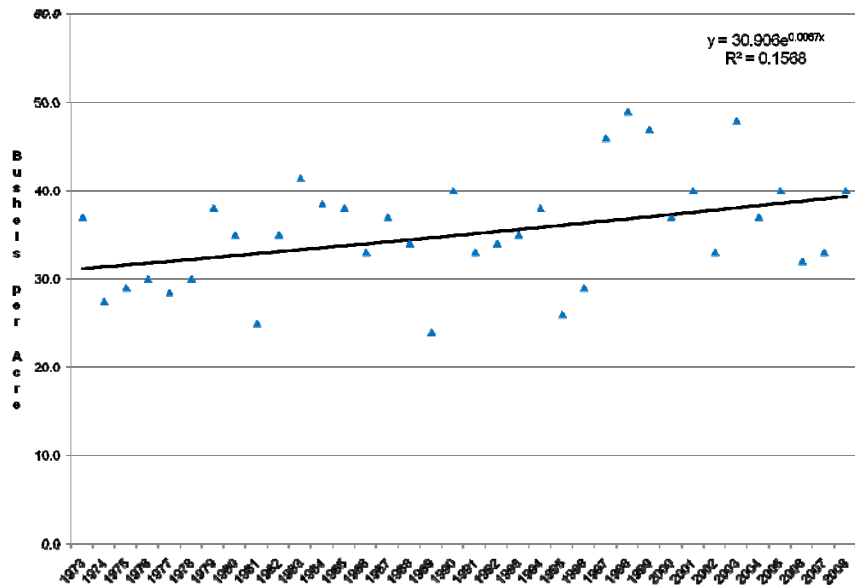
Trend in Grain Sorghum Yields



Trend in Soybean Yields



Trend in Wheat Yields



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Results

- **Relative Growth in Price Ratios, 1973 to 2008**
 - The trends in prices were favorable to wheat. However, not much of the variation in price ratios was explained by the trend.
 - The favorable prices for wheat likely prevented more acreage from switching away from wheat.

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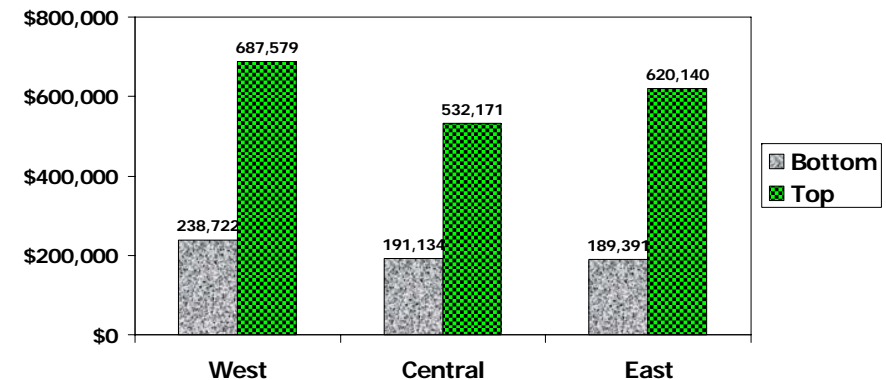
Results

- **Whole-Farm Efficiency Analyses**

- Farms in the top third efficiency group tended to be larger, had higher operating profit and asset turnover ratios, and had a higher crop intensity index (harvested acres divided by crop acres).
- Efficient farms produced less wheat and more feed grains.

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Value of Farm Production



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Financial Performance and Efficiency Western Kansas

	Bottom One-Third	Top One-Third
Profit Margin	0.0151	0.2219
Asset Turnover	0.1937	0.4517
Technical Efficiency	0.881	0.977
Cost Efficiency	0.598	0.901

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Financial Performance and Efficiency Central Kansas

	Bottom One-Third	Top One-Third
Profit Margin	-0.0282	0.2074
Asset Turnover	0.2035	0.4719
Technical Efficiency	0.733	0.933
Cost Efficiency	0.487	0.757

