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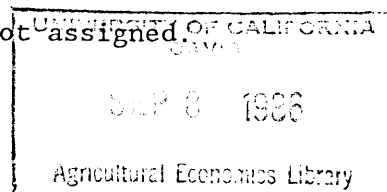
MANAGERIAL PERFORMANCE AND INCOME VARIABILITY
FOR A SAMPLE OF ILLINOIS CASH GRAIN PRODUCERS

by

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Farm business analysis

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ABSTRACT

Managerial ability is thought to be a key determinant of success in farming. This analysis evaluates managerial performance for a sample of 179 Illinois cash grain producers from 1976-83. Characteristics of the top performing groups are presented and the variability of performance is assessed. Further research needs are suggested.

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Introduction

Management and the decision making process have long been a concern of both scholars in academia and of actual decision makers. Within the last five years a number of books have achieved best-seller status, even though focused on the seemingly mundane topic of decision making in large corporations (Hellor, Iacocca, and Peters and Waterman). This heightened awareness of problems associated with decision making undoubtedly arises from the turbulent economic conditions of the last two decades and the resulting pressures that have been exerted upon the competitiveness of American firms.

Agricultural economists also have a rich tradition of analysis and education related to the role of decision making in the management process (Jensen). Inspection of a sample of popular farm management texts finds that the lead chapter in each relates to the management process and decision making (Kay; Harsh, et. al.; and Osburn and Schneeberger). A key feature of the study of management in the farm firm is its traditional orientation to decision making in the small firm with one or a limited number of managers involved. While this attribute raises considerable difficulty for the individual farm entrepreneur, faced with simultaneously conducting a number of tasks, it is a useful distinction for analytical purposes.

Relating to the study of management in general, Davis and Olson denote three perspectives that have been used for analyzing decision making:

- o the classic economic model
- o the administrative model
- o the human expectations model.

The classic economic model assumes the decision maker to be economically rational, having complete certainty relative to potential outcomes and their consequences. The pioneering work of Simon (1960) is probably most closely linked to the concepts of the administrative model of decision making. Here the decision maker is defined as a satisfier rather than as an optimizer, making decisions in an uncertain world of limited information. The human expectations model further extends our view of the complexity of decision making by incorporating variability arising from characteristics of individual decision makers. This more psychological view of the manager suggests that actual decisions may be significantly affected by the individual's cognitive style of learning, as well as the economic facts of the situation (Huber).

Within agricultural economics, it appears that two major approaches have been utilized in conducting research and educational efforts to improve agricultural decision making. The first has relied on quantitative models of decision making situations to draw inferences and develop recommendations for actual decision makers. As noted by King and Sonka, these types of quantitative analyses based on the static theory of the firm were particularly well suited to the relatively stable environment of the 1950's and 1960's. Recent computational and analytical improvements, and a significant increase in the rate of change in the external environment, have led agricultural economists to relax the constraints of the classic economic model to develop more realistic models of decision making behavior.

The second type of agricultural management research has been more focused on the functions that managers perform. While closely linked to the administrative model noted previously, these analyses have attempted to

realistically define the actual activities conducted by agricultural decision makers. The most significant example of this line of work is, of course, the Interstate Managerial Studies of the 1950's (Johnson, et. al.). Although the classic economic model was one of their key conceptual underpinnings, such studies also drew heavily upon concepts from other behavioral and decision sciences.

A major element affecting firm level behavior is the potential for income variability. Again agricultural economists have devoted considerable effort to analysis in this area (Barry). The preponderance of this work has been focused on the effects of yield and price variability. Relatively less work has involved analysis of the actual experience and behavior of individual producers over time (Sonka and Patrick). Recent work has demonstrated that individual producer responses to risk may be more complex than the profession's modeling approaches have been able to accommodate (Patrick, et. al.; Robinson and Lev).

The current financial crisis in American agriculture underscores the need for continued efforts to enhance the decision making capabilities of agricultural managers. King and Sonka note that future analyses of managerial processes need to be more focused on the specific actions and decisions of individual managers, if such analyses are to generate information that is relevant to the problems of agricultural decision makers.

Analysis of actual decision making behavior is important for reasons other than simply improving firm-level performance. Much of our macro and policy-level analysis is premised upon microeconomic foundations. Some have

argued that significant improvement to aggregate analyses can only be derived by enhancing those micro foundations. Indeed, Simon (1984) asserts:

...that the continuing progress of the (macro) economic theory of change and cycles requires massive empirical work at the level of the economic agents who make decisions--for example, the consumer and the firm. The dynamics of the economic system depends critically on just how economic agents go about making their decisions, and no way has been found for discovering how they do this that avoids direct inquiry into and observation of the processes (p. 52).

Goals of this study

Although the importance of the manager and decision making is continually stressed, little is known about the quality of decision making among agricultural producers, the decision processes actually employed, or the information used to support actual decisions. Indeed there is relatively little evidence which rigorously documents the value of input from the individual manager. The effort described in this paper is an exploratory study relating to the quality of decision making among farm producers. Specifically, the effort documents the characteristics of managerial performance over time for a sample of farm producers. In addition the variability of income performance for this group is assessed.

Data sources

If the decision making capabilities of the individual farm producer are important, it should be possible to identify farm decision makers whose business performance is consistently superior or, conversely, consistently inferior to the performance of a group of peers. To determine these

performance characteristics, a relatively high quality set of consistent data on performance for a group of farm firms is required. The set of data should relate to a large number of homogeneous farm firms. Several years of consecutive observations for each firm are required to document variability of returns.

Such data sets are not widely available. A number of farm record systems, however, may have the capability to provide such information. This study utilizes an existing sample of data derived from the Illinois Farm Business Farm Management (FBFM) records. Continuous observations for the eight years, 1976-83, are contained in the data set for a sample of 179 cash grain producers. To be selected from the larger pool of FBFM cooperator data, each farm record had to have been certified usable by the FBFM field staff representative in each of the eight years, more than 95 percent of the land base had to have been available for crop production, and less than 5 percent of farm receipts could have been from livestock sales. Although the data set had originally been selected for other purposes (Strack), its characteristics seem appropriate for the study of managerial performance described here. All economic data were converted to 1972 real dollars for the analysis.

To provide an indication of the types of farms included, Table 1 presents average, minimum and maximum values for the farms in the sample. These variables will be discussed in greater detail when the performance measure results are presented in the following section. Inspection of the data in Table 1 does confirm that the sample contains farms which are typical of family-oriented, commercial farms of the Midwest.

Table 1. Averages and ranges for a set of descriptive variables for a sample of 179 Illinois cash grain farmers over the period 1976-1983.

Variable	Units*	Overall Average	Minimum	Maximum
Farm size	Acres	598	153	2,121
Corn acreage	%	49	15	92
Diverted acreage	%	2	0	9
Soil productivity index	--	86	46	100
Value of production	\$	112	44	204
Total operating expense	\$	59	16	136
Interest expense	\$	6.87	0	45.28
Corn price	\$	1.46	.76	2.35
Soybean price	\$	3.86	3.24	4.28
Corn yield	Bushels	125	64	150
Soybean yield	Bushels	42	25	57

*Economic data are in 1972 constant dollars.

Results

A major question relating to an evaluation of performance is defining a measure which appropriately discriminates among performance levels.

Although numerous alternatives exist, this study utilizes two relatively straightforward measures of performance, management returns per acre and rate of return on nonland assets. Here management returns are defined as the residual remaining after imputed charges for interest on capital and unpaid family labor have been deducted from net income. The rate of return on nonland assets is defined as net farm income divided by the value of nonland assets. Although more comprehensive measures need to be tested, these measures are consistent with those commonly utilized in analyzing business performance.

Tables 2 and 3 present data for top performing farmers based on the two measures of managerial performance. Values for selected characteristics of these groups also are displayed. The intent of this segment of the analysis is to document that differences in managerial performance exist within the sample group and, if they do, to identify major structural variables which might explain those differences. The first two columns of Table 2 list values for the group of farmers identified as being in the top 1/8 and top 1/4, respectively, of the sample; based on management return per acre evaluated over the entire eight year period. The first two columns of Table 3 are analogous to those of Table 2, except that the ranking criterion is rate of return on non-land assets. Note that the values displayed in the two tables are not identical because the farmers included in each top performing group differ by criterion used. For comparison purposes, the last column in each table provides average values for the entire sample.

Table 2. Eight-year average values for performance measures and descriptive variables for top farmers based on management returns per acre.

Variables	Units*	Farmers ranked by management returns		All Farmers
		Top 1/8	Top 1/4	
Management returns per acre.	\$	24	20	5
Rate of return on non-land assets . . .	%	36	33	14
Farm size	acres	597	634	598
Corn acreage.	%	50	49	49
Diverted acreage. . . .	%	2	2	2
Soil productivity index	--	87	88	86
Value of production.	\$	117	113	112
Total operating expenses.	\$	54	52	59
Interest expense. . . .	\$	6.58	5.46	6.87
Corn price.	\$	1.52	1.49	1.46
Soybean price	\$	3.95	3.93	3.86
Corn yield.	bushels	126	129	125
Soybean yield	bushels	44	44	42

*Economic data are in 1972 constant values.

Table 3. Eight-year average values for performance measures and descriptive variables for top farmers based on rate of return on non-land assets.

Variables	Units*	Farmers ranked by management returns		All farmers
		Top 1/8	Top 1/4	
Management returns per acre.	\$	15	13	5
Rate of return on non-land assets . . .	%	48	40	14
Farm size	acres	564	527	598
Corn acreage.	%	51	49	49
Diverted acreage.	%	2	2	2
Soil productivity index	--	86	88	86
Value of production.	\$	120	117	112
Total operating expenses.	\$	50	51	59
Interest expense.	\$	2.11	2.57	6.87
Corn price.	\$	1.45	1.46	1.46
Soybean price	\$	3.90	3.91	3.86
Corn yield.	bushels	123	126	125
Soybean yield	bushels	42	42	42

*Economics data are in 1972 constant values.

The first two rows of each table support the contention that substantial differences in performance exist for this time period. Management returns for the top two groups were over \$15 greater (in real values) per acre than the entire group average (Table 2). Similarly, the top two groups of performers, with respect to return on nonland assets, had values that were twice the rates of the entire group (Table 3).

Tables 2 and 3 also list data for several values which might be expected to contribute to these performance differences. These variables are those that are readily available from farm record data. More extensive analysis of managerial differences is warranted if these variables do not sufficiently explain the observed performance differences. Farm size has long been considered to be a major factor in determining farm success. In general, these results show that the farms in the four high performing groups were of approximately the same size as the entire group. It is interesting to note that the top groups with respect to rate earned are somewhat smaller than the group average. Cropping pattern is another variable that might be thought to explain performance differences. However, for the entire period the average proportion of the acreage in corn and the proportion that was diverted for government programs were quite constant across groups.

Because of the sensitivity of crop production to climate and soil characteristics, location of the operation within Illinois is a non-managerial factor which would be suspected to affect the performance measures. Figure 1 identifies (by county) the location of producers in both the top 1/4 and bottom 1/4 of the entire sample. Visual inspection of that figure suggests that location did not guarantee success nor predefine inferior performance for the individuals in this sample.

