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RISKS, ATTITUDES AND SOURCES OF INFORMATION OF LARGE-SCALE CORN BELT FARMERS

George F. Patrick

Purdue University

Abstract

The transfer of innovations and knowledge to farmers can be improved by increased understanding of farmers' decision making and their sources of information. To assist, farmers attending the Purdue University Top Farmer Crop Workshops (TFCW) have responded to brief questionnaires. Participants in the 1991, 2001 and 2012 TFCWs were asked to rate sources of and managerial responses to risk and the value of different sources of information. Production, marketing or price, financial, legal and human risks were included. TFCW participants are younger, have more years of education and operate much larger than average farms. Likert-type scales from 1 (low) to 5 (high) were used for rating. Not unexpectedly, prices were consistently a highly rated source of risk. The importance of yields declined over time, and there were considerable changes in other rankings. Similar results were found for responses to risk. The increase in importance of crop/revenue insurance was striking. Ratings of value of information sources generally increased from 1991 to 2001 and then declined in 2012. These results suggest that producers themselves, educators and others working with farmers need to review producers' perceptions frequently because only change is certain.

Keywords: risk, risk management, agricultural risk, information

1. Introduction

Farming is a dynamic industry. Farmers and agribusinesses face risks which come from traditional sources as well as risks from new and unexpected directions. Farmers must react to frequent changes in the prices and quantities of agricultural commodities. Innovations in technology, such as genetically modified varieties of crops and other organisms, may require changes in both the production and marketing systems to meet the requirements of the consumers. The economic environment, both domestically and internationally, is seldom static. In addition to farmers, other individuals and institutions serving agriculture need to be aware of these nearly constant changes and their effects on the agricultural sector. This paper reports some results of surveys conducted with large-scale grain producers in the eastern US Corn Belt during the 1991 to 2012 period. These surveys emphasized producers' ratings of the importance of various sources of risk in their farm decision-making. Farmers' ratings of the importance of responses to risk and their sources of information, including consultants, are also included.

The first section of the paper briefly discusses the procedures used to collect the risk-related information and some characteristics of the respondents. The respondents, participants in an annual three-day conference/workshop at Purdue University, are not a statistically representative sample of all farmers. However, the views and opinions of workshop participants are considered typical of large-scale com-

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mercial producers who will be producing the bulk of commodities in the future. The second section presents the ratings of the importance of various sources of risk by participants in the 1991, 2001 and 2012 workshops. Similar rating type information was obtained from producers for possible managerial responses to risk, sources of information, and the role of consultants in the following sections. The final section draws some implications for producers and for those serving the agricultural sector.

2. Procedures

Purdue University has conducted a three-day conference/workshop, the Top Farmer Crop Workshop (TFCW), for agricultural producers in July for about 45 years. The TFCW has focused largely on new and developing technology in production and economics of grain production in the eastern Corn Belt (Ohio, Indiana, Illinois, and Iowa). Participants have had the opportunity to use a mathematical programming model to analyze timeliness in their planting and harvesting, returns to additional land and other issues for their individual farm operations. Participants have often been asked to complete a questionnaire which generally includes some basic information about the farm and farm operator as well as some topics of current interest (i.e., tillage changes, marketing practices, flexible cash rents, and crop insurance). Information on the sources of and responses to risk has been a regular part of the questionnaire. Ratings of information sources had been part of the 1991 and 2001 questionnaires and an update was included in the 2012 TFCW. It is common for more than one individual to be involved in the management of these large-scale farm operations and to attend a workshop. In these cases, one participant per farm operation was asked to complete the questionnaire and return it during the workshop. Only questionnaires of active farmers with a gross farm income of \$100,000 or more were included in the analysis. There were 80 useable responses in 1991, 39 in 2001 and 37 in 2012.

Table 1 summarizes information about the respondents from 1991, 2001 and 2012 TFCWs and their farm operations. The TFCW participants are not a statistically representative sample of farmers. Some farmers attend the workshop each year, but most would attend for 2-3 years and

Table 1. Means and Standard Deviations of Selected Operator and Farm Characteristics of 1991, 2001 and 2012 TFCW Participants