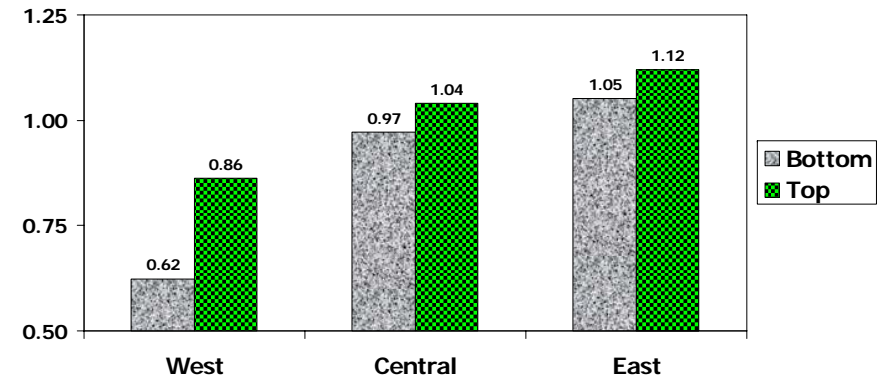
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Financial Performance and Efficiency Eastern Kansas

	Bottom One-Third	Top One-Third
Profit Margin	0.0169	0.2592
Asset Turnover	0.1778	0.3823
Technical Efficiency	0.672	0.927
Cost Efficiency	0.510	0.813

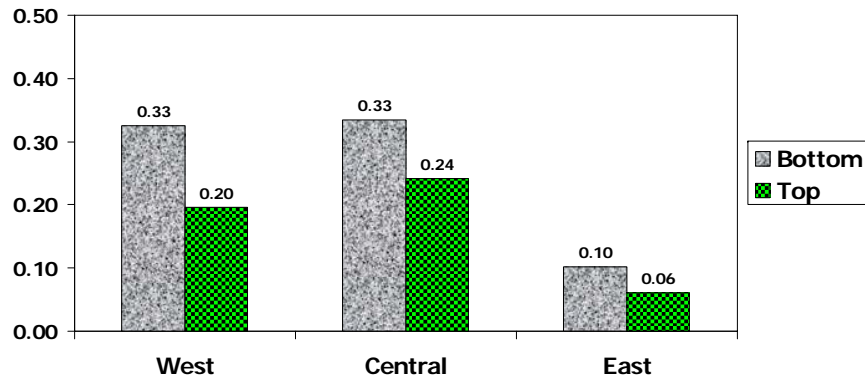
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Crop Intensity Index



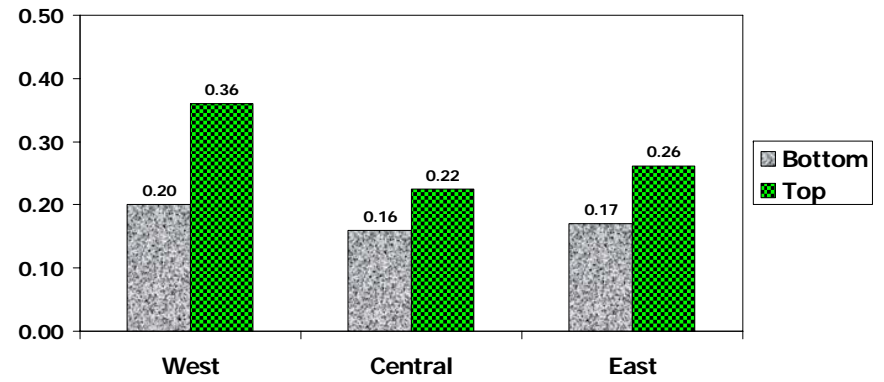
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Income Share for Small Grains



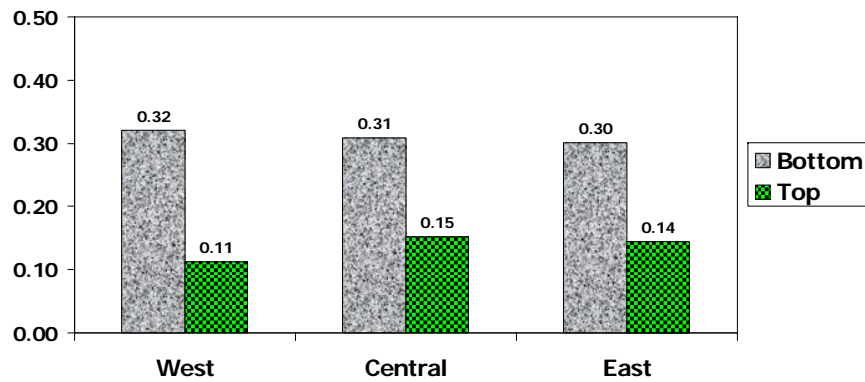
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Income Share for Feed Grains



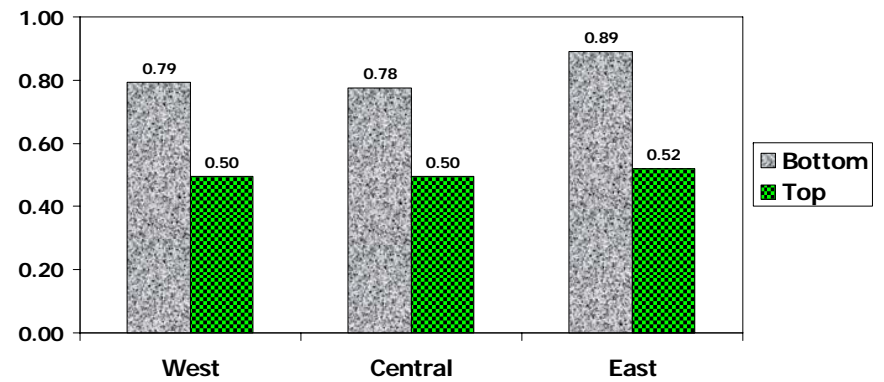
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Cost Share for Labor



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Cost Share for Capital

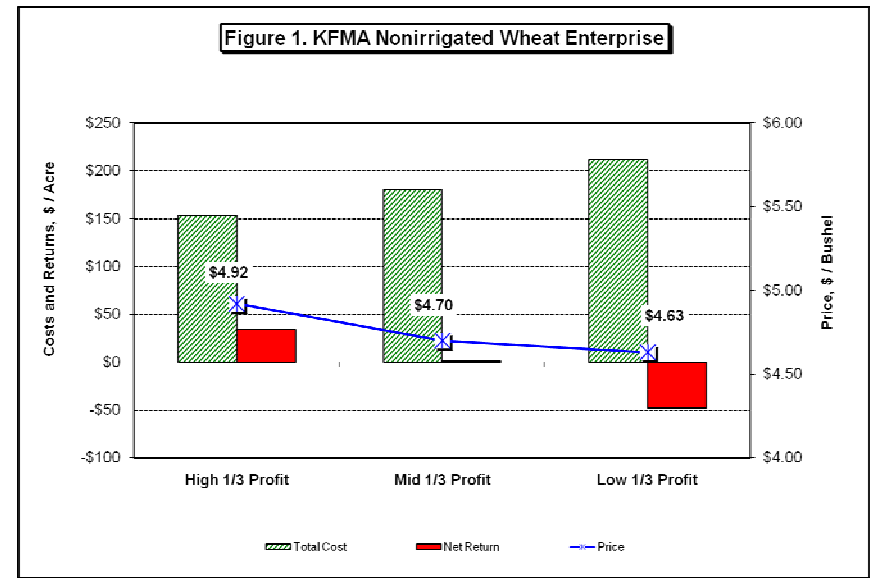


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Results

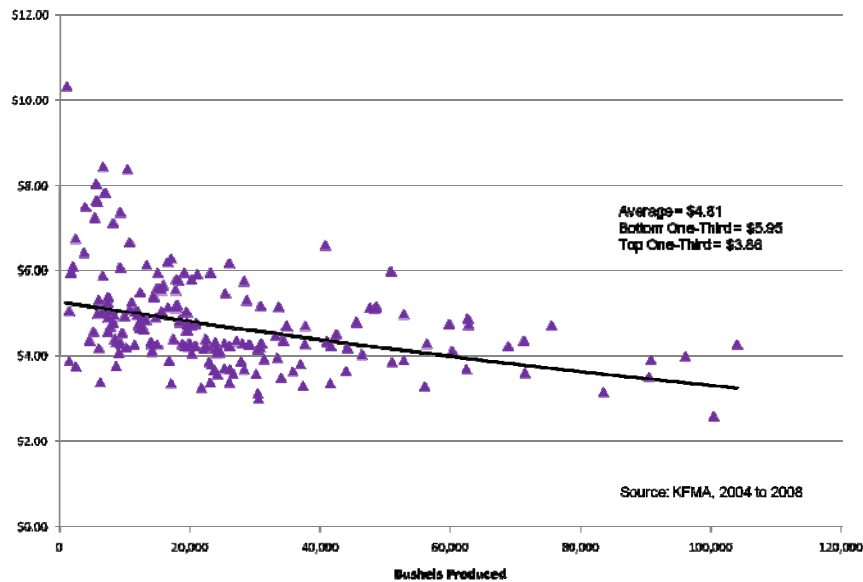
- **Enterprise Efficiency and Profitability**
 - The high profit group was more efficient, had more wheat acres, more crop acres, a higher yield, a higher price per bushel, and significantly lower costs.
 - Total cost per acre for the high profit group was 28 percent lower.
 - Fertilizer, machinery, and labor costs per acre were from 23 to 33 percent lower for the high profit group.

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Figure 2. Cost per Bushel of Wheat in Kansas



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Summary

- Objectives
- Data and Methods
- Results
 - Yields
 - Prices
 - Whole-Farm Efficiency
 - Enterprise Efficiency and Profitability

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Implications

- Wheat is going to be an important crop in Kansas for years to come.
- However, with the potential for more drought tolerant corn and soybean varieties looming, the acreage of wheat may continue to decline as producers switch to rotations involving wheat, feed grains, and oilseeds rather than using rotations that are more oriented towards wheat.

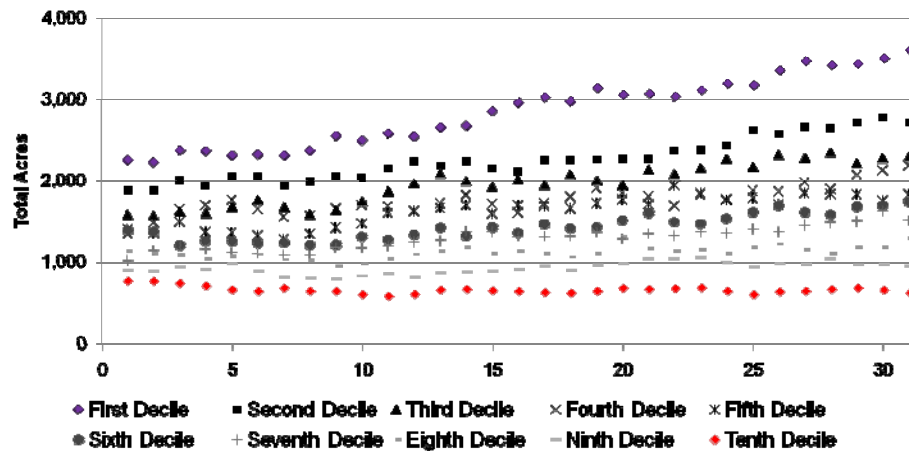
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Implications

- Research in this study is very consistent with recent research examining the convergence of farm size and financial performance among farms, and research examining changes in economies of size since 1973.

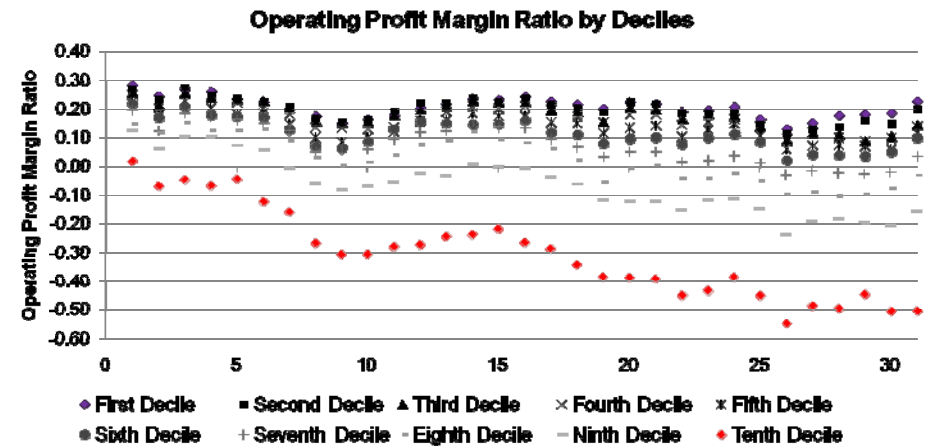
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Total Acres



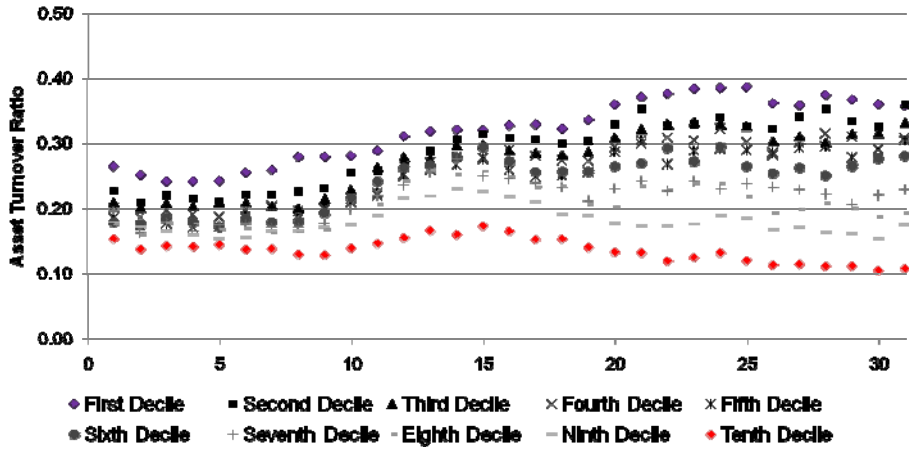
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Operating Profit Margin

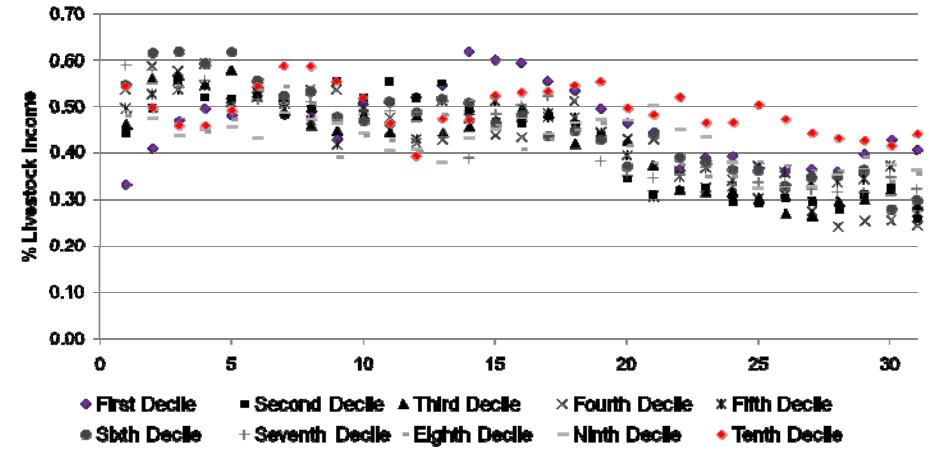


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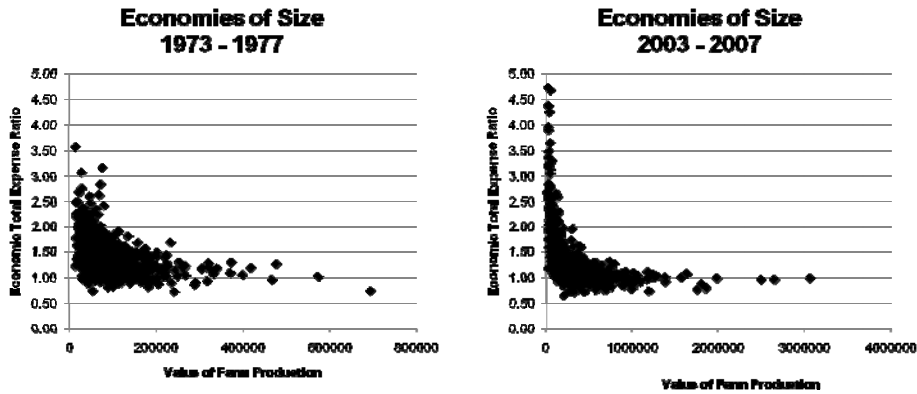
Asset Turnover Ratio



Percent Income from Livestock



Changes in Economies of Size



Competitive Advantage

		Relative Price Per-Unit		
		Lower	Average	Higher
Relative Cost Per-Unit	Lower	1 Indeterminate Position	2 Competitive Advantage	3 Competitive Advantage
	Average	4 Competitive Disadvantage	5 Parity Position	6 Competitive Advantage
	Higher	7 Competitive Disadvantage	8 Competitive Disadvantage	9 Indeterminate Position

Competitive Advantage 1988-2007 KFMA Data

Variable	Above Average (30% of farms)	Average (42% of farms)	Below Average (28% of farms)
Value of Farm Production	332,709	211,173	109,601
Operating Profit Margin Ratio	0.212	0.136	-0.024
Asset Turnover Ratio	0.338	0.263	0.169
Cost Efficiency	0.696	0.589	0.453
Source: Yeager and Langemeier (2009)			

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 - Ag Manager Contributor Site (www.agmanager.info)
 - KFMA Newsletter
 - Credit Crisis References

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