

Impact of Farm Size and Type on Competitive Advantage¹

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Introduction

Per-unit costs vary substantially among farms and ranches. Are these per-unit cost differences due to random events such as weather or are these differences due to controllable factors such as managerial ability? The answer to this question has important implications to benchmarking. If per-unit cost differences are due to random events, then long-term average performance measures should be used to benchmark. If per-unit cost differences are due to controllable factors, then benchmarking should focus on the performance measures of farms with superior managerial ability.

This study examines the prevalence of sustained competitive advantage for a sample of Kansas farms. Overall efficiency measures are computed per farm and year. Farm characteristics of a group of farms with above average overall efficiency are then compared to those of a group of farms with below average overall efficiency.

Conceptual Framework

Overall efficiency was computed for each farm and year. Overall efficiency represents the product of technical, allocative, and scale efficiency. Technical efficiency examines the impact of technology adoption on overall efficiency. Allocative efficiency examines a farm's ability to combine inputs optimally. Scale efficiency examines the impact of operation size on overall efficiency. Each of the efficiency measures ranges from 0 to 1.

¹ Paper presented at the 2002 Risk & Profit Conference, August 15-16, 2002, Manhattan, Kansas.

A farm with a value of 1.00 is efficient. A farm with a value less than 1.00 is inefficient. The closer the value is to 0.00 the more inefficient the farm is.

Individual farm overall efficiency measures over a 20-year period were used to separate farms into three categories: those with significantly above average overall efficiency (top category), those with overall efficiency that was insignificantly different from average, and those with significantly below average overall efficiency (bottom category). The discussion of the results focuses on the differences in farm characteristics between the top and bottom overall efficiency categories. Farm characteristics compared included farm size, farm type, financial ratios, and financial stress.

Kansas Farm Management Data

Whole farm data from the Kansas Farm Management Associations (KFMA) were used in this study. Specifically, farms with continuous data from 1982 to 2001 were included in the analysis. Inputs included labor, purchased inputs, and capital. Outputs included milk, swine, beef, hay and forage, crops, and other. Cost of production estimates included cash costs and opportunity costs on unpaid family and operator labor and owned assets.

Table 1 presents the mean and standard deviation of selected farm characteristics for the 224 KFMA farms with continuous data from 1982 to 2001. Average gross farm income was \$252,626. Farms were divided into four gross farm income categories: those with less than \$100,000 in gross farm income (GFI1), those with a gross farm income between \$100,000 and \$250,000 (GFI2), those with a gross farm income between \$250,000 and \$500,000 (GFI3), and those with a gross farm income above \$500,000 (GFI4).

Approximately 19.2% of the farms or 43 farms had an average gross farm income below

\$100,000. Approximately 7.1% of the farms or 16 farms had an average gross farm income above \$500,000.

The average profit margin ratio was 7.55%. The financial total expense ratio measures a farm's ability to cover cash costs. On average, this ratio was approximately 0.80 indicating that the farms on average had \$0.20 of every dollar earned to cover opportunity costs. The economic total expense ratio measures a farm's ability to cover cash and opportunity costs. On average, this ratio was approximately 1.16 indicating that on average the farms did not cover all of their opportunity costs. Approximately, 19% of the farms were able to cover all of their cash and opportunity costs.

Results

The average level of each efficiency measure is presented along with distributional information in table 2. Average overall efficiency was 62%. Technical, allocative, and scale inefficiencies all contributed to overall inefficiency. Allocative inefficiency was less of a problem, however, than technical and scale inefficiency.

Statistical tests indicated that 69 farms had above average levels of overall efficiency (top category) and 73 farms had below average levels of overall efficiency (bottom category). Table 3 presents the farm characteristics of the top and bottom overall efficiency categories. Average overall efficiency was approximately 0.78 for farms in the top category and 0.48 for farms in the bottom category. On average, farms in the top category were substantially larger. Average gross farm income for the top category was \$386,466. In contrast, average gross farm income for the bottom category was \$145,618. Only 1 of the 43 farms with a gross farm income below \$100,000 was in the top category while 11 of the 16 farms with a gross farm income above \$500,000 were in the top category (table 4). In addition to being

relatively larger, farms in the top category derived a higher percent of their gross farm income from swine and dairy.

The average profit margin ratio for the farms in the top category and bottom category was 17.1% and -3.3%, respectively. The financial total expense ratio for the top category was approximately 0.10 lower than that for the bottom category. Similarly, the economic total expense ratio was 0.30 lower for the top category. On average, none of the farms in the bottom category earned an economic profit. In contrast, on average, 62% of the farms in the top category earned an economic profit. Figures 1 and 2 illustrate the relationship between individual farm financial and economic total expense ratios, and farm size. Dispersion of the total expense ratios was substantially larger for smaller farms. This indicates the trouble some small farms have in controlling expenses.

As mentioned above, farm size, as measured with gross farm income, was a key characteristic that varied among overall efficiency categories. In light of this, table 5 summarizes overall efficiency, the profit margin ratio, and the total expense ratios by gross farm income category. Overall efficiency for the smallest farm size category averaged approximately 0.50. Conversely, average efficiency for the largest farm size category averaged approximately 0.74. Thus, larger farms have a substantial advantage over smaller farms. This result is evident by examining the average profit margin ratio and total expense ratios for different farm size categories. The larger farms have, on average, substantially higher profit margins and substantially lower total expense ratios. In fact, the largest farm size category, on average, earned an economic profit.

Conclusions and Implications

This study examined whether some farms have a sustained competitive advantage. Results indicated that approximately 31% of the farms had substantially higher levels of overall efficiency than average. These farms tended to be larger and received more of their income from swine and dairy.

The results of this study have important implications. First, according to this study, a substantial proportion of small farms are at a competitive disadvantage. Small farms tend to be covering cash costs, but are not even coming close to covering opportunity costs. Second, because some farms have a competitive advantage, it is important for farms to benchmark using the information from these farms. Benchmarking using average farm information will provide a false signal. Farms that grow and prosper will have to have above average performance.

Table 1. Farm Characteristics

	Mean	Standard Deviation
Gross Farm Income (GFI)	252,626	213,734
GFI 1	19.20%	39.47%
GFI 2	45.09%	49.87%
GFI 3	28.57%	45.28%
GFI 4	7.14%	25.81%
% of GFI from Beef Enterprises	21.51%	24.67%
% of GFI from Dairy Enterprises	7.81%	22.35%
% of GFI from Swine Enterprises	9.20%	18.98%
% of GFI from Grain	29.77%	20.65%
% of GFI from Cash Crops	9.20%	12.73%
% of GFI from Hay and Forage	2.32%	5.95%
% of GFI from Government Payments	10.56%	5.92%
Aggregated % of GFI from Crops	43.32%	25.11%
Aggregated % of GFI from Livestock	38.51%	30.46%
Value of Farm Production	215,571	169,238
Net Farm Income	47,268	53,070
Operating Expense Ratio	0.5827	0.098
Depreciation Expense Ratio	0.1183	0.0403
Interest Expense Ratio	0.0971	0.0809
Financial Total Expense Ratio	0.7981	0.1301
Economic Total Expense Ratio	1.1608	0.2211
Profit Margin Ratio	0.0755	0.1655
Current Ratio	0.5643	0.7216
Debt to Asset Ratio	0.2700	0.2447
Asset Turnover Ratio	0.2753	0.122
% Income Stressed	0.5118	0.264
% Debt Stressed	0.0841	0.2122
% Financially Stressed	0.0562	0.1523

Table 2. Efficiency Distributions

Efficiency Range	Technical	Allocative (By Number of Farms)	Scale	Overall
Average Efficiency	82%	88%	85%	62%
1.00	4	2	0	0
0.95 to 0.99	26	19	46	1
0.90 to 0.95	27	79	68	1
0.85 to 0.90	41	76	22	9
0.80 to 0.85	32	30	20	9
0.75 to 0.80	31	12	43	20
0.70 to 0.75	32	4	0	27
0.65 to 0.70	17	0	8	28
0.60 to 0.65	8	1	5	29
0.55 to 0.60	6	0	8	34
0.50 to 0.55	0	1	2	25
0.45 to 0.50	0	0	0	16
0.40 to 0.45	0	0	2	19
0.35 to 0.40	0	0	0	2
0.30 to 0.35	0	0	0	3
0.25 to 0.30	0	0	0	1

Table 3. Farm Characteristics

	Above Average 69 Farms	Below Average 73 Farms
Gross Farm Income (GFI)	386,466	145,618
GFI 1	1.45%	39.73%
GFI 2	40.58%	49.31%
GFI 3	42.03%	10.96%
GFI 4	15.94%	0.00%
% of GFI from Beef Enterprises	17.52%	24.42%
% of GFI from Dairy Enterprises	20.54%	0.08%
% of GFI from Swine Enterprises	16.28%	2.73%
% of GFI from Grain	21.78%	34.75%
% of GFI from Cash Crops	8.78%	18.27%
% of GFI from Hay and Forage	1.47%	2.86%
% of GFI from Government Payments	7.97%	12.18%
Aggregated % of GFI from Crops	30.56%	53.02%
Aggregated % of GFI from Livestock	54.34%	27.23%
Value of Farm Production	305,858	136,366
Net Farm Income	76,587	22,964
Operating Expense Ratio	0.5447	0.6256
Depreciation Expense Ratio	0.1161	0.1269
Interest Expense Ratio	0.0879	0.0952
Total Expense Ratio	0.7487	0.8477
Economic Total Expense Ratio	1.0367	1.3238
Profit Margin Ratio	0.171	-0.0332
Current Ratio	0.4937	0.4891
Debt to Asset Ratio	0.2960	0.2132
Asset Turnover Ratio	0.3101	0.2341
% Income Stressed	0.3609	0.6705
% Debt Stressed	0.0877	0.0616
% Financially Stressed	0.0464	0.0507
Technical Efficiency	91.57%	73.03%
Allocative Efficiency	91.68%	86.28%
Scale Efficiency	92.19%	76.93%
Overall Efficiency	77.57%	47.81%

