FARM BUSINESS MANAGEMENT

FARM ECONOMICS Facts & Opinions

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SIZE ECONOMIES ON ILLINOIS GRAIN FARMS

An often-asked question is whether larger grain farms have lower per acre costs than smaller grain farms. In this paper, data from the Illinois Farm Business Farm Management (FBFM) Association are used to address this question. We find that per acre costs for farm sizes in size categories less than 800 to 1,200 acres are higher than for larger farm size categories. Total costs are relatively constant across categories for categories above 1,200 acres.

Data Used in this Analysis

Data are for 2002 and come from Economic Management Analysis reports that FBFM produces for farmer members. These reports gives yields, revenues, and costs on a per operator acre basis. To be included in the analysis presented here, farms have to pass screening procedures designed to insure that the data are correct. Farms also have to receive the majority of their farm income from grain operations. All farms in Illinois that passed these two tests are included in this analysis.

A total of 1,955 farms are used. Yields, costs, and management returns for these farms are divided into nine size categories based on tillable acres farmed. The smallest category is farms with less than 400 acres and the largest size category is for farms with greater than 3,201 acres. Within the above 3,201 acre category, the average farm size is 4,065 tillable acres.

Yields, Economic Costs, and Management Returns

Table 1 shows yields; percent of acres owned, share-rented, and cash-rented; economic costs divided into crop, power, building, labor, overhead, and land categories; and management returns which equal revenue minus economic costs. Economic costs include both accounting costs and opportunity charges. Opportunity charges are included for capital invested in the operation and unpaid labor. Inclusion of these opportunity charges cause the economic costs shown in Table 1 normally to be higher than costs that would be shown on an income statement.

Table 1. Yields, Tenure, Economic Costs for Grain Farms Enrolled in Illinois Farm Business Farm Management (FBFM), Illinois, 2002.

	Tillable Acre Size								
Greater than:	0	401	801	1,201	1,601	2,001	2,401	2,801	3,201
Less than:	400	800	1,200	1,600	2,000	2,400	2,800	3,200	
Number of farms	195	633	562	281	142	60	41	17	24
Tillable Acres	305	603	986	1,385	1,768	2,168	2,561	2,995	4,065
Yield	bu. per acre								
Corn	140	144	145	143	140	142	149	125	142
Soybeans	47	48	49	48	48	48	49	43	47
Percent Acres:	percent								
Owned	35	22	17	14	17	14	13	14	19
Share-rented	35	49	53	52	47	49	46	60	32
Cash-rented	30	29	30	34	36	37	41	26	49
Economic Costs	$ per acre								
Crop costs [1]	$97	$97	$95	$97	$95	$101	$101	$102	$92
Power costs [2]	92	77	69	68	68	67	70	63	75
Building costs [3]	23	19	19	17	17	18	18	16	22
Labor [4]	72	51	38	33	33	30	31	31	35
Overhead [5]	47	42	40	39	39	39	40	36	40
Land [6]	119	116	112	109	108	109	112	100	111
Total Costs	$449	$401	$373	$364	$360	$365	$372	$349	$376
Mgt. Return[7]	-$95	-$40	-$15	-$5	-$10	-$8	-$8	-$16	-$7

[1] Includes fertilizer, seed, and pesticides.
[2] Includes utilities, machinery repairs, machine hire, fuel, machinery depreciation, and light vehicles.
[3] Includes drying, storage, building repair, and building storage.
[4] Includes unpaid and paid labor.
[5] Includes livestock expense, insurance, misc., non-land interest, and overhead.
[6] Includes land interest, property taxes, cash rent, and share-rent leasing costs.
[7] Management returns equals revenue minus economic costs

Source: Illinois Farm Business Farm Management Association and Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign.

Two points are evident from Table 1. First, total costs decline as farm size increases up to 1,200 acres. Total costs are $449 per acre for farms less than 400 acres, $401 per acre for farms between 401 and 800 acres, $373 per acre for farms between 801 and 1,200 acre. Declines in labor and power costs cause most of the reductions in total costs. Declines in building, overhead, and land costs also contributed to declining total costs. Crop costs, however, do not decrease for larger farm size categories.

