Management Factors:

What is Important, Prices, Yields, Costs, or Technology Adoption?

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(updated July 2011 – data from 2001-2010)

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What's New in this Paper?

This paper looks at the connection between differentiating your farm in core management areas and the net profit gains that result. It is an update of previous research, however, this version introduces new variables – seed costs per acre and the proportion of custom hire used – to answer additional questions related to farmers' management styles. Does spending more money on new seed varieties and hybrids increase income enough to offset the higher cost? Does custom contracting free up time, optimize planting, spraying, and harvesting windows, or have other effects that lead to increased net income? It also includes a section on how farm size and marketing abilities affect net incomes and how these factors have changed over time. Precision farming technology, new genetically modified seed varieties, and commodity market trends can alter production practices and factors impacting relative profitability over time. Thus, the effects particular management practices and abilities have on profits may change over time, and new management areas may become important. We try to capture and identify these possible trends and changes in this paper.

As in previous versions of this paper (see www.agmanager.info/farmmgt/finance/management), there is a section reporting the net profit results gained from "being in the best third" for a particular management trait. This aligns with our main focus on degrees of differentiation's effect on net profits, and provides a type of benchmark for farmers to strive for. It is another way of looking at the type of performance and farm characteristic benchmarks a farm should be striving to achieve.

Defining Good Farm Management

Economically, a well-managed farm is one that *consistently* makes greater profits than similarly-structured *neighboring* farms having access to similar resources and pricing opportunities. Per acre profits and other management performance measures for individual farms are compared to those of an average farm in their respective Kansas Farm Management Association (KFMA) region. That is, individual farms are compared to the average of other farms located in comparable production environments and subjected to the same outside factors, such as crop and input prices, interest rates, etc. Thus, even during especially good or especially bad times for the industry as a whole, or specific regions, individual management differences can still be identified. However, because random localized events, such as weather or pest problems often mask differences or similarities in management, even within Farm Management regions, it is important to observe only those profit differences among farms that persist over time.

In the context of crop production management, an operator could be more profitable than his neighbors for a number of reasons. Perhaps he tends to get higher crop yields. Or perhaps he is a better marketer and consistently gets higher crop prices. Maybe he does a better job of controlling costs than his neighbors. Or maybe he does a better job of using fixed assets such as land in planting intensity. Or, does the more profitable manager do a better job of determining when and how to adopt new agricultural technologies – such as less tillage? Other questions also arise. Are profitable operators especially good at one thing? Or, are they better than average at a number of tasks? How easy is it to be better than average at cutting costs or increasing crop prices? How are profits impacted by having input costs that are 10% lower than average? This paper addresses questions such as these in an empirical study of Kansas farms from 2001-2010. This study marks the eleventh such 10-year study of management factors, with the first one occurring in 1997 and examining the 1987-1996 time period. Previous study reports can be found at the www.agmanager.info website or otherwise obtained directly from the authors.

Description of the Study

The Department of Agricultural Economics at Kansas State University maintains an historical economic database of financial records from Kansas farms that are members of one of six regional farm management associations. The database is often referred to as KMAR, for Kansas Management, Analysis, and Research. Records from farms continuously enrolled from 2001-2010 comprise the principal data used in this study (678 farms). The KMAR data were augmented with data from other sources, such as Enterprise Profit Center and Kansas Agricultural Statistics as needed (see Nivens, Kastens, and Dhuyvetter for additional detail).

Goals of this study involved quantifying the following basic management measures:

a) Per acre profit. In dollars per main cropped acre, how much greater (less) was each farm's cropping enterprise ***profit*** than the average farm in their KFMA region that year? This measure of economic profit equaled zero for the average farm in a region for a given year. Thus, negative values imply lower, and positive values higher, than average profits.

b) For each major crop (wheat, corn, grain sorghum, soybeans, and alfalfa) produced each year, what was a farm's ***yield*** as a percent of the county average for that year? What was the average of that measure across all crops raised by that farm for each year, where the average is a weighted average (by number of acres of each crop), so that crops with larger acreages on a farm are given more weight in the yield performance measure? This index provided a measure of yield superiority, with negative values implying lower than expected yields and positive values higher than expected yields.

c) As a percentage, how much higher/lower were crop input ***costs*** for a farm in some year relative to what was expected in the region for similar cropping programs in that year? This index provided a measure as to whether or not a producer was low cost relative to other producers given their particular crop mix.

d) As a percentage, how high or low were farm ***seed*** costs per acre, compared to the region's average. There are many different types of seed, at both ends of the price spectrum, for farmers to choose from. This index provides a measure as to whether producers spending more on seed, presumably to achieve higher yields, realize higher profits per acre.

e) Compared to the average farm within a region in a given year, how much more or less, as a percentage of machine costs, are ***custom*** hire costs. Producers have increasingly asked about the custom hire practices of successful farms. Net custom costs, the difference between income from custom work and custom expenses, are divided by total machine costs to measure the relative amount of custom work farms hire. This should shed light on the net profit outcomes of contracting more or less work to custom operators.

f) For the important crops raised each year, as a percentage, how much higher/lower was the overall ***price*** compared to what was expected based on other farms in the county raising the same crop mix and having the same crop yields? This provided a general measure of pricing superiority/inferiority (Is the producer a relatively good marketer?).

g) Compared to the average farm within a region in a given year, how much more or less, as a percentage, of total "chemical (herbicide & insecticide) cost + crop machinery cost + crop labor cost" was chemical cost? This provides a measure of the impact relative use of chemicals (rather than machinery) has on crop relative profitability. It is intended to serve as a proxy for less tillage, i.e., ***technology***.

h) As a percentage, how much higher/lower was the ***planting intensity*** for a farm in some year relative to what was expected in the region in that year? This provides a measure of a manager's ability to use fixed assets.

i) Compared to the average farm within a region in a given year, how much more or less, as a percentage, of total crop acres does a farm ***rent*** rather than own. This provides a measure of the impact land tenure (rent versus own) has on crop relative profitability.

j) As a percentage, how much higher/lower were overall ***government payments*** compared to what was expected based on other farms in the region? Because government payments primarily are based on historical yields and acres, they cannot necessarily be "managed." However, differences in payments between farmers likely will impact profitability differences so this variable is included in the analysis so that such less-manageable features do not mask what we wish to find out – how much management matters.

k) Relative to the average farm within a region in a given year, how much larger or smaller, as a percentage, is the ***size*** of the farm in terms of total crop acres. This variable is included to determine if farms that are larger (smaller) than the average sized farm are more or less profitable – after accounting for the other management variables.

l) As a percentage, how much higher/lower was the overall ***risk*** (farm income variability across years) compared to other farms in the region? This provides a general measure of how farm profitability is associated with risk. Also, it makes our measure of profit a "risk-adjusted" one so that readers do not simply respond with statements such as "Sure, doing X makes money, but no one would want to take such risks."

The tillage technology index used in this research is referred to as "less-tillage" to avoid being confused with the terms "reduced-tillage" or "no-till." The measure, computed for each farm each year, measured the tradeoffs between herbicides and tillage (and crop labor).[1]

$$\text{less-till index} = \frac{\text{herbicide expense}}{\text{herbicide expense} + (\text{crop labor and crop machinery operation expense})}$$

The less-till index increases in value as herbicide expenditures increase relative to crop labor and machinery expenditures.[2] With 0 herbicide expense the index equals 0 and if labor and machinery costs were 0 the index would equal +1. The index value would tend to be small and likely never even reach 0.5 because crop labor and machinery operating costs typically exceed herbicide costs.

The "less-tillage" index also captures changing crop mixes to the extent that different crops rely more (less) on herbicides than others. Thus, while this variable quantifies the trend towards no-till production, i.e., greater herbicide application and less tillage (machinery and labor), changes cannot be attributed exclusively to tillage practices. This is unlikely a large problem because often tillage and crop rotation decisions go hand in hand. However, changes in herbicide prices, decisions to use more (less) expensive herbicide products, and highly variable fuel prices over time somewhat compromise the effectiveness of this variable. For example, a producer that uses Roundup will have a different less-till index value than a neighboring producer using a generic glyphosate product even though they may have identical tillage practices. Regardless, this index provides a good place to start a discussion about the impact of tillage practices on profitability.

After quantifying each of the management measures described above such that they were "relative to their neighbors" (i.e., compared to the average farm in the region), the effect yield,

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[1] A farmer's involvement in less-tillage practices is not typically all-or-none. Often only a part of the farm is no-tilled, or only in some years, or only with some crops, or only for some field operations. Thus, it is most difficult to label one farmer as a no-tiller and another as a conventional farmer. What is needed is some measure of the extent tillage is used that covers the continuum from moldboard plowing to 100% herbicide-based weed control and seedbed preparation. Then, the impact of that less-tillage measure on profitability could provide the answers needed. But, farm profitability is affected by more than the decision to adopt less tillage; other management characteristics might be equally important, as might be luck or land quality or weather. To properly understand the relationship between no-till and profitability it is important to identify the impact of less tillage on profitability – *after* other important profitability-determining factors are accounted for. After all, no-till adoption essentially is a management issue similar to marketing or cost control.

[2] Machinery operation expense is defined as the crop share (as opposed to livestock share) of: machinery repairs, gas-fuel-oil, farm auto expense, motor vehicle depreciation, and machinery-equipment depreciation; plus crop machine hire expense; plus an opportunity interest charge on crop machinery investment; minus machine work income. To that value is added the crop share of labor (operator, hired, and unpaid family labor).

cost, seed cost, custom hire, price, technology adoption, planting intensity, rent, government payments, farm size, and risk had on profitability was established in a statistical model.

Results of the Farm Management Study

The first question to answer is, How persistently did farms differentiate themselves from their region's average for the various management measures: profits, yields, costs, seed costs, custom hire, prices, less-till adoption, planting intensity, rent, government payments, and farm size? This was determined by averaging each of the farms' annual management measure difference from the region mean over the 2001-2010 period and testing whether this average measure was statistically different from 0 (from the average or typical farm).

Statistical significance is important for establishing confidence in the results. Using the profit per acre variable as an example, consider hypothetical Farm A, which is assumed to have this annual profit stream over 5 years: {−$80, $200, −$50, −$270, $300}. The average annual profit for farm A is $20/acre. What would you expect farm A's profit to be in year 6? Your best guess is probably $20/acre, but given the farm's high profit variability you would have little confidence in that prediction. Given Farm A's volatile profits it can easily be shown that its $20/acre profit is not statistically different from 0. Now consider Farm B, whose profit stream is {−$5, $30, $20, $25, $30}. Like Farm A, Farm B's average profit is also $20/acre. Now, however, it is much easier to have confidence in a $20/acre profit prediction for year 6. In this case, the $20 average is statistically different from 0. Farm B's profits are significantly more persistent than farm A's. In this simplified example it is much easier to believe that farm B's manager has the management skills necessary to make positive profits of $20/acre. On the other hand, it appears farm A's $20/acre profits might chiefly be due to chance. In other words, the profits of farm B are *persistent*, whereas the profits of farm A are much more random.

There is another important characteristic about our analysis to understand before interpreting the results of this study. This analysis measures how persistently farms differentiate themselves from their neighbors' (i.e., other farms in the same KFMA region) average performance and management measures and how that relates to profit gains. We draw conclusion from differences, not absolute values for farm profit, prices, costs, or the like. Keeping with the profit example in the above paragraph, consider another example farm (Farm C), and how this analysis would interpret profits. Farm C's profits over five years were {−$5, $0, -$5, -$10, $0}. For this five-year period, assume the region's average profits were {-$20, -$15, $-15, -$20,-$15}. Farm C's five-year average profit was -$4/acre and the region's average was -$17/acre. We compute and analyze the difference between individual farm and region profits for each year; in this case they are {$15, $15, $10, $10, $15}. On average, Farm C differentiates itself by $13/acre from the region average. Despite having negative average profits, Farm C consistently outperforms the average farm in the region and would thus be considered a "better than average" manager. By focusing on "different from average" values, we hope to eliminate the affect that uncontrollable forces have on farm performance across the state. Given that broad factors can impact the absolute values for profit in a region (e.g., drought in southwest and south central Kansas in 2011) or the entire state (e.g., high commodity prices in 2011), this differencing approach takes into account these factors when determining the profit gains attributed to better management performance.

Based on the 678 farms analyzed, Figure 1 shows persistence of management traits by reporting the percent of farms whose 2001-2010 10-year average management measure was statistically different from 0 (from the average farm in that area). With 80 percent of the farms statistically different from 0, the percent of acres rented (Rent) is shown to be highly persistent among farmers. As might be expected, this indicates that producers tend to rent a consistently high or low percent of their crop acres from year to year. The most persistent management measure is size; however, this and government payments (Govt) are not highly manageable, at least not in the short run. Therefore, of the more manageable traits, the next most persistent measure, with 68.2 percent of the farms statistically different from 0, is the cost of custom work as a percentage of total machinery costs (Custom). This new variable indicates that farmers in Kansas use significantly different amounts of custom planting, spraying, and/or harvesting services. The other new management variable (Seed) showed that only 41.9 percent of farms have seed costs persistently different than region averages. Planting intensity (Plant) is the next most persistent trait. Producers tend to have consistently low or high planting intensity relative to their neighbors, not jumping about from year to year. Cost and less-tillage technology adoption (Tech) were the next most persistent management traits, where 61.3 (Cost) and 54.4 (Tech) percent of the farms were persistently better or worse than their neighbors on average. Cost differentiation was marginally more persistent in this analysis compared to past studies, possibly reflecting higher more volatile fertilizer and fuel prices. A smaller number (39.1%) of farms was significantly better or worse in realized yields than their neighbors. This should not be too surprising given that crop yields are so weather-dependent. The least persistent management measure is price, where only 27.4 percent of the farms received significantly higher or lower prices than the average. While this is the least persistent management trait, this value has increased from previous studies suggesting that more producers are differentiating themselves from others with regard to price (both higher and lower) today than in the past.

For farms wishing to differentiate themselves from their neighbors, Figure 1 suggests which management aspects should be the easiest ones to focus on – those with the greatest persistence. For example, it should be relatively easy for a farm to set itself off from its neighbors, presumably to make more profit, by either increasing or decreasing the percent of acres rented, or hiring a higher or lower percent of custom operations, or changing

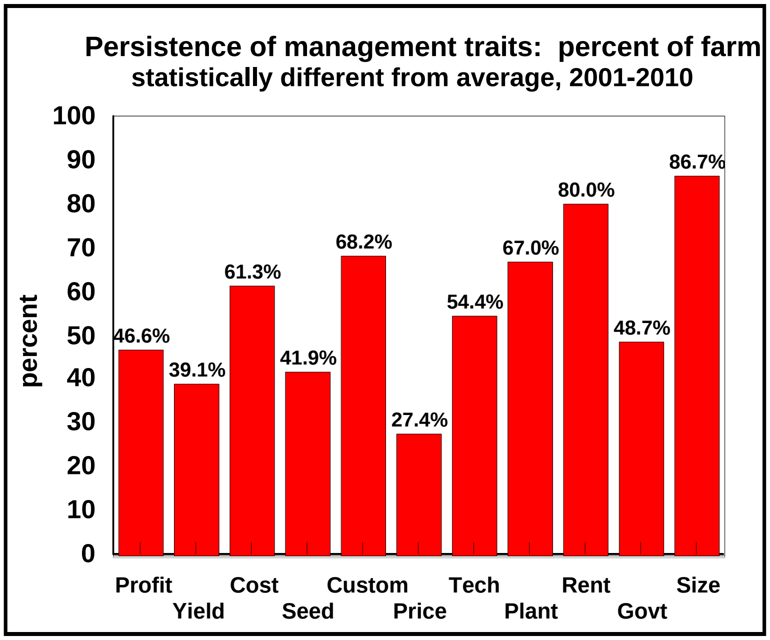

Figure 1

their planting intensity. We know that because so many farms have demonstrated they can do it. On the other hand, the low persistence on price management suggests it will be especially difficult for a farm to become better at achieving higher prices than its cohorts. But, the appropriate effort expended to achieve higher prices depends also on the expected payoff, which is discussed later.

How variable are the management measures? Table 1 reports the average value and the standard deviation for each measure, revealing a seemingly wide range of profitability. A larger standard deviation indicates more variabiliby across farms and thus the degree to which some farms are superior or inferior, relative to the average, is greater. Likewise, a smaller standard deviation indicates less differentiation across producers. Farms that have costs one standard deviation lower than the mean are 28.3 percent below their neighbors' costs. Top managers for crop yields have 14.2 percent higher yields than average. Figure 1 showed that it likely would be difficult to become a superior price manager. Table 1 shows that even those who are good at pricing (one standard deviation change from mean) get prices only 8.7 percent higher than average. There is significant variation in the seed costs and share of custom work farms use in Kansas. For seeds costs, farms one standard deviation above the average have 37.2 percent higher seed costs than the region's average farm. In the case of custom hire as a share of machine costs, one standard deviation below or above the average means a 107.4 percent difference than the average. This deviation was significantly greater than the next highest variable deviation, profit, suggesting the use of custom hire practices varies considerably across producers.

Table 1. Variability of Management Measures: Average Value and Standard deviation.

Measure	Average*	Standard Deviation
Profit	0.00	95.8
Yield	0.00	14.2
Cost	0.00	28.3
Seed	0.00	37.2
Custom	0.00	107.4
Price	0.00	8.7
Less-till technology adoption (herbicide use)	0.00	46.2
Planting Intensity	0.00	22.8
Percent of crop acres rented	0.00	44.8
Government payments	0.00	64.7
Size	0.00	75.2
Risk (Profit variability across years)	0.00	64.0

* because individual farm measures were differenced from the average across farms, the average difference is zero by mathematical definition

In general, each value in table 1 is expected to have the same likelihood of occurrence. That is, it should be as easy to get 28.3 percent lower costs as it is to get 8.7 percent higher prices. If we assume that the typical price just breaks even, then it is certainly more profitable to be a superior cost manager. Like figure 1, table 1 suggests that producers should focus on planting intensity, cost, and yield ahead of price (i.e., a 28.3% reduction in cost is more profitable than an 8.7% increase in price). However, the relationship each of these has with profits must be determined before making strong recommendations as to where to focus management efforts. Historically, this report would show a figure depicting changes in the less-till index values over time by Kansas Farm Management region. In such figures it was easy to point to the idea that farmers, on average, have been replacing tillage with herbicides over the years. However, in more recent years, temporally declining glyphosate (an important herbicide; Roundup) prices, especially relative to tillage-related costs such as diesel, have caused the regional graphical lines to appear essentially flat. Consequently, beginning with 2006, we no longer show this figure. But, though our index is now less of an indicator of temporal trends in less-tillage, it still remains as an important numerical indicator of less-tillage relative to one's neighbors in farming.

Can the effects of management traits be quantified? For example, can we establish how much more profitable a farm manager was who was one standard deviation greater than the average of a management trait compared to if he were only at the average? To accomplish this, a statistical model was constructed that measures the effect each management trait has on profitability, holding all other traits constant. Although the only technology adoption variable explicitly considered was our less-tillage proxy, other technologies also might be important in explaining profitability. Consequently, because technology adoption often can be measured by farm size (larger farms tend to be those that adopt new technologies), our statistical model also included a variable of farm size (the percent of acres greater or less than the regional average). Variables that represent core producer management abilities and farm characteristics were included – planting intensity to marketing to size – that explain a significant amount of the variation in farm profits. While all the variation was not explained ($R^2 = 52.8$), we are still able to draw conclusions about the connection between specific management abilities and farm profits.

Table 2 reports the impact of the various management values on profit per acre. The left side of the table reports how marginal changes in management impacted profitability for the farms in this study. A one percentage point increase in yields resulted in farm profits rising by $0.51/acre. A one percentage point increase in costs resulted in farm profits decreasing by $0.68/acre. However, increasing seed costs by one percentage point, relative to the average, increased profits by $0.15/acre. Also, a one percentage point increase in relative herbicide usage resulted in increased profits of $0.27/acre. Hiring custom operations was not statistically significant, indicating that producers that rely more on custom operations have similar profits as those who use less custom services. A one percentage point increase in the percent of crop acres rented resulted in increased profits of $0.12/acre. This suggests that producers who rent crop land have been more profitable than those who own their land. However, it should be noted that capital gains associated with owning land have not been included in this analysis, which makes it a farming profitability study rather than a land investment study; land ownership is considered a separate profit center, outside of this analysis. That is, owner-operators are "charged" a rent on owned land as if they rented it. A one percentage point increase in farm size is associated with a

$0.30/acre increase in profit, indicating economies of size in crop production. Increasing farm income variability by one percentage point resulted in a $0.64/acre increase in profit, which shows that producers who are willing to take on more risk receive a higher profit. Unique to the 2001-2010 period, profit per acre was inversely related to government payments received. Profits increased by $0.23 for a one percentage point *decrease* in government payments. This result is statistically significant, but is somewhat counterintuitive, especially if government payments are primarily direct payments. It may be that farms receiving larger government payments were receiving disaster payments (e.g., wheat freeze in 2007) later than the crop year involving the disaster, causing the model to be unable to adequately isolate the effect of crop yield from the effect of government payments.

Table 2. Impact on Profit per Acre of Management Traits.

Marginal			**One Standard Deviation Change**	
This change	Results in this change in profit/acre		This change	Results in this change in profit/acre
A 1% increase in yields	$0.51*		A **14.2%** increase in yields	$7.32*
A 1% decrease in costs	$0.68*		A **28.3%** decrease in costs	$19.16*
A 1% increase in seed costs above average	$0.15*		An **37.2%** increase in seed costs	$5.52*
A 1% increase in custom expenses below average	-$0.02		A **107.4%** decrease in custom costs	-$2.12
A 1% increase in prices	$1.34*		An **8.8%** increase in prices	$11.74*
A 1% increase in the % herbicide is of herbicide plus machinery costs	$0.27*		A **46.2**% increase in the % herbicide is of herbicide plus machinery costs	$12.40*
A 1% increase in planting intensity	$0.55*		A **22.8%** increase in planting intensity	$12.47*
A 1% increase in percent of acres rented	$0.12*		A **44.8%** increase in percent of acres rented	$5.26*
A 1% increase in government payments	-$0.23*		A **64.7%** increase in government payments	-$14.71*
A 1% increase in farm size above average	$0.30*		A **75.2%** increase in size	$22.31*
A 1% increase in farm income variability	$0.64*		A **64.0%** increase in farm income variability	$40.87*

* denotes significantly different than 0 at the 90% confidence level

The left side of table 2 does not address whether it is easier to get a one percent increase in yields or a one percent reduction in costs. One way to examine this is to look back at table 1 at the values associated with being one standard deviation above (or below) the mean in a management category rather than at its mean.[3] Roughly, it should be as easy to be one standard deviation above or below the mean in one category as another. Thus, the right side of table 2 reports the effects of those larger changes on profits. For example, going from a farm with average yields to one standard deviation above the average implies 14.2 percent higher yields, which implies $7.32/acre higher profits ($0.51 x 14.2). Being one standard deviation below the mean for costs impacts profits more than any other management trait except for the size measure (large farms are more profitable) and the risk measure, which is not necessarily a desired management factor. Of the other factors that are within the managers control, being one standard deviation above the mean in terms of planting intensity significantly impacted profits, followed by technology adoption, prices, yields, seed costs, and percent of crop acres rented.

Over the years that this study has been undertaken (first analysis was conducted in 1997 with 1987-1996 data), the least changing and likely most important result is that farms desiring to increase profitability should focus mostly on lowering costs (see the large value associated with the cost row in the rightmost column of table 2). The other variable that has consistently had a large and growing impact on profitability is farm size (more on this later). Also, from those prior studies we have regularly noted that managers should focus more on technology adoption, planting intensity, land tenure, and farm size than on crop yields and prices. Although these statements still are true in this present study, some additional points are worth making. This study is the fifth consecutive time that price management had a significant impact on profit (in early studies this variable was not statistically significant). In particular, this study shows that three of the primary traits, yield, percent acres rented, and government payments, have smaller profit impacts than price management. This is not so much an indication of weakening impacts of yield as it is strengthening impacts of price management over the years. Nonetheless, we should not lose sight of the fact that price impact is still less than the cost, technology adoption, and planting intensity impacts in terms of management.

It is worth noting that, despite our efforts to statistically identify a separate variable for each management trait of interest, it is likely that many reported impacts are still somewhat confounded. For example, less tillage typically goes along with increased planting intensity (i.e., less summerfallow in western Kansas and more double-crop soybeans in eastern Kansas). So, it might be that a reader would want to add together the technology impact and the planting intensity impact to represent the best expected impact of adopting less tillage (hence, $29.00/acre). Similarly, large farms tend to rent a greater portion of the crop land they operate. Hence, it might be that the impact of increased farm size actually is best measured by adding together the impact of renting and farm size (hence, $31.27/acre).

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[3] With data that follow a normal distribution (i.e., the bell-shaped curve), the mean plus one standard deviation is roughly equivalent to the average of the top-third of the data and the mean minus one standard deviation is comparable to the average of the bottom-third. Thus, evaluating the impact of a specific management trait at plus (minus) one standard deviation is similar to talking about a producer being in the top (bottom) third of producers with regard to that management trait.

Another View of the Impact of Management Traits

Evaluating a statistical model at the one "standard deviation different from average" variable value, as is shown in table 2, is similar to evaluating the model at the typical value in the "best third" of a category of interest – at least if variables are normally distributed about their means. Yet, thinking of farms as being in the "top third" often is more understandable than farms being one standard deviation above their neighbors. In particular, for a particular trait, we ask the following questions. First, what is the average value of that variable for only those farms in the best third of that variable? Second, what does the model predict for an expected change in profit associated with that best-third average value? Figure 2 shows the profit impacts associated with being in the best third for each category (the risk impact is not shown). Notice that, though not identical to the numbers in table 2's right column, corresponding values in figure 2 are similar.

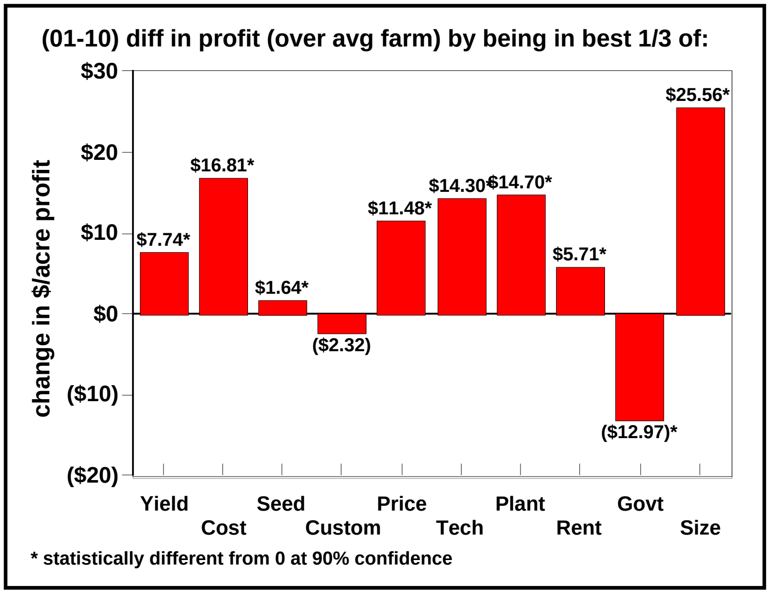

Figure 2

Trends Over Time

This management study has been on-going since 1997, each time analyzing farms that were continuously enrolled in KFMA for ten years. This presents an opportunity to look at how specific management abilities or factors have impacted profit during different periods of time. While the management factors model has not been estimated every year and slight modifications have been made to the model over time, the same basic modeling approach has been used regularly and the key management abilities and farm characteristics have been included. Individual studies have produced pertinent results that can be combined to identify trends over time. Here we have chosen to look at the trends over time for two variables – farm size and

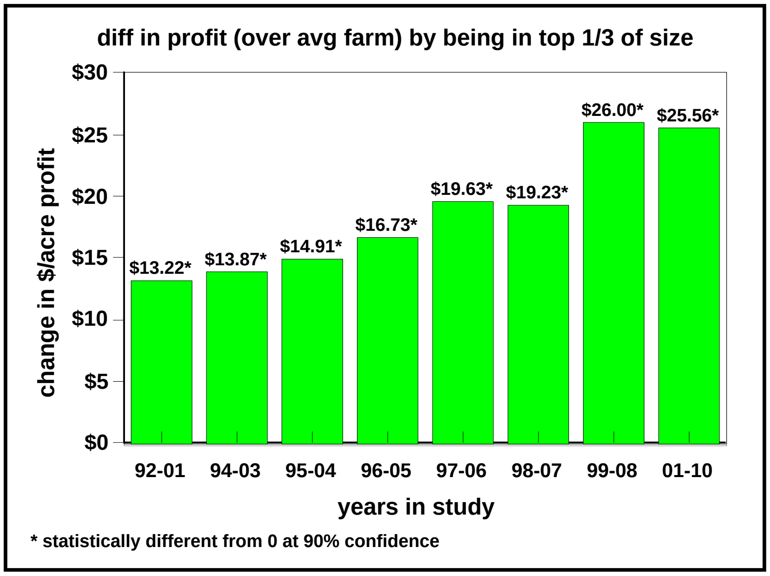

Figure 3

price. The analysis of ten-year time periods, and its capturing of core management abilities and farm characteristics, should enable it to effectively capture trends over time. Size and price effects on profits are based on coefficient estimates from various ten-year time periods evaluated for producers in the top third of the respective category.

Figure 3 displays the impact farm size has had on profitability for the last eight analyses (first analysis was based on 1992-2001 data and the last on 2001-2010 data). Farm size has always been a significant factor in explaining profitability differences across producers and the impact has been growing over time. For the ten-year time period 1992-2001 producers that were in the top third of farm sizes received $13.22/acre higher profits and that value has increased to $25.56 for the most recent ten-year period (2001-2010). Thus, the advantage larger farms have over the average sized farm, after accounting for other management factors, has been growing over time.

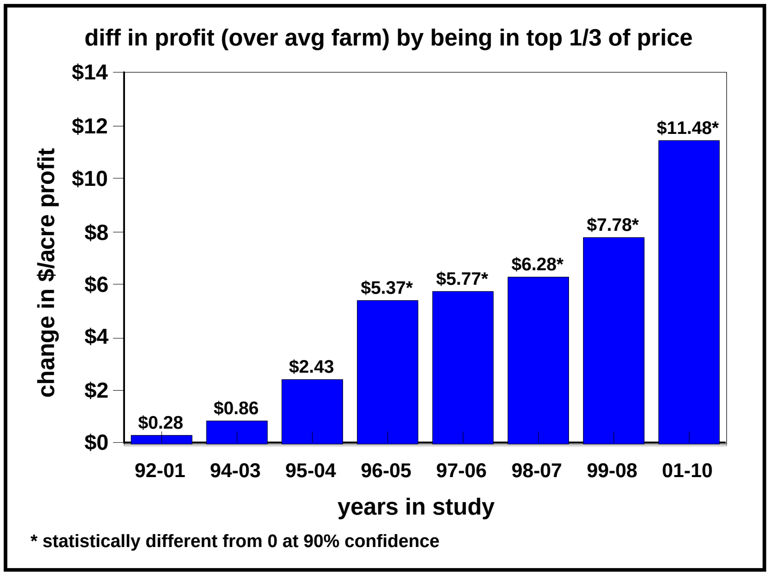

Figure 4

The impact price has had on profits over time is shown in Figure 4. For the first three ten-year periods shown (1992-2001, 1994-2003, and 1995-2004), price differences between producers was not a significant factor in explaining profit differences. However, subsequent studies has found price to be a significant factor and the impact of price differences has been increasing over time. While the impact of being in the top third of prices is considerably lower than being in the top third of farm sizes, at $11.48/acre it is a significant management factor. It is not clear as to what has led to this change. It may be that with the increased commodity price volatility in recent years some producers have been better at picking the right times to sell their crops. It also might be related to the growing disparity in farm size and larger farms consistently receiving slightly higher prices due to volume premiums (another analysis of KFMA data indicates that the gap between large and average sized farms is growing and larger farms tend to get higher prices). Regardless of the reason, this suggests that the producers have increased their ability to differentiate themselves from others based on price received and thus price has become increasingly significant in explaining profitability differences across producers.

Summary

A study of 678 farms in Kansas over the 2001-2010 time period revealed that farmers are most able to differentiate themselves from their neighbors in terms of cost, planting intensity, less-tillage adoption, followed next by prices, yields, and percentage of land rented. Despite being persistently different than region averages, new seed cost and custom hire management variables did not have large impacts on profitability (custom hire was not statistically significant). Increasing the variability in farm income would increase overall profit as well. However, this is generally not a goal of producers. For reasons not completely understood, government payments had a negative effect on farm profits. Increasing size would make the most significant impact on profitability; however, this is generally outside the control of the manager – at least in the short-run. Nonetheless, it is important for farm managers to recognize this "economies of size" impact as they think about long-term goals and objectives for their operations. Of the factors that are likely more manageable in the short run, being in the low cost group of a region's farms and adopting technologically-related farming practices (e.g., substituting herbicides for tillage and increasing planting intensity) were more important than being in the high price group or getting high yields.

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