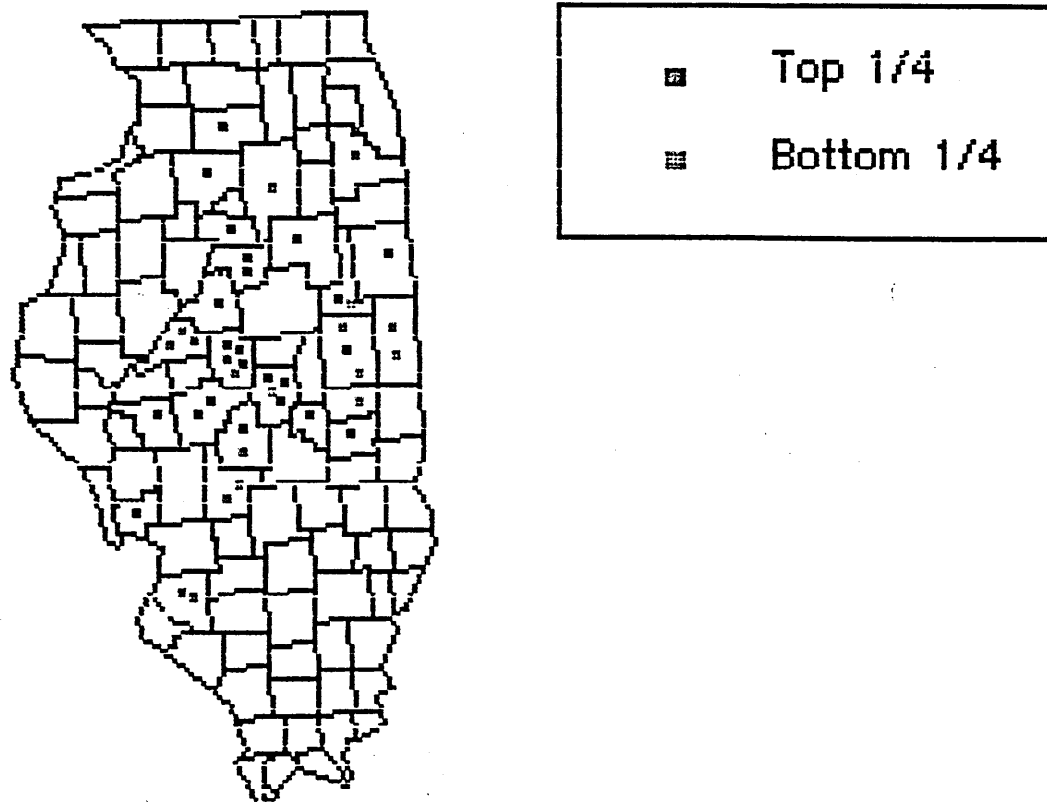


Figure 1.

Location of Farms in Sample, Top and Bottom Quartiles,
when Ranked by Management Returns

The farm record data also contain an index of basic soil productivity, defining soil quality up to a maximum value of 100. The average values for this soil productivity index for the five groupings shown in Tables 2 and 3 are quite similar.

The value of farm production in the top performing groups differs significantly from the overall average of the sample. The top 1/8th group with respect to management returns receives nearly \$5 more per acre. Both top performing groups with respect to rate of return have receipts more than \$5 per acre greater than the overall average. On the cost side, all four top performing groups are significantly below the total sample average in terms of the cash expenditures required for production. These cost differences range from \$5 to \$8 per acre.

Interest costs have become a factor of major concern for farm operators, particularly during the latter portion of the sample period. Although the top performing groups consistently spend fewer dollars on interest, savings in this category range from less than \$0.30 to slightly more than \$4 per acre. These savings do not, however, comprise a majority of the cost savings noted.

Price and yield patterns for the top performing groups are surprisingly similar to those for the entire sample average. The soybean price received is the only factor for which the top groups achieve consistently better performance. The extent of that differential is relatively small, however, ranging from 8¢ to 13¢ per bushel.

Although several differing characteristics are noted by these results, it appears that better managers on average tend to be superior in all functions rather than making significant gains in only one function, such as marketing, physical production or cost efficiency. This suggests that it is the integrative managerial function that is the key to superior performance.

This result has significant implications for resident and extension education efforts as this attribute is considerably more difficult to teach using the traditional lecture approach.

Analysis of managerial performance requires criterion measures which provide consistent, meaningful and accurate rankings. The two measures shown here were selected as being representative of common financial measures used in business analysis. However their rankings of performance differ considerably. For example, only eight farmers were included in the top 1/8th category for both criteria. Twenty-four farmers were included in both criteria's grouping of top 1/4th producers.

Income variability

The second factor of interest in the study was the actual pattern and extent of income variability experienced by the entire sample as well as the top producers. One means to consider variability is to assess the year-to-year stability of the top group rankings just discussed. Figure 2 illustrates the average management return per acre for the producers in the top 1/8th category, the top 1/4th category, and for the entire sample for each of the eight years in the period. Figure 3 shows similar data when the performance criterion is rate of return on nonland assets.

The patterns displayed in these two figures are relatively similar. A vivid message indicated by these data is the pronounced deterioration of the general economic environment for corn and soybean producers over the eight year period. Although, on average, the top producers were consistently superior to the overall group, they still suffered a decline in real earnings over the period. A second image suggested by these figures is that the relative position of the top performing groups did not change markedly over the period.

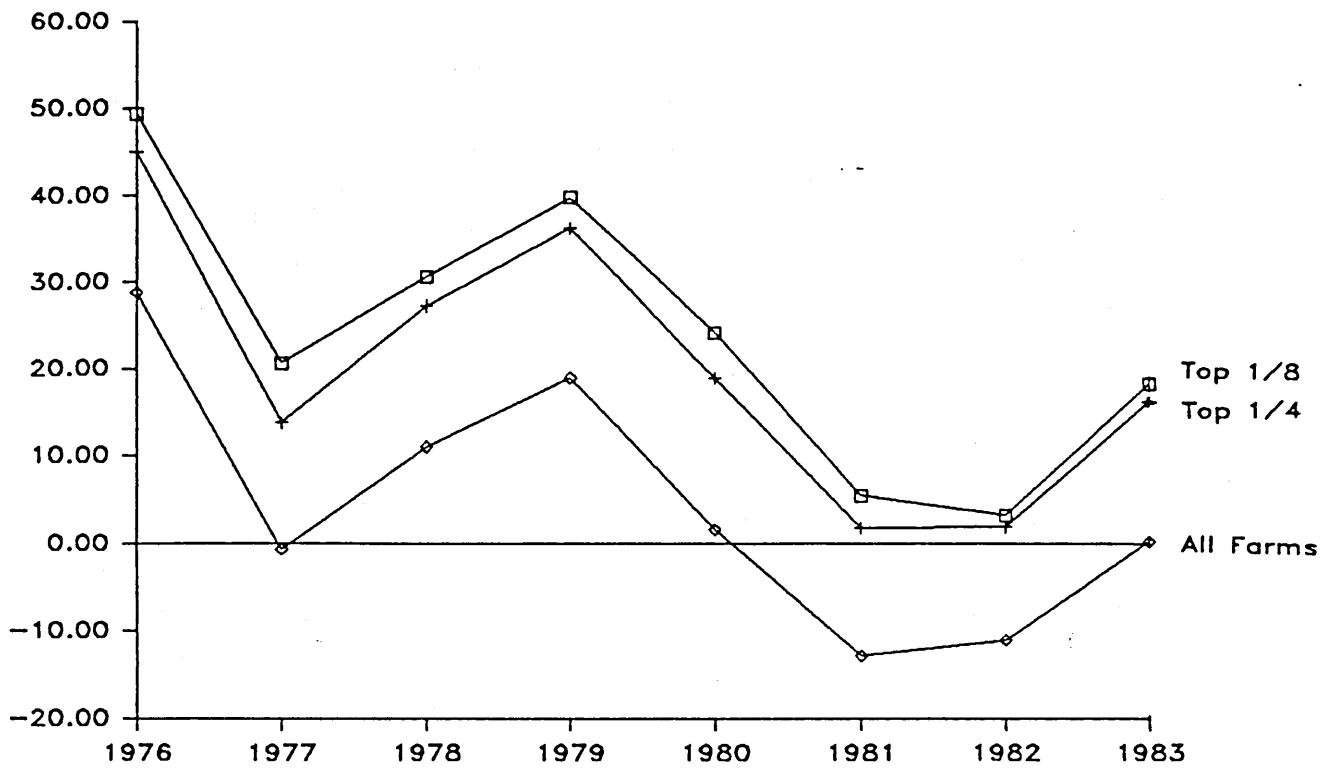


Figure 2. Average Annual Management Returns Per Acre
For Sample Farmers From 1976-1983

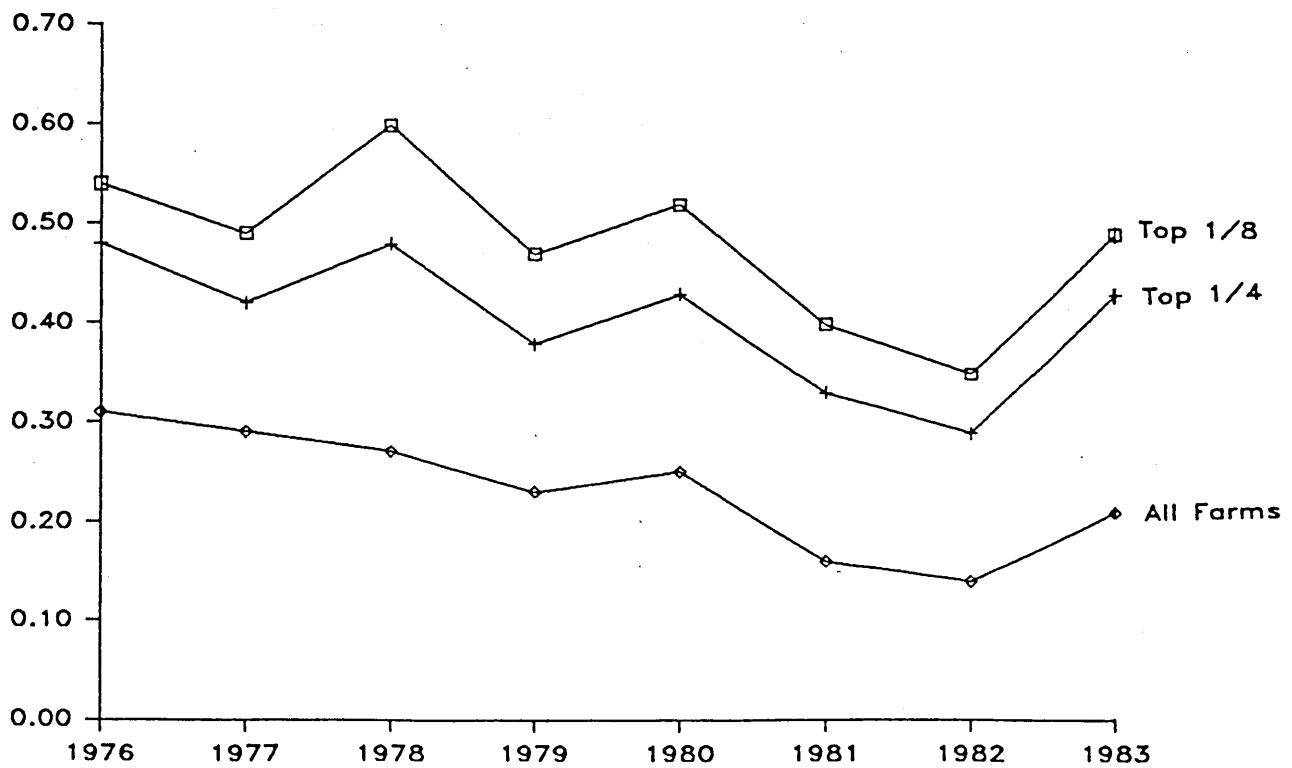


Figure 3. Average Annual Rate Of Return On Non-Land Assets
For Sample Farmers From 1976-1983

These average data mask a tremendous amount of year-to-year variation in performance, however. For the sample of 179 producers, 128 producers had annual management returns which ranked in the top 1/4th of the sample in at least one year of the eight in the sample. For rate earned on assets, 112 producers ranked in the top 1/4th in at least one year. The number of producers who consistently achieved higher levels of performance, of course, is considerably less than those values. For example, using the management returns criterion, only 22 producers were in the top 1/4th category in 5 or more years during the period and only 4 producers were in the category in 7 or more years. These results underscore the difficulty associated with monitoring farm business performance on a year-to-year basis and reinforce the need for analytical tools that utilize accrual versus cash measures of performance.

One would expect the producers in the top categories when performance over the entire period was considered, would tend to achieve relatively high performance levels more often during the period. For the rankings based on management returns, the producers in the top 1/8th group on an overall basis, however, were in that same category on an average of only 3.4 times out of the eight year period. That same producer group averaged being in the top 1/4 category 5.4 times over the period. Comparable estimates for the ranking by return on non-land assets are 4.59 and 6.27 times for the eight period. This again suggests considerable variability of performance even for groups of producers who over the longer run are superior achievers. In addition, this result raises the possibility that the producer who is a top performer over the long run may not choose to undertake some strategies, even though those actions may be superior in some particular years.

Implications

The major purpose of this paper is to document the extent of performance differences existing among farm decision makers for a relatively large group of homogeneous producers evaluated over a series of years. Although summaries of farm record systems routinely define such performance differences on a yearly basis, little work has been done to analyze these performance differences on a longer run basis. In addition, the characteristics of the top performing producers were investigated in an exploratory fashion. It appears that a number of the general characteristics typically thought to be crucial, such as farm size or cropping pattern, are not major factors leading to these performance differences. A characteristic that is documented by these results is that considerable year-to-year variability in relative achievement does exist.

Numerous innovative research opportunities are suggested by the results of this analysis. Although many more could be detailed, several will be briefly discussed here. First, it is imperative to more rigorously define managerial performance, identify more comprehensive measures of performance, and repeat the type of analysis done here for those measures. A value of using farm record data is that a number of farm record systems exist in the nation. Presumably similar analyses could be done for producers of other commodities and in alternative geographic locations.

The variability of performance noted previously suggests a continuing need for risk management related efforts, including efforts to define the interaction between risk management strategies and overall managerial performance. In addition to efforts to discover workable risk management strategies, analysis of practices used by superior managers would seem valuable. Because of these considerable year-to-year fluctuations, there

appears to be a need to develop analytical tools and measures that producers and their advisors can use to evaluate performance over the longer run.

Another exciting opportunity is to better define why these differences in managerial performance exist. It appears that the integrative managerial function is a key, in addition to superior performance in the separate managerial functions. Although requiring methodologies that may be based in disciplines other than economic theory, defining the decision processes, information sources, and managerial strategies of farm producers who are consistently achieving levels of high performance could significantly enhance decision making on farm firms.

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