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Examining the Efficiency and Profitability of Kansas Farms from 2005-2015

Elizabeth A. Yeager

Cody O'Brien

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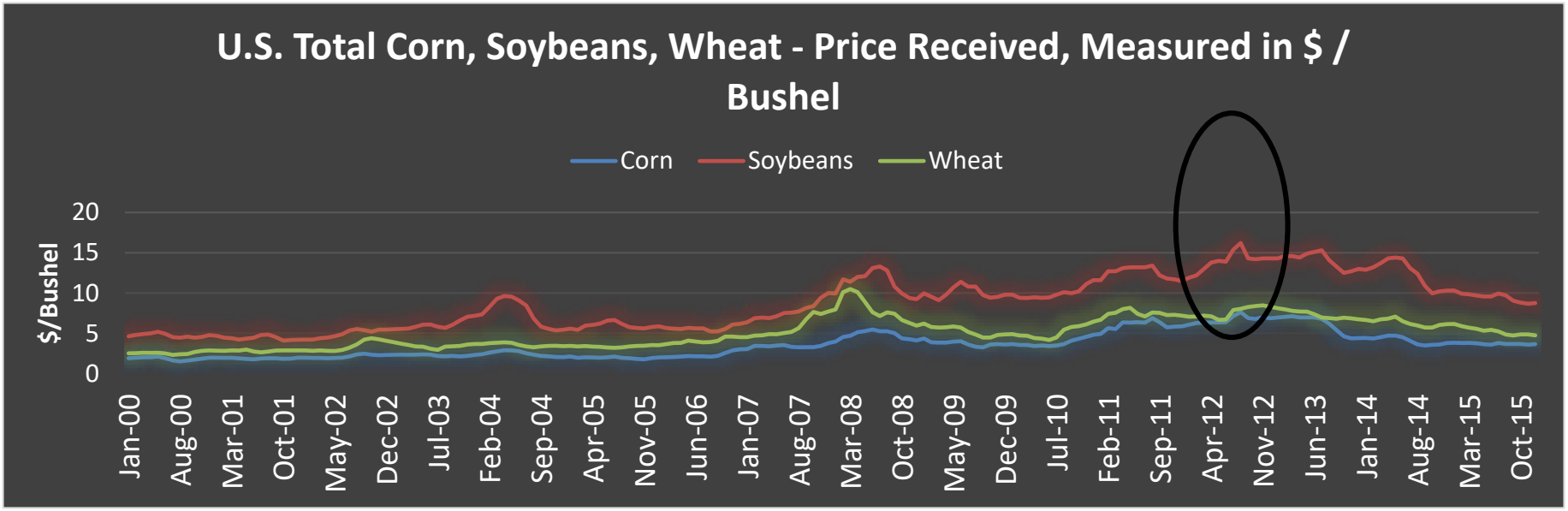
Motivation

- Desire to examine the efficiency and profitability of Kansas farms in order to draw inferences among the profitability, efficiency, and growth of agricultural producers in Kansas
- Following recent downturns, it is important to continuously evaluate firm performance and examine changes in performance over time.

Farm Price Received History



- Commodity prices spiked with crop prices peaking in the fall of 2012 and cattle prices rising in 2014 and 2015

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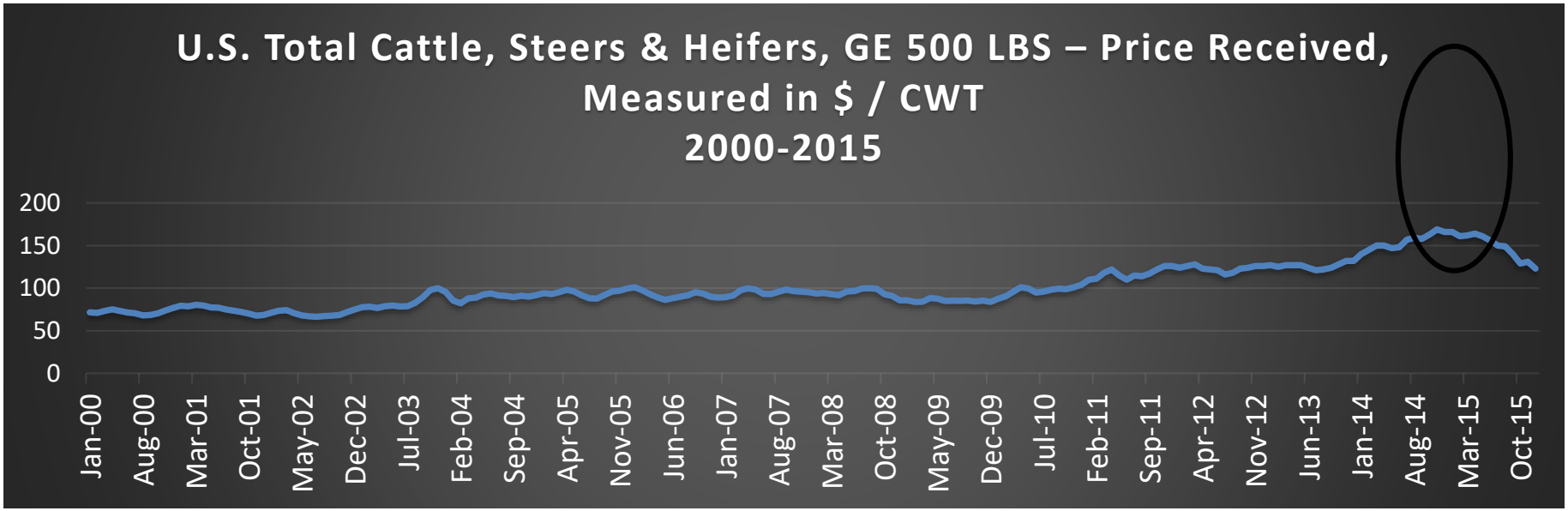

- Commodity prices spiked with crop prices peaking in the fall of 2012 and cattle prices rising in 2014 and 2015

Motivation

- Ibendahl (2016) reported 2015 Net Farm Income from Operations for KFMA farms to be at levels not seen since 1981 with approximately 45% of farms reporting negative NFIO
- Mugera, Langemeier, and Ojede (2016) examined the productivity and profitability of Kansas farms, the two farm characteristics that were identified as having the most profitability increase potential from productivity increases were small farms and livestock operations

Motivation

- Performance measures of Kansas farms and possible connections between the performance measures should be examined during these financial times
- Previous research has suggested that financial constraints may play a role in profitability, efficiency, and growth

Methods

- Overall Cost Efficiency
  - Represents the minimum cost of producing the firm's level of output, given the input prices, and constant returns to scale technology
- Profitability Measures
  - Operating Profit Margin Ratio
  - Return on Assets

Methods

- Growth
  - Percentage Growth for Value of Farm Production
- Risk Classifications defined by USDA
  - Net Farm Income from Operations
  - Debt to Asset Ratio

Data

- 564 Farms, 2005 - 2015
- Average Farm Characteristics
  - 1,466 Crop Acres
  - 602 Pasture Acres
  - 1.55 Workers
  - Crop Labor Percentage 80%
  - $509,929 Value of Farm Production
  - 4.1% Rate of Return on Assets
  - $116,775 Net Farm Income from Operations

Results

- Lowest average cost efficiency was 36.1% in 2010 and the highest average cost efficiency was 54.7% in both 2006 and 2014
- After analyzing possible persistence in profitability, initial results suggest that farms with higher return on assets tend to be more solvent, but farms with higher operating profit margin tend to be less solvent

Results

- The analysis of relative positioning of farms in terms of return on assets suggests that during 2007 to 2011 some farms were able to consistently differentiate themselves
- The relative positioning analysis for operating profit margin indicates that farms had similar operating profit margins from 2010 through 2014; divergence occurred in 2015

Results

- After analyzing the risk classifications, several observations were made about the “new” financial position of farms
- One hundred fifty-three farms moved out of the favorable risk class between 2013 and 2015, evidence that Kansas farms were less profitable
- However, most of these farms still maintained their lower solvency levels

Farm Risk Class Distribution 2005-2015

	Favorable[1]	Marginal-income[2]	Marginal-solvency[3]	Vulnerable[4]
2015	280	198	36	50
2014	384	79	68	33
2013	433	38	78	15
2012	422	43	88	11
2011	418	44	85	17
2010	417	38	95	14
2009	377	42	115	30
2008	375	32	130	27
2007	355	29	148	32
2006	318	49	135	62
2005	322	44	155	43

[1] Favorable Risk Classification; positive net farm income with a debt-to-asset ratio less than or equal to 0.4
[2] Marginal-income Risk Classification; negative net farm income with a debt-to-asset ratio less than or equal to 0.4
[3] Marginal-solvency Risk Classification; positive net farm income with a debt-to-asset ratio more than 0.4
[4] Vulnerable Risk Classification; negative net farm income with a debt-to-asset ratio more than 0.4

Cost Efficiency Scores

Year	Average Cost Efficiency
2015	0.544
2014	0.547
2013	0.465
2012	0.470
2011	0.501
2010	0.361
2009	0.514
2008	0.502
2007	0.445
2006	0.547
2005	0.503

Year	Average Net Farm Income from Operations
2015	$4,816
2014	$119,903
2013	$157,636
2012	$159,294
2011	$166,267
2010	$156,081
2009	$124,158
2008	$145,054
2007	$127,738
2006	$55,009
2005	$68,570

Farm Characteristics of Top Performing Farms

Sorted by Operating Profit Margin Ratio

Significant Variables	Years	Top vs. Bottom Year	Top 25%	Bottom 25%
Total Farm Assets	2005-2015	2015	$3,627,288	$2,171,397
Value of Farm Production	2005-2015	2015	$757,481	$210,537
Number of Workers	All except 2006, 2008, 2009, and 2013	2015	1.84	1.25
Age of Operator	All except 2006, 2007, and 2008	2015	61.5	64.6
Average Total Crop Acres	All except 2014	2015	1,631	1,001
Non-Farm Taxable Income	All except 2012, 2013	2015	$26,676	$39,314
Ending Working Capital	2005-2015	2015	$550,469	$202,200

Farm Characteristics of Top Performing Farms

Sorted by Return on Assets

Significant Variables	Years	Top vs. Bottom Year	Top 25%	Bottom 25%
Total Farm Assets	All except 2006 and 2013	2015	$3,603,139	$1,843,711
Value of Farm Production	2005-2015	2015	$773,892	$299,411
Number of Workers	All except 2006, 2008, 2009, and 2013	2015	1.87	1.5
Age of Operator	All except 2015	2014	59.1	61.4
Average Total Crop Acres	All except 2014	2015	1,800	1,242
Non-Farm Taxable Income	All except 2012, 2013	2015	$26,676	$39,314
Ending Working Capital	2005-2015	2015	$554,528	$155,103

Farm Characteristics of Top Performing Farms

Sorted by Cost Efficiency

Significant Variables	Years	Top vs. Bottom Year	Top 25%	Bottom 25%
Total Farm Assets	2005-2015	2015	$3,346,438	$2,414,520
Value of Farm Production	2005-2015	2015	$742,951	$309,302
Number of Workers	Not Significant			
Age of Operator	Not Significant Except 2011	2011	57.7	60.2
Average Total Crop Acres	All except 2008 and 2013	2015	1,957	1,112
Non-Farm Taxable Income	2006, 2008, 2009, 2011, and 2014	2014	$25,790	$34,696
Ending Working Capital	2005-2015	2015	$552,823	$236,549

Implications and Conclusions

- Stakeholders should be aware that persistence in profits has been interrupted in terms of ROA under these lower profitable economic times
  - This will help in understanding there will likely be errors if utilizing previous financial performance as a measure for repayment capacity

- Top performing farms in terms of profitability don't necessarily have the same characteristics as top performing efficient farms
  - In the last two years of the sample period top CE farms were significantly more crop concentrated than bottom farms, while top profitable farms were significantly less crop concentrated than bottom farms