Table 4. Overall Efficiency by Gross Farm Income

	Above Average	Insignificant	Below Average	Total Farms
Less than \$100,000	1	13	29	43
\$100,000 to \$250,000	28	37	36	101
\$250,000 to \$500,000	29	27	8	64
Greater than \$500,000	11	5	0	16

Table 5. Farm Performance by Gross Farm Income

	Less than \$100,000	\$100,000 to \$250,000	\$250,000 to \$500,000	Greater than \$500,000
Average OE	50.19%	61.42%	69.14%	74.09%
Minimum OE	29.01%	32.11%	44.04%	57.67%
Maximum OE	72.27%	87.74%	94.88%	98.10%
Profit Margin Ratio	-0.1581	0.0910	0.1749	0.1936
Financial Total Expense Ratio	0.8558	0.7988	0.7614	0.7853
% FTER > 1	11.62%	4.95%	1.56%	0.00%
Economic Total Expense Ratio	1.4440	1.1461	1.0343	0.9981
% ETER > 1	100.00%	88.12%	68.75%	37.50%
Average GFI	\$74,910	\$167,641	\$361,189	\$832,459

Figure 1. Financial Total Expense Ratio by Gross Farm Income

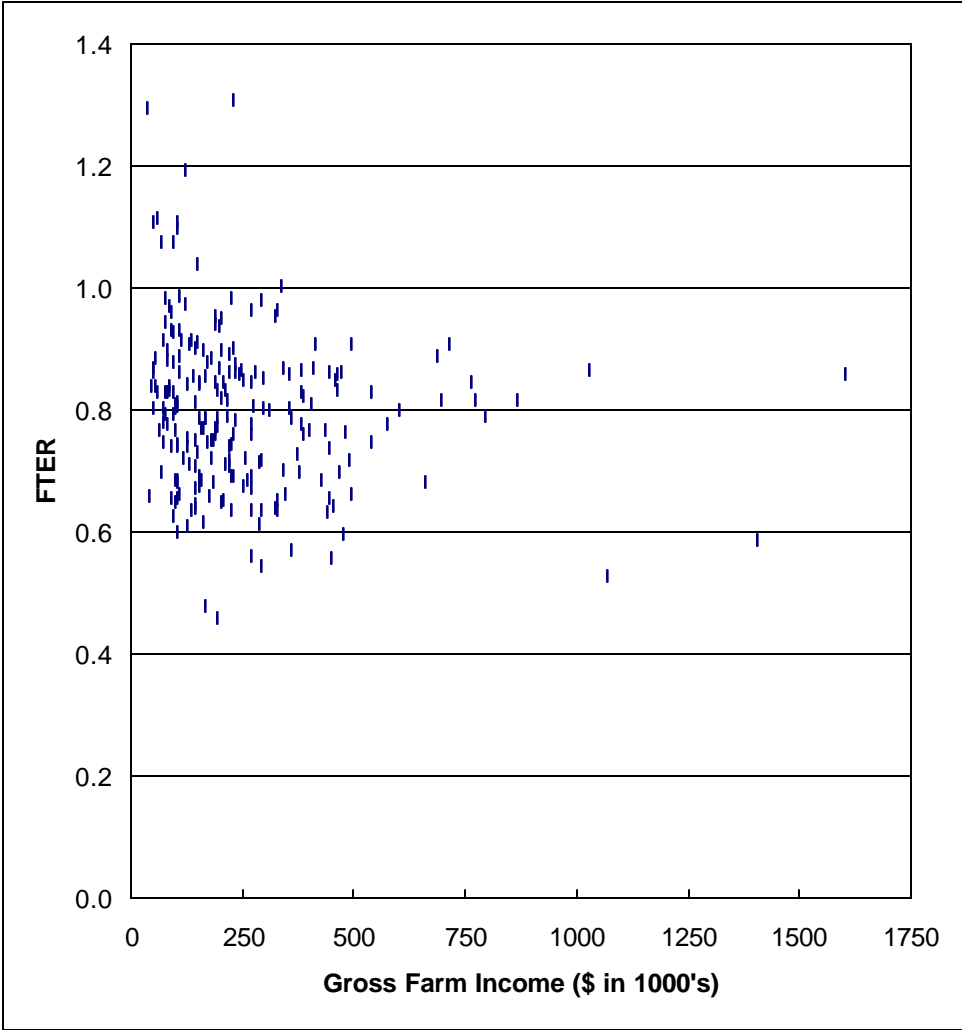


Figure 2. Economic Total Expense Ratio by Gross Farm Income