Second, yields, economic costs, and management returns are relatively constant for farm sizes greater than 1,200 acres. Statistical tests were conducted to see if differences existed in yields and economic costs across size categories. These tests indicate that yield and costs are statistically the same for categories greater than 1,201 acres. The 2,801 to 3,200 size class has lower costs than other size categories: $349 per acre compared to costs in the $364 to $376 per acre range for the other categories above 1,200 acres. This difference is not statistically significant and is likely caused by the small number of farms within the category.

Results in Table 1 suggest that farms in size categories less than 801 to 1,200 acres face cost disadvantages. Not reported in Table 1, however, is the tremendous range of economic costs within a size category. Some farms in smaller farm sizes have lower costs than larger farms. Future newsletters in this series will address this range in costs.

Implications

1. Average total costs are the same for farm sizes over 1,200. Once farms reach 1,200 acres, we find no evidence that per acre costs decreases with increases in farm sizes. We have few observations for farms greater than 6,000 acres. Additional observations may suggest that larger farms have cost advantages. However, in our opinion, it is unlikely that farms between 4,000 and 10,000 acres have significant per acre cost advantages over farms between 1,200 and 4,000 acres.

2. Some individuals might have expected larger farms to have purchasing power that smaller farms do not have. Given this purchasing power, costs would decline as farm size increases. The data presented here do not support this contention because costs are relatively constant across farm sizes. In particular, crop costs remain constant across larger farm sizes suggesting that farmers do not have purchasing power with fertilizer, seed or pesticide inputs (See Table 2 for a more detailed breakdown of costs.) A reason for the lack of evidence for purchasing power may be the competitiveness of the input supply sector.

3. Farms have incentives to expand; however, these incentives are not due to cost advantages. Rather the incentives are due to volume considerations. As long as revenue is above total costs and per acre costs do not increase, farms have an incentive to expand. The only way expansion will stop is if costs increase as farm size increases.

Issued by: Gary Schnitkey and Dale Lattz, Department of Agricultural and Consumer Economics

Table 2. Breakdown of Economic Costs for Grain Farmers Enrolled in Farm Business Farm Management (FBFM), Illinois, 2002.

	Tillable Acre Size								
Greater than:	0	401	801	1,201	1,601	2,001	2,401	2,801	3,201
Less than:	400	800	1,200	1,600	2,000	2,400	2,800	3,200	
	$ per acre								
Fertilizer	36	36	36	38	37	39	41	36	36
Seed	31	32	31	30	30	33	31	33	29
Pesticides	29	28	28	29	28	29	29	32	27
Crop costs	$97	$97	$95	$97	$95	$101	$101	$102	$92
Utilities	8	6	5	4	4	4	4	4	4
Machine repair	22	17	15	15	14	14	13	15	17
Machine hire	13	9	7	7	7	8	9	10	9
Fuel and oil	10	9	9	9	9	9	9	9	11
Light vehicle	5	3	2	1	1	1	1	1	1
Mach. depreciation	36	33	32	32	33	31	33	24	33
Power costs	$92	$77	$69	$68	$68	$67	$70	$63	$75
Drying	6	5	5	5	4	5	5	4	5
Storage	5	4	4	4	3	4	2	2	2
Building repair	6	4	4	4	4	3	4	6	7
Building depreciation	7	6	5	5	6	6	7	4	8
Building costs	$23	$19	$19	$17	$17	$18	$18	$16	$22
Unpaid labor	69	46	32	24	21	18	22	18	16
Paid labor	2	5	7	9	12	12	9	13	19
Labor costs	$72	$51	$38	$33	$33	$30	$31	$31	$35
Insurance	14	13	12	12	12	11	11	9	11
Misc.	9	7	6	5	5	6	5	5	4
Non-land interest	24	22	22	22	22	23	23	22	24
Overhead costs	$47	$41	$40	$39	$39	$39	$40	$36	$40
Land interest	35	24	19	16	18	14	15	15	17
R.E. taxes	11	7	5	5	5	4	4	4	5
Cash rent	35	39	45	51	52	56	61	40	71
Share-rent leasing	38	46	42	38	34	35	32	43	18
Land costs	$119	$116	$112	$109	$108	$109	$112	$100	$111
Total Costs	$449	$401	$373	$364	$360	$365	$372	$349	$376

Source: Illinois Farm Business Farm Management Association and Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign.