Factors Influencing Producer Sentiment




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Abstract

Producer sentiment is typically analyzed on an aggregate basis and believed to be largely driven by market conditions. Our research introduces alternative determinants of producer sentiment. Drawing from survey data gathered in April 2023, we analyze the interplay between producer sentiment, current market dynamics, future anticipations, and underlying farm-specific attributes. Specifically, correlation coefficients and t-tests are used to pinpoint characteristics that inherently differ across three sentiment-defined groups. Our findings indicate that producer sentiment intertwines with expected financial performance, farm resilience, growth prospects, and educational achievements, rather than being solely reliant on current market conditions.

INTRODUCTION

Farmers are feeling the crunch—adverse conditions, including high interest rates, high input prices, and unpredictable weather, present significant risk to farmers and negatively influence producer sentiment. Farmers have plenty of reason to be concerned about the future of their operations, yet despite turbulent market conditions, our survey results indicate many farmers remain relatively optimistic. At the same time, some farmers are relatively pessimistic. If producer sentiment was solely tied to current market conditions for the agricultural industry, variability in sentiment across producers would be minimal. This leads us to believe there are other factors driving producer sentiment, such as intrinsic characteristics unique to each farming operation.

On a monthly basis, the Purdue University-CME Group Ag Economy Barometer samples approximately 400 agricultural producers across the United States to generate a cumulative score indicating the health of the agricultural economy. While the index score is representative of overarching trends in farmer sentiment, variability in individual survey responses is lost in computations of the cumulative index. Prior reports on the Ag Economy Barometer Index focus on connections between aggregate farmer sentiment, land values, input costs, interest rates, farm policy, farm growth as well as many other dimensions impacting commercial farms (Mintert and Langemeier, 2023b).

This study explores how individual farm characteristics, such as management practices and farm resilience influence producer sentiment measured by the Purdue University-CME Group Ag Economy Barometer, a standalone measurement of farmer sentiment in the United States. Instead of just aggregating producer

sentiment scores, we use individual survey responses to pinpoint how farm characteristics and other factors sway producer sentiment.

SURVEY METHODS

A phone survey of U.S. crop producers was conducted in early April 2023 using a similar methodology as that used for the monthly Ag Economy Barometer Index (Purdue University Center for Commercial Agriculture, 2023). The survey targeted commercial producers, which are defined as agricultural producers having annual market value of production equal to or exceeding $500,000, and was developed specifically to contrast producer sentiment, farm characteristics, management practices, and resilience among a sample of farms. Question categories included producer sentiment, farm growth, risk preferences, farm demographics, management practices, and strategic risk.

The first five questions replicated those used for the monthly Ag Economy Barometer Index. Use of these questions allows us to compute the Index of Current Conditions, the Index of Future Expectations, and the Ag Economy Barometer Index for each respondent and for groups of respondents.

Farm growth questions asked respondents about opportunities to expand their farm and their planned annual growth rate over the next five years. These two questions have been asked in previous Ag Economy Barometer surveys. For example, Langemeier and Mintert (2023) indicated that approximately 50% of survey respondents in February 2023 had either no plans to grow or plan to exit or retire. Based on Langemeier and Mintert (2023), we expect sentiment to be positively related to farm growth.

Survey respondents were also asked to rate their risk preferences. Risk aversion measures a producer's willingness to take on risk in their operation. High levels of risk aversion are often associated with hesitation to adopt new farming practices or technologies, lack of self-efficacy, reluctance to engage in social networks, maintenance of large financial reserves, and low levels of farm growth (Sulewski and Kłoczko-Gajewska, 2014; Finger, Wüpper, and McCallum, 2023).

Popular strategies to elicit risk preferences include lottery questionnaires and domain-specific risk assessments (Charness, Gneezy, and Imas, 2013). Data for this study were collected via a call center, which makes it difficult for respondents to answer complex questions effectively, such as those involving lotteries or gambles. Studies on farmer risk preference indicate most farmers are risk averse across all domains, which signals the presence of a common underlying risk trait (Dohmen et al., 2011; Hansson and Lagerkvist, 2012). Thus, little additional value would be derived from using domain-specific risk assessments, further motivating our use of generic questions to measure risk preferences. Specifically, two questions were posed. The first question addressed each survey respondent's attitude toward risk, and the second asked each survey respondent to describe how a neighbor would describe their risk-taking behavior.

Demographic questions involved total acres operated, educational level, and operator age. We had a priori hypotheses regarding the relationship between producer sentiment and the answer to each demographic question. Each of the demographic variables was expected to have a positive relationship with producer sentiment. Increases in age, education, and farm size give farm operators a greater resource base and superior ability to deal with adversity, providing them a more optimistic outlook for their operation.

Management practice questions addressed the implementation of written succession plans, written crop lease agreements, advice from agronomic consultants, use of financial ratios, documentation and evaluation of crop pricing performance, use of standard operating procedures, no-till adoption, and adoption of specific precision agriculture technologies such as variable rate fertilizer application, grid or zone soil sampling, GPS guidance systems, yield monitors, and drones. These questions make it possible to examine the relationship between producer sentiment and each management practice.

Strategic risks are related to shocks in a farm's strategic position and stem from a multitude of factors, including a shift in the political or social environment, changes in government policy, and a growing or contracting macroeconomy (Miller et al., 2004). Survey respondents were asked six questions pertaining to absorption capacity and agility that were adapted from Sull (2009). Absorption capacity is related to a farm's ability to withstand shocks from strategic risk, while agility measures a farm's ability to identify and capture business opportunities more quickly than rivals. We hypothesized that producer sentiment would be positively related to a farm's resilience score, computed using responses to the six strategic risk questions. In two related questions, survey respondents were asked to evaluate potential threats to their operation and to identify which source of risk was most important to their farm.

STATISTICAL METHODS

In addition to summarizing the aggregated responses to each survey question, we analyze correlation between producer sentiment and various farm characteristics. Segmenting survey responses into three groups by producer sentiment level allows us to test differences in means for each survey question, across groups. Producers with sentiment levels within one standard deviation of the mean were categorized as having "medium" sentiment, those above one standard deviation of the mean were categorized as having "high" sentiment, and those below one standard deviation of the mean were categorized as having "low" sentiment.

Correlation coefficients were used to examine the relationship between the aggregated sentiment indices (i.e., Ag Economy Barometer, Index of Current Conditions, and Index of Future Expectations) and the relationship between producer sentiment and farm characteristics. Correlation coefficients reveal which component questions of the Ag Economy Barometer Index have the greatest influence on overall producer sentiment. Correlation coefficients between producer sentiment and each farm characteristic identify the sign and strength of relationships between producer sentiment and factors such as farm growth, risk aversion, farm demographic variables, management practices, and strategic risk.

Due to the nature of the dataset, which primarily consists of ordinal variables, we had two options for calculating correlation coefficients, Spearman's Rho and Kendall's Tau, both of which are designed to accommodate non-linear relationships among data. Research on the two methods indicate similar results in correlation coefficients, with slightly lower coefficient values reported using Kendall's Tau. However, when examining statistical significance of the correlation coefficients for varying sample sizes, Kendall's Tau consistently produces smaller confidence intervals and smaller mean squared errors across tested confidence levels (Croux and Dehon, 2010; Puth, Neuhäuser and Ruxton, 2015). Kendall's Tau correlations are also considered more robust and have higher efficiency than Spearman correlations (Croux and Dehon, 2010).

Additionally, when deciding on a method to test correlations, tied data need to be taken into consideration. Tied data occur when two or more observations have the same values, preventing rank from being assigned. For example, two farms that were independently sampled may have the same responses to a variety, but not necessarily all, of the survey questions. Similarities in responses create issues assigning rank to observations in a dataset. Because the survey sampled more than 400 producers using questions with small ranges of ordinal responses, we would expect significant presence of ties within the data. Spearman correlations are calculated using rank for each observation. Therefore, if Spearman correlations were used for this data, risk of reporting inaccurate correlation coefficients is high. Kendall's Tau measures correlations using concordances and discordances in paired observations rather than based on rank measurements, as used for Spearman correlations, resulting in more accurate correlation coefficients for tied data (Puth, Neuhäuser, and Ruxton, 2015).

T-tests were also used to evaluate whether the survey responses among the three producer groups (i.e., low producer sentiment, medium producer sentiment, and high producer sentiment) were statistically different. Discussion will focus on the variables that were statistically different between the groups with "low" and "high" producer sentiment.

PRODUCER SENTIMENT AMONG SURVEY RESPONDENTS

Survey results for the Ag Economy Barometer Index ranged from 0 to 324 with a mean of 122 (Table 1). The Index of Current Conditions had slightly more optimistic readings, with scores ranging from 0 to 397 and a mean of 130. Future expectations as measured with the Index of Future Expectations were on average more pessimistic with scores ranging from 0 to 288 with an average of 119. These results are consistent with the Ag Economy Barometer Index report for April 2023, which collected data from April 10-14th. For April 2023, the Ag Economy Barometer Index was 123, with the Index of Current Conditions at 129 and the Index of Future Expectations at 120 (Mintert and Langemeier, 2023a).

In addition to reporting the average producer sentiment values for the entire sample, Table 1 reports the average values for each producer sentiment group. Given that we sorted the survey responses on producer sentiment, it was not surprising to find a significant difference between the "low" and "high" producer sentiment groups for each of the questions used to compute the Ag Economy Barometer Index. What was surprising was how different these averages were from the mean for the entire sample. For example, the average Ag Economy Barometer Index for the group categorized as having "low" producer

sentiment was only 20, while the average index for the group categorized as having "high" producer sentiment was 259.

While values range by question in Table 1, on average, those categorized as having "low" sentiment have extremely negative outlooks on the agricultural economy compared to those with "medium" or "high" sentiment levels. For example, 95% of respondents with "low" sentiment believe the general agricultural economy will have poor times financially in the coming year. In contrast, 73% of farmers with "high" sentiment believe there will be good times financially in the coming year. T-tests indicate that for all questions used to calculate the producer sentiment index, we are 99% confident the average values for farms in the "low" versus "high" sentiment categories are statistically different from one another.

Table 2 reports the correlation coefficients between each producer sentiment index and the five questions used to assess producer sentiment. As expected, the correlations between the three sentiment indices are significant, with correlation coefficients ranging from 0.228 to 0.785. Also, as expected, the Index of Current Conditions is more correlated with its components (i.e., current financial positioning and large farm investments) than it is with the components for the Index of Future Expectations (future financial positioning and ag economy outlook). Similarly, the Index of Future Expectations is highly correlated with its components. Determining the influence of each question helps identify concerns that are top of mind for farmers and whether producer sentiment is more dependent on current market conditions or future expectations.

Initially, one might expect that each of the five questions used for the Ag Economy Barometer Index influences sentiment equally. However, correlation coefficients and their relative significance levels displayed in Table 2 show higher correlations between sentiment, questions relating to financial performance, and prospects for the agricultural economy in the coming year. This demonstrates that uncertainties (particularly financial uncertainties) within the next 12 months have greater influence over farmers' sentiment than current conditions.

The results in Tables 3-6 discuss differences in survey responses with respect to farm growth, risk aversion, demographic variables, management practices, and strategic risk between survey respondents with "low" and "high" sentiment, and present correlation coefficients between producer sentiment and these factors. This will help us identify which factors are influencing producer sentiment.

PRODUCER SENTIMENT AND FARM CHARACTERISTICS

In prior research, positive relationships are observed among farm growth, operator age, farm size, and education (Villatoro and Langemeier, 2006; Akimowicz, et al., 2013). We hypothesize that farmer sentiment reacts concurrently with these characteristics. This section analyzes the relationship between each of these farm characteristics and producer sentiment.

On an aggregate basis, 55% of farmers expect their operation to grow in the next five years (Table 3). This is only slightly higher than the proportions reported in Langemeier and Mintert (2023). Farms categorized as having "low" sentiment had lower growth expectations on average, with 50% expecting growth at any level over the next five years and only 18% believing they will have greater opportunities to expand over the next five years. In comparison, 60% of farmers with "high" sentiment expect positive growth within the next five years and 33% believe there will be more opportunities to expand their operation. Using Kendall's Tau correlation coefficients, both questions used to assess farm growth display positive, statistically significant correlations with producer sentiment (Table 6). Results demonstrate that among respondents in our sample, positive outlooks on the agricultural economy tend to be associated with higher annual growth expectations and the belief that opportunities to expand will be greater over the next five years.

Survey questions on risk aversion asked farmers to rate their risk preferences and estimate how their neighbors would rate their risk-taking behaviors (Table 3). Of the 403 survey respondents, 11% self-selected as strongly risk averse and 7% selected this category based on their neighbor's perceptions. Moderate risk aversion was the most popular choice among respondents, with 61% for the self-assessment and 66% based on their neighbor's perceptions.

Once farms are split into groups by sentiment level, those with both "low" and "high" sentiment are relatively more risk seeking than the farms with "medium" sentiment. In fact, responses to both questions on risk-taking behavior were not statistically different between producer groups with "low" and "high" producer sentiment. Correlation coefficients between the two questions on risk aversion also display differing signs, furthering suspicions of a non-

linear relationship between producer sentiment and risk aversion.

Farm demographics, including farm size, educational attainment, and operator age all display positive correlations with producer sentiment (Table 6), but only the correlations between producer sentiment and educational attainment are statistically significant. Differences in operator age and farm size are not significant across producer sentiment levels for the most part, the only exception being for farms operating less than 1,000 acres. Approximately 36% of farmers with "low" sentiment operate less than 1,000 acres, while only 20% of farms with "high" sentiment operate farms this small. Correlations also show that, on average, more positive sentiment is associated with having obtained more schooling. In particular, 49% of farms with "low" sentiment have only a high school diploma and less than 12% obtained graduate level education. In contrast, 33% of farmers with "high" sentiment only have a high school education and nearly the same proportion (31%) have completed graduate school.

PRODUCER SENTIMENT AND MANAGEMENT PRACTICES

Much of current research in farm management focuses on the impacts of specific practices such as fertilizer application rates, irrigation, planting density, and education on farm performance (Rains, Olson and Lewis, 2011; Agnolucci et al., 2020; Akhavizadegan et al., 2022). Our assessment of management practices strays from this trend. We assess specific management practices and overall managerial ability by assessing an array of six questions, including questions on succession planning, written lease agreements, advice from agronomic consultants, financial ratios, documentation and evaluation of crop pricing alternatives, and standard operating procedures. For each of the management practices assessed in our survey, at least one-half the farms had already adopted the practice. The highest adoption rates (60%) were associated with written crop lease agreements, as well as documentation and evaluation of crop pricing alternatives.

The adoption rates of management practices were not statistically different for producers with "low" versus "high" sentiment, nor were correlation coefficients between management practices and producer sentiment statistically different from zero. In a question pertaining to the adoption of a no-till cropping system, 46% of the survey respondents indicated that they used no-till practices on more than one-half of their crop acreage. Differences in the adoption of no-till between producer sentiment groups were minimal.

The adoption of precision agriculture technologies showed greater variation by sentiment group compared to those seen for management practices and no-till adoption. Questions on adoption of precision agriculture technologies mimic those studied in Thompson, et al. (2018) and DeLay, Thompson, and Mintert (2021). Thompson, et al. (2018) reported over 90% of farms used GPS guidance and yield monitors, 66% used grid soil sampling, and 25% used drones or other unmanned aerial vehicles. In our survey, 62% of farms used VRT fertilizer application, 73% used grid or zone soil sampling, 67% used GPS guidance, 69% used yield monitors, and 27% used drones. Approximately 8% of the survey respondents indicated that they did not use any of the listed precision agriculture technologies.

Use of grid or zone soil sampling, yield monitors, and drones tended to be highest for farms with "high" sentiment, followed by those with "medium," then "low" sentiment (Table 4). More than 9% of farms with "low" sentiment reported not using any of the listed precision agriculture technologies, whereas only 7% of producers with "high" sentiment did not use precision technologies. Precision agriculture technology adoption rates were not statistically different for producers with "low" versus "high" sentiment. Moreover, correlation coefficients between adoption rates and producer sentiment were not statistically different from zero.

It is important to note that while prior studies focused on crops farms with 1,000+ crop acres, our study focused on commercial farms, regardless of the number of crop acres. According to the 2021 census, the average farm size in the U.S. was 445 acres (USDA, 2022). Considering 31% of our survey respondents operate farms with less than 1,000 acres, adoption rates reported here are likely a more accurate representation of average U.S. farmers.

PRODUCER SENTIMENT AND STRATEGIC RISK

Resilience to strategic risk is measured by assessing absorption capacity and agility, which act as a proxy for a farm's ability to adapt to change and weather unfavorable market conditions. Six survey questions, adapted from Sull (2009), were used to measure absorption capacity and agility. The first three

questions (i.e., questions related to per-unit fixed cost, diversification, and balance sheet) measure absorption capacity. Of the 403 survey respondents, 72% believe they have lower fixed costs than competitors, 55% have more diversified operations now relative to five years ago, and 90% believe they have a strong balance sheet (Table 5). The second three questions (i.e., questions related to goals and objectives; opportunities; and advantages and disadvantages) measure agility. Of the 403 respondents, 90% have established goals, objectives, and core values; 83% seek out opportunities new enterprises may provide; and 71% actively compare their farm's advantages and disadvantages with competitors.

Using the six questions assessing resilience to strategic risk, we created a strategic risk score. Based on this cumulative score, 15% of respondents have low resilience to strategic risk while 85% have high resilience. Results presented in Table 6 also show that resilience to strategic risk is positively correlated with producer sentiment, so on average, we would expect producers with "low" sentiment to have lower resilience to strategic risk. In fact, of the respondents with "low" sentiment, 20% have low resilience in comparison to the "high" sentiment group which only has 7% of respondents with low resilience to strategic risk. Additionally, t-test results show that resilience for producers with "low" versus "high" sentiment is statistically different at a 95% confidence level.

Differences in responses are also apparent across producer sentiment groups for each of the six questions assessing resilience. Farms with "high" sentiment had low fixed costs and strong balance sheets. Correlation coefficients corroborate these results with positive statistically significant relationships among producer sentiment, balance sheet strength, and low per-unit fixed costs. Slight positive relationships between sentiment and farms looking for new business opportunities are also observed, but these coefficients are not statistically significant, thus we are unable to draw any conclusions from the data based on these results. The other three metrics for resilience to strategic risk display negative correlations with producer sentiment, but again, none of the correlation coefficients were statistically different from zero.

While many farmers possess relatively high resilience to strategic risk, when asked to identify threats to their operation, few farmers identified strategic risk as a major threat. In fact, from the aggregate sample, only 5% of respondents chose this option. The group most sensitive to strategic risk was the "high" sentiment group, with 6% identifying strategic risk as a major threat.

The identification of other threats was largely comparable across different sentiment levels. Producers with "low" sentiment exhibited slightly fewer concerns regarding extreme weather and the ability to find skilled farm workers, but showed greater concern pertaining to high input costs and geopolitical conflicts. The reduced concerns in the "low" sentiment group regarding the ability to find skilled workers may be attributed to the smaller average size of these farms, resulting in lower demand for hired labor. However, it's important to note that these relationships did not attain statistical significance.

Farmers with "low" sentiment also expressed the highest level of concern about financial risks, followed by marketing risks. Among farms categorized as having "medium" sentiment, marketing risk was the primary concern, followed by financial risks. Interestingly, farms with "high" sentiment did not rank financial risk among their top two concerns. Instead, human risk and marketing risk took the lead as the primary worries for farms with "high" sentiment. This is likely attributed to their larger average farm size and dependence on more farm workers.

CONCLUSIONS

In this paper, we examined connections between producer sentiment and farm growth, risk aversion, demographic variables, management practices, and strategic risk. Measurements of farmer sentiment using the Purdue University-CME Group Ag Economy Barometer are available monthly and provide a comprehensive view of sentiment towards the current agricultural economy. Results from this research add to reports provided on the Ag Economy Barometer by identifying factors that influence variation in sentiment scores among producers.

Producer sentiment varied widely among the farmers surveyed. Pessimistic producers believe the agricultural sector is experiencing bad times and will continue to do so for the next five years. On the other hand, optimistic producers believe we are experiencing good times and will continue to do so. However, most respondents lie somewhere in the middle, with a mix of positive and negative perceptions of current and future performance for the agricultural economy.

By segmenting farms into three groups based on sentiment, distinct differences in farm characteristics become apparent. On average, farms with higher

sentiment have operators that are older (40% at or above age 65), are more educated (with 31% having graduate education compared to 12% of those with "low" sentiment), have greater growth expectations (60% expect positive farm growth over the next 5 years), and are more resilient to strategic risk. Farmers with lower sentiment were less likely to indicate that they have low per-unit costs or a strong balance sheet and correspondingly were more concerned about financial risk.

Correlations in the data corroborate patterns observed when survey respondents were split by sentiment level, with statistically significant relationships between producer sentiment, farm growth, the operator's educational attainment, and farm resilience. Correlation coefficients also reveal that sentiment on the agricultural economy has a distinct reliance on future expectations, particularly financial performance over the next 12 months.

While we do not attempt to assign causality, our findings provide insight into factors that influence the range of producer sentiment scores collected by the Ag Economy Barometer Index. Farm managers are encouraged to assess their own operations using survey questions presented in this study to evaluate which sentiment category and related characteristics they best align with. Self-evaluation may aid farm managers in identifying strengths and weaknesses of their own operation and how these compare to other commercial farms across the United States.

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Table 1. Measurements of Producer Sentiment					
	Aggregate	**Low**	**Medium**	**High**	**Significance**
	n=403	n = 76	n = 272	n = 55	(Low vs High)
Ag Economy Barometer Index	122.4	19.6	123.6	258.8	0.0000
Indices of Current Conditions	130.2	26.1	125.1	299.3	0.0000
Indices of Future Expectations	118.6	16.4	122.8	239.1	0.0000
Barometer Questions	**Aggregate** n = 403	**Low** n = 76	**Medium** n = 272	**High** n = 55	**Significance** (Low vs High)
Would you say that your farm operation today is financially better off, worse off, or about the same compared to a year ago?					
Better Off	19.6%	0.0%	16.5%	61.8%	0.0000
Worse Off	32.0%	73.7%	26.5%	1.8%	0.0000
Do you think that a year from now your farm operation will be better off financially, worse off, or just about the same as now?					
Better Off	19.1%	0.0%	15.4%	63.6%	0.0000
Worse Off	34.7%	82.9%	27.6%	3.6%	0.0000
Turning to the general agricultural economy, do you think that during the next twelve months there will be good times financially, or bad times?					
Good Times	24.8%	0.0%	22.1%	72.7%	0.0000
Bad Times	52.4%	94.7%	50.4%	3.6%	0.0000
Do you think it is more likely that US agriculture during the next five years will have widespread good times or widespread bad times?					
Good Times	31.0%	0.0%	30.9%	74.5%	0.0000
Bad Times	40.2%	85.5%	34.6%	5.5%	0.0000
Thinking about large farm investments – like buildings and machinery – generally speaking, do you think now is a good time or bad time to buy such items?					
Good Times	17.4%	0.0%	12.5%	65.5%	0.0000
Bad Times	73.7%	100.0%	76.5%	23.6%	0.0000

Note: Results of U.S. survey conducted in April 2023.

Table 2 : Correlation Coefficients bewteen Producer Sentiment Indices			April, 2023
	Ag Economy Barometer	Index of Current Conditions	Index of Future Expectations
Ag Economy Barometer	1	0.567***	0.785***
Index of Current Conditions	0.567***	1	0.228***
Index of Future Expectations	0.785***	0.228***	1
Sentiment (Current Financial Positioning)	0.478***	0.764***	0.22***
Sentiment (Future Financial Positioning)	0.543***	0.203***	0.612***
Sentiment (Ag Economy 12-Month Outlook)	0.611***	0.274***	0.666***
Sentiment (Ag Economy 5-Year Outlook)	0.501***	0.089**	0.637***
Sentiment (Large Farm Investments)	0.445***	0.685***	0.182***
Significance Levels: p < .01 '***' p < .05 '**' p < .1 '*'			

Note: Results of U.S. survey conducted in April 2023.

Table 3. Farm Growth, Risk Aversion, and Farm Demographics					
Farm Growth	**Aggregate** n = 403	**Low** n = 76	**Medium** n = 272	**High** n = 55	**Significance** (Low vs High)
Do you think opportunities to expand your farm will be greater than, fewer, or about the same in the next 5 years?					
Greater	26.3%	18.4%	27.2%	32.7%	0.0695
Fewer	29.8%	42.1%	29.4%	14.5%	0.0003
What is the planned annual growth rate you have for your farm over the next 5 years?					
Growth	54.6%	50.0%	54.8%	60.0%	0.2591
No Growth	45.4%	50.0%	45.2%	40.0%	
Risk Aversion	**Aggregate** n = 403	**Low** n = 76	**Medium** n = 272	**High** n = 55	**Significance** (Low vs High)
How would you rate your attitude towards risk?					
Strongly Risk Averse	10.9%	14.5%	10.7%	7.3%	0.1835
Moderately Risk Averse	60.8%	51.3%	64.0%	58.2%	0.4395
Slightly Risk Averse	28.3%	34.2%	25.4%	34.5%	0.9686
How would your neighbors describe your risk-taking behavior?					
Risk Avoider	7.2%	5.3%	8.1%	5.5%	0.9622
Cautious	65.5%	61.8%	68.4%	56.4%	0.5337
Real Gambler	27.3%	32.9%	23.5%	38.2%	0.5377
Farm Demographics	**Aggregate** n = 403	**Low** n = 76	**Medium** n = 272	**High** n = 55	**Significance** (Low vs High)
How many total acres do you operate?					
< 1000 acres	31.3%	35.5%	32.4%	20.0%	0.0475
1000 to 2000 acres	25.1%	26.3%	24.3%	27.3%	0.9039
2000 to 5000 acres	29.0%	19.7%	30.5%	34.5%	0.0649
5000 to 10,000 acres	7.7%	7.9%	7.4%	9.1%	0.8114
> 10,000 acres	6.9%	10.5%	5.5%	9.1%	0.7861
What is your highest completed level of education?					
High School	41.2%	48.7%	40.8%	32.7%	0.0662
Undergraduate	32.8%	38.2%	30.9%	34.5%	0.6739
Graduate	24.6%	11.8%	26.8%	30.9%	0.0106
What is the average age of the primary farm owner/operator?					
< 35 Years Old	4.7%	5.3%	4.4%	5.5%	0.9622
35 - 65 Years Old	59.1%	65.8%	58.1%	54.5%	0.1995
65+ Years Old	36.2%	28.9%	37.5%	40.0%	0.1950

Note: Results of U.S. survey conducted in April 2023.

Table 4. Management Practices and Adoption of Precision Ag Technologies					
Management Practices	**Aggregate** n = 403	**Low** n = 76	**Medium** n = 272	**High** n = 55	**Significance** (Low vs High)
Does your farm have written succession plans in place?					
Yes	55.1%	51.3%	57.0%	50.9%	0.9637
No	44.9%	48.7%	43.0%	49.1%	
Are most of your farm's crop lease agreements written?					
Yes	60.5%	64.5%	59.9%	58.2%	0.4708
No	39.5%	35.5%	40.1%	41.8%	
Does your farm use advice from agronomic consultants when making decisions?					
Yes	57.3%	56.6%	57.0%	60.0%	0.6977
No	42.7%	43.4%	43.0%	40.0%	
Does your farm use financial ratios to make decisions?					
Yes	50.6%	52.6%	48.9%	56.4%	0.6749
No	49.4%	47.4%	51.1%	43.6%	
Does your farm document and evaluate crop pricing alternatives?					
Yes	60.3%	67.1%	57.7%	63.6%	0.6840
No	39.7%	32.9%	42.3%	36.4%	
Are standard operating procedures documented for reptitive and routine tasks?					
Yes	49.6%	52.6%	49.6%	45.5%	0.4215
No	50.4%	47.4%	50.4%	54.5%	
Adoption of No-Till and Precision Ag Technologies	**Aggregate** n = 403	**Low** n = 76	**Medium** n = 272	**High** n = 55	**Significance** (Low vs High)
On average, what percent of your crop acreage uses no-till practices?					
> 50%	45.9%	46.1%	46.0%	45.5%	0.9465
< 50%	54.1%	53.9%	54.0%	54.5%	
Does your farm use any of the following precision agriculture technologies?					
VRT fertilizer application	61.8%	60.5%	62.5%	60.0%	0.9521
Grid or zone soil sampling	73.0%	72.4%	72.1%	78.2%	0.4477
GPS guidance	67.2%	68.4%	66.9%	67.3%	0.8907
Yield monitor	68.7%	64.5%	69.1%	72.7%	0.3163
Drones	27.3%	27.6%	26.5%	30.9%	0.6879
None	8.4%	9.2%	8.5%	7.3%	0.6909

Note: Results of U.S. survey conducted in April 2023.

Table 5. Resilience to Strategic Risk & Threats to Operation					
Resilience to Strategic Risk	**Aggregate** n = 403	**Low** n = 76	**Medium** n = 272	**High** n = 55	**Significance** (Low vs High)
We have low per unit fixed costs relative to our most efficient competitors.					
Agree	72.0%	55.3%	74.6%	81.8%	0.0009
Disagree	28.0%	44.7%	25.4%	18.2%	
Our farm enterprise is more diversified today than it was 5 years ago.					
Agree	55.1%	60.5%	54.4%	50.9%	0.2789
Disagree	44.9%	39.5%	45.6%	49.1%	
We have a strong balance sheet.					
Agree	90.1%	77.6%	92.3%	96.4%	0.0008
Disagree	9.9%	22.4%	7.7%	3.6%	
Our farm has established goals, objectives, and core values.					
Agree	89.6%	96.1%	88.2%	87.3%	0.0867
Disagree	10.4%	3.9%	11.8%	12.7%	
Our farm looks for opportunities that new enterprises may provide.					
Agree	82.9%	82.9%	82.0%	87.3%	0.4872
Disagree	17.1%	17.1%	18.0%	12.7%	
We regularly assess our advantages and disadvantages compared to other farms.					
Agree	70.7%	73.7%	72.1%	60.0%	0.1056
Disagree	29.3%	26.3%	27.9%	40.0%	
Cumulative Resilience to Strategic Risk					
Low (6-15)	14.9%	19.7%	15.1%	7.3%	0.0334
High (16-24)	85.1%	80.3%	84.9%	92.7%	
Threats to Operation	**Aggregate** n = 743	**Low** n = 144	**Medium** n = 499	**High** n = 100	**Significance** (Low vs High)
Looking ahead to next year, my farming operation has evaluated potential threats caused by ...					
Low market prices	24.6%	20.8%	26.5%	21.0%	0.8821
High input costs	35.8%	39.6%	35.1%	34.0%	0.1147
Extreme weather events	14.0%	9.0%	15.4%	14.0%	0.2586
Limited ability to find skilled farm workers	11.7%	12.5%	10.6%	16.0%	0.4948
Geopolitical conflict	13.9%	18.1%	12.4%	15.0%	0.3974
Which of the following risks would you say is most threatening to your organization?					
	n = 640	n = 126	n = 435	n = 79	
Financial	24.7%	31.7%	24.6%	13.9%	0.0001
Legal	7.3%	7.9%	7.4%	6.3%	0.4631
Marketing	25.8%	23.8%	26.4%	25.3%	0.7196
Production	20.0%	19.0%	20.5%	19.0%	0.5958
Strategic	4.8%	5.6%	4.4%	6.3%	0.9815
Human	17.3%	11.9%	16.8%	29.1%	0.0078

Note: Results of U.S. survey conducted in April 2023.

Table 6. Correlation Coefficients (Producer Sentiment & Farm Characteristics)			
	Ag Economy Barometer	Index of Current Conditions	Index of Future Expectations
Opportunities to Expand	0.129***	0.129***	0.093**
Farm Growth	0.089**	0.092**	0.07*
Risk Aversion (Self-Percieved)	-0.037	-0.017	-0.022
Risk Aversion (Neighbors' Perception)	0.031	0.07	0.003
Farm Size	0.038	0.058	0.025
Education	0.118***	0.057	0.119***
Operator Age	0.012	0.007	0.01
Succession Planning	0.004	0.002	0.013
Use of Written Lease Agreements	-0.017	0.008	-0.037
Use of Agronomic Consultants	0.063	0.097**	0.017
Use of Financial Ratios	-0.007	-0.023	0.012
Use of Crop Pricing Alternatives	-0.015	0.051	-0.053
Use of Standard Operating Procedures	-0.015	-0.017	-0.014
Use of No-Till Practices	-0.013	0.064	-0.05
Precision Ag Technology (VRT Fertilizer Application)	0.003	0.096**	-0.058
Precision Ag Technology (Grid/Zone Soil Sampling)	0.022	0.076*	-0.012
Precision Ag Technology (GPS Guidance)	0.019	0.108**	-0.047
Precision Ag Technology (Yield Monitor)	0.038	0.109**	-0.014
Precision Ag Technology (Drones)	0.03	0.073	-0.013
Precision Ag Technology (None)	-0.016	-0.067	0.019
Cumulative Resilience to Strategic Risk	0.071*	0.066*	0.051
Low Per Unit Fixed Costs	0.199***	0.11***	0.196***
Farm Diversification	-0.045	-0.028	-0.046
Balance Sheet Strength	0.184***	0.191***	0.136***
Established Goals, Objectives, & Core Values	-0.012	0.068	-0.055
Exploration of New Enterprises	0.023	-0.009	0.03
Assess Advantages/Disadvantages	-0.047	-0.031	-0.057
Threats Identified: Low Market Price	-0.006	0.075*	-0.064
Threats Identified: High Input Costs	-0.084**	-0.024	-0.102**
Threats Identified: Extreme Weather	0.081*	-0.023	0.122***
Threats Identified: Issues Finding Skilled Workers	-0.006	-0.041	0.019
Threats Identified: Geopolitical Conflict	-0.03	-0.012	-0.022
Threats Identified: Financial Risk	-0.159***	-0.207***	-0.088**
Threats Identified: Legal Risk	-0.06	0.045	-0.094**
Threats Identified: Marketing Risk	0.022	0.029	0.006
Threats Identified: Production Risk	-0.016	-0.008	-0.015
Threats Identified: Strategic Risk	0.003	-0.046	0.023
Threats Identified: Human Risk	0.116***	0.113**	0.094**
Significance Levels: p < .01 '***' p < .05 '**' p < .1 '*'			

Note: Results of U.S. survey conducted in April 2023.