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Perceived versus Actual Competitive Advantage

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Selected Paper prepared for Presentation at the Southern Agricultural Economics
Annual Meeting, Dallas, Texas, February 1-4, 2014

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Abstract

This paper examined the relationship between farm characteristics and perceived sources of competitive advantage, and cost-based and revenue-based efficiency indices. Gross farm income and the percentage of labor devoted to crop production were significant and positively correlated with cost and revenue efficiency while the perception of the cowherd being the most important part of the operation was negatively correlated with efficiency. In general, perceived sources of competitive advantage were not significantly correlated with cost or revenue efficiency.

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Introduction

The notion of competitive advantage has been extensively discussed in the business and farm management literature (e.g., Hunt, 2000; Besanko et al., 2010; and Boehlje, 2013). To obtain a competitive advantage, a farm must receive relatively higher per unit prices and have average per unit costs; receive average per unit prices and have relatively lower per unit costs; or both. Competitive advantage can be related to cost minimization and product differentiation. Specifically, producers can outperform other operations by creating comparable value at lower cost (i.e., cost minimization), delivering greater value to customers (i.e., product differentiation), or both. Though the importance of obtaining and sustaining a competitive advantage is widely acknowledged, little research exists that compares a producer's perceived competitive advantage to measures of actual competitive advantage, such as efficiency indices.

The objective of this paper was to examine the relationship between farm characteristics and perceived sources of competitive advantage, and cost-based and revenue-based efficiency indices for a sample of farms. Results have implications for farm benchmarking and strategic management.

Methods

Economic efficiency indices were the primary measure of interest in this study. Economic efficiency scores range from 0 to 1 where a score of 1 indicates a farm is producing on the production frontier and using the optimal mix of inputs under the cost-based approach or producing the optimal output mix under the revenue-based approach.

Data envelopment analysis (DEA) was used to measure cost-based and revenue-based efficiency under variable returns to scale. DEA compares the farms in terms of their input use

and resulting output level to construct a benchmark or best practice frontier. Information pertaining to the estimation of cost-based and revenue-based efficiency indices under variable returns to scale can be found in Fare, Grosskopf, and Lovell, 1985; and Coelli et al., 2005.

Once estimated, cost-based and revenue-based efficiency indices for each farm were sorted into quartiles. Comparisons among quartiles focused on the top and bottom quartiles, and involved comparisons of farm characteristics and perceived sources of competitive advantage. The bottom (top) quartile represented the farms with the lowest (highest) efficiency indices. Farm characteristics included gross farm income, percentage of income from beef cows, crop labor percentage (i.e., the percentage of unpaid and hired labor devoted to crop production), an indication of whether the cowherd was considered the most important part of the farm business, and a risk preference score.

In a recent survey (Pope, 2009), farmers were asked to indicate their perceived sources of competitive advantage. The farmers surveyed could choose from the following sources of competitive advantage: analysis and use of technology, business planning skills, cattle genetics, high quality land and pasture, loan and interest rate management, low cost, machinery management, marketing skills, personnel management, and production skills. Of these sources, low cost was expected to be closely aligned with cost-based efficiency so we expected the top quartile in terms of cost-based efficiency to have indicated low cost as a competitive advantage. Conversely, the bottom quartile in terms of cost-based efficiency was expected to have marked low cost as a competitive advantage to a lesser degree. Cattle genetics and marketing skills were expected to be closely aligned with revenue-based efficiency. Thus, the top quartile in terms of revenue-based efficiency was expected to have a higher percent of producers that marked this as a competitive advantage than the bottom quartile in terms of revenue-based efficiency.

In addition to sorting the farms into quartiles, correlation coefficients between cost and revenue efficiency, and farm characteristics and perceived sources of competitive advantage were computed. A positive and significant correlation between cost efficiency (revenue efficiency) and low cost (cattle genetics and marketing skills) as a source of competitive advantage was expected.

Data

The 258 farms included in this study were members of the Kansas Farm Management Association (KFMA) and had completed a survey (Pope, 2009) sent to all KFMA farms with a whole-farm analysis and a cowherd in 2008. The data for this study combined information from each farm's whole-farm analysis with their answers to the survey questions.

Five inputs, obtained from each farm's whole-farm analysis, were used in the analysis: labor, crop input, fuel, livestock input, and capital. All costs were annualized. Labor was represented by the number of workers (paid and unpaid) on the farm and labor price was obtained by dividing labor cost by the number of workers. Implicit input quantities for the crop input, fuel, the livestock input, and capital were computed by dividing the respective input costs by USDA input price indices (USDA-NASS). Crop inputs consisted of seed; fertilizer; herbicide and insecticide; crop marketing and storage; and crop insurance. Fuel was comprised of fuel, auto expense, irrigation energy, and utilities. Livestock inputs included dairy expense; purchased feed; veterinarian expense; and livestock marketing and breeding. The capital input included repairs; machine hire; general farm insurance; property taxes; organization fees, publications, and travel; conservation; interest; cash farm rent; and interest charge on net worth (Langemeier 2010).

Summary statistics related to farm characteristics and perceived sources of competitive advantage are reported in table 1. The average value of farm production of the farms in the sample was \$446,987. The average percentage of income derived from beef production was 23.5 percent and the average percentage of labor devoted to crops was 70.1 percent. One of the survey questions pertained to the farmer's perception of the importance of the cowherd to the operation. Specifically, participants were asked the following question: "economically, I view my cowherd as the most important part of overall farm income?" Survey participants had five choices ranging from strongly agree (index =1) to strongly disagree (index =5). On average, the participant's answers landed between the neutral and disagree choices.

Five questions in the survey were related to risk: how a respondent's neighbor would describe their risk taking behavior, retained ownership strategies, best and worst case calf return strategies, and questions related to investing in an innovative business with the chance for a large gain, but a significant chance of loss (Pope 2009). The risk preference scores generated from the survey responses could range from 5 to 113 with a smaller risk preference score indicating more risk aversion. The scores for the 258 farms in the analysis ranged from 5 to 86. Pope (2009) broke the scores down further: 5 to 21, strongly risk averse; 22 to 38, slightly risk averse; 39 to 86, all other risk preference levels. The average risk preference score for the 258 farms was 25.8 indicating slight risk aversion.

Another question in the 2008 survey was directly related to competitive advantage. Specifically, the participants were asked to indicate whether they considered any of the following factors as their competitive advantage: analysis and use of technology, business planning skills, cattle genetics, high quality land and pasture, loan and interest rate management, low cost, machinery management, marketing skills, personnel management, and production skills.

Participants could mark one or more of these items as a source of competitive advantage. Cattle genetics, high quality land and pasture, low cost, and production skills were perceived to be a competitive advantage by over 50 percent of the survey participants. The average number of items identified was 4.2 and ranged from 1 to 8.

Results

The average cost-based and revenue-based economic efficiency indices were 0.5691 and 0.6735, respectively. Using individual farm cost-based and revenue-based efficiency indices, farms were sorted into quartiles. Table 2 contains comparisons for the top and bottom cost-based efficiency quartiles and table 3 presents results for the top and bottom revenue-based efficiency quartiles. The last column in both tables reports t-test results.

Farms in the top quartile (both in terms of cost and revenue-based efficiency) were significantly larger and devoted more of their labor to crops than farms in the bottom quartile. Farms in the top efficiency quartiles also had a lower percentage of income from beef and indicated that the cowherd was less important to the overall operation than farms in the bottom efficiency quartiles. Farms in the top quartile with respect to cost-based efficiency also tended to be less risk averse. With the exception of land and pasture quality, which was significantly lower for the top risk averse group in terms of revenue-based efficiency, none of differences in the sources of competitive advantage between the top and bottom efficiency quartiles were significantly different. In particular, unlike prior expectations, the low cost strategy was not significantly different between the two cost-based efficiency quartiles; and cattle genetics and marketing skills were not significantly different between the two revenue-based efficiency quartiles.

It is interesting to note that 48 percent of the farms in the bottom cost-based efficiency quartile indicated that low cost is a competitive advantage. Similarly, 70 percent of the farms in the bottom revenue-based efficiency quartile indicated that cattle genetics is a competitive advantage.

To further examine the relationship between cost and revenue efficiency, correlation coefficients between the two efficiency indices, and farm characteristics and perceived sources of competitive advantage are presented in table 4. Gross farm income and the percentage of labor devoted to crops were significant and positively correlated with cost-based and revenue-based efficiency. The percentage of income from beef was significant and negatively correlated with revenue-based efficiency, and the perception of the importance of the cowherd to whole-farm income was significant and negatively correlated with cost-based and revenue-based efficiency. Consistent with the t-test results, the only significant correlation coefficient for the perceived sources of competitive advantage was between revenue efficiency and the quality of land and pasture.

Conclusions and Implications

This paper compared farm characteristics and perceived sources of competitive advantage with cost-based and revenue-based efficiency estimates. Gross farm income and the percentage of labor devoted to crop production were significant and positively correlated with cost-based and revenue-based efficiency while the perception of the cowherd being the most important part of the business was negatively correlated with efficiency. In general, perceived sources of competitive advantage were not significantly correlated with cost or revenue efficiency.

The lack of significance between efficiency indices and perceived sources of competitive advantage has important implications regarding the use of benchmarking and strategic management by farms and ranches. Perceived sources of competitive advantage certainly did not match actual competitive advantage measures using efficiency indices. Ironically, the group of farms included in this study had a whole-farm analysis which included benchmarks pertaining to profitability, financial efficiency, and enterprises. The results imply that additional study of the relationship between benchmarks and competitive advantage is warranted.

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Table 1. Summary Statistics for Sample of 258 KFMA Farms.

Variable	Average
<u>Farm Characteristics</u>	
Value of Farm Production	446,987
Percentage of Income from Beef Cows	0.2348
Crop Labor Percentage	0.7014
Cowherd Most Important Part of Farm Business	3.33
Risk Preference Score	25.8
<u>Competitive Advantage</u>	
Analysis and Use of Technology	0.2674
Business Planning Skills	0.2248
Cattle Genetics	0.6202
High Quality Land and Pasture	0.5039
Loan and Interest Rate Management	0.3721
Low Cost	0.5543
Machinery Management	0.3798
Marketing Skills	0.2054
Personnel Management	0.3411
Production Skills	0.7287
Competitive Advantage Index	4.1977

Table 2. Variable Averages for Top and Bottom Cost Efficiency Quartiles.

Variable	Bottom Quartile	Top Quartile	Significance (p-value)
<u>Efficiency Indices</u>			
Cost Efficiency	0.3918	0.7704	< 0.0001
Revenue Efficiency	0.4782	0.8802	< 0.0001
<u>Farm Characteristics</u>			
Gross Farm Income	200,928	715,721	< 0.0001
Percentage of Income from Beef Cows	0.3190	0.2167	0.0229
Crop Labor Percentage	0.6377	0.7306	0.0182
Cowherd Most Important Part of Farm Business	3.87	3.11	0.0002
Risk Preference Score	23.2	29.0	0.0062
<u>Competitive Advantage</u>			
Analysis and Use of Technology	0.2187	0.2969	0.3181
Business Planning Skills	0.2031	0.2969	0.2261
Cattle Genetics	0.6719	0.5938	0.3649
High Quality Land and Pasture	0.5000	0.4844	0.8613
Loan and Interest Rate Management	0.3594	0.4219	0.4739
Low Cost	0.4844	0.5625	0.3819
Machinery Management	0.3437	0.2656	0.3427
Marketing Skills	0.2031	0.2344	0.6726
Personnel Management	0.3281	0.3437	0.8533
Production Skills	0.8281	0.7344	0.2049
Competitive Advantage Index	4.1405	4.2345	0.6599

Table 3. Variable Averages for Top and Bottom Revenue Efficiency Quartiles.

Variable	Bottom Quartile	Top Quartile	Significance (p-value)
<u>Efficiency Quartiles</u>			
Cost Efficiency	0.4108	0.7225	< 0.0001
Revenue Efficiency	0.4377	0.9433	< 0.0001
<u>Farm Characteristics</u>			
Gross Farm Income	224,622	678,705	< 0.0001
Percentage of Income from Beef Cows	0.3211	0.2047	0.0126
Crop Labor Percentage	0.6270	0.7291	0.0099
Cowherd Most Important Part of Farm Business	3.78	2.98	0.0001
Risk Preference Score	24.3	27.8	0.1091
<u>Competitive Advantage</u>			
Analysis and Use of Technology	0.2344	0.2656	0.6866
Business Planning Skills	0.1875	0.2656	0.2968
Cattle Genetics	0.7031	0.5938	0.2003
High Quality Land and Pasture	0.5937	0.3906	0.0231
Loan and Interest Rate Management	0.3281	0.3437	0.8533
Low Cost	0.4375	0.5469	0.2213
Machinery Management	0.2656	0.2812	0.8446
Marketing Skills	0.2344	0.2187	0.8347
Personnel Management	0.3125	0.3750	0.1441
Production Skills	0.8281	0.7187	0.4620
Competitive Advantage Index	4.1249	3.9998	0.5794

Table 4. Correlation Coefficients for Cost and Revenue Efficiency Indices.

Variable	Cost Efficiency	Revenue Efficiency
<u>Efficiency Quartiles</u>		
Cost Efficiency	1.000	0.772
Revenue Efficiency	0.772	1.000
<u>Farm Characteristics</u>		
Gross Farm Income	0.466	0.408
Percentage of Income from Beef Cows	-0.091	-0.162
Crop Labor Percentage	0.142	0.154
Cowherd Most Important Part of Farm Business	-0.223	-0.237
Risk Preference Score	0.217	0.152
<u>Competitive Advantage</u>		
Analysis and Use of Technology	0.070	0.046
Business Planning Skills	0.067	0.080
Cattle Genetics	-0.048	-0.082
High Quality Land and Pasture	-0.078	-0.129
Loan and Interest Rate Management	0.089	0.036
Low Cost	0.090	0.070
Machinery Management	-0.032	-0.013
Marketing Skills	0.045	0.027
Personnel Management	0.013	0.034
Production Skills	-0.029	-0.065
Competitive Advantage Index	0.067	-0.005