Variable	1991 N = 80	2001 N = 38	2012 N = 37
Age of operator	41.1 ^b (10.2)	48.1 ^a (11.2)	52.7 ^a (13.4)
Years of education	14.8 ^a (1.8)	15.5 ^a (1.4)	15.2 ^a (2.0)
Hectares of crops	736.5 ^c (514.2)	931.4 ^b (665.2)	1271.1 ^a (905.4)
% of crop land owned	36.2 ^a (28.6)	32.2 ^a (26.9)	35.8 ^a (26.4)
% debt on farm	21.1 ^a (15.0)	24.5 ^a (13.6)	22.3 ^a (16.80)
Willingness to bear risks	3.8 ^a (1.0)	3.6 ^a (0.7)	3.7 ^a (0.9)
Skill in management	3.9 ^a (0.7)	3.8 ^a (0.6)	3.9 ^a (0.6)

¹ Numbers in a row with the same superscript letter are not significantly different

then return when they were considering major changes in their operation. The average producer responding in 2012 operated over 1,271 hectares of crops, primarily corn and soybeans, up from 736 hectares in 1991 and 931 hectares in 2001. The USDA estimates, based 2007 Census of Agriculture, the large family farm category had an average of 844 hectares and the average US farm has about 195 hectares. The TFCW participants reporting gross farm income of more than \$2,000,000 increased from 11.7% in 1991 to 41.2% in 2012. Although there was a large increase in farm size over the period, the percentage of crop land owned and percent debt in the farm operation were not significantly different. The major changes in the size of farms occurring had little effect of the financial structure of farming.

Average age of the respondents increased significantly from 41.1 years in 1991 to 52.7 in 2012. This is still below the average age of 57 for US farmers but reflects some “graying” of farm operators on these large-scale farms. The number of years of education completed by the TFCW respondents was nearly constant and approaching the 16 year level that is considered equivalent to graduation from college. Their educational level was considerably above the average US farmer. Respondents were asked to rate themselves, relative to other farmers, on their willingness to take risks and their management skills. Their responses on the Likert-type scales of 1 (low) to 5 (high) ranged from 3.8 to 3.9 and were above the mid-point of the scale and were almost identical across years. There were statistically significant positive relationships between the scales indicating higher skill in management was associated with greater willingness to take risks. Thus, differences in decisions which might be attributed to producers’ attitudes toward risk may be reflecting their perceived management skills.

3. Sources of risk

The sources of risk for farm operations can be categorized in a number of different ways. It is common to classify the risks faced by producers into the five categories of production, market or price, financial, legal, and human risk. Yields and technology are directly related to production risk, while crop prices reflect the market risk. Input costs, costs of capital items, interest rates and credit availability are related to financial risk. Changes in the government commodity programs and environmental regulations are risks in the legal area. Some aspects of the human risk include something unforeseen happening to the operator, changes in family relationships (e.g. divorce or “falling outs”), and labor provided by family (e.g., new baby, child comes home to farm).

Risks, as typically conceptualized, involve negative outcomes (i.e., revenue less than budgeted). A variety of “what-if” scenarios do need to be considered in decision-making. However, sometimes actual outcomes may be much better than expected and should not be ignored. In this case, failure to be able to take advantage of the opportunity may be costly. The probability associated with the upside risk is generally low, but should not be ignored.

Participants in the TFCWs were asked to indicate the importance of a number of sources of risk to their farm firm decision-making on a 5-point Likert-type scale on which 1 was not important and 5 was very important. Table 2 presents the means and standard deviations of 13 sources of risk for participants in the 1991, 2001 and 2012 TFCW surveys. The sources of risk are listed in descending order of their ratings in 1991.

Crop prices were the highest rated source of risk in 1991 and were second in both 2001 and 2012 with no statistically significant differences among years. Crop yields were rated second in 1991, but declined to fourth in 2001 and sixth in 2012. Crop yields tended to follow trend yields closely. Until the disaster of 2012, farmers and others thought most US yield variability had been eliminated by improved varieties. Injury, illness or death of the operator ranked third in 1991 and declined some in

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later years. Government commodity programs ranked first as a source of risk in 2001 and declined a full point in the ratings and ranked 12th in 2012. This decline in ratings of government commodity programs was closely associated with the increase in market prices. Government environmental regulation was the highest rated source in 2012 after having had significantly lower ratings in 1991 and 2001. This suggests increasing concern by farmers that limitations may be placed on the use of fertilizers and pesticides. Input prices ranked in the top half of the sources of risk in all three surveys.

Changes in family relationships and family labor were generally not rated as important sources of risk for farmers. However, the standard deviations of the ratings of some of the family related sources of risk were relatively large. This indicates a large variation in responses and suggests that these sources of risk may be very important for some families and not important for other families.

The average ratings of the 13 sources of risk were not significantly different across periods. This suggests that producers did not vary greatly over time in their evaluation of the overall riskiness of agriculture. However there were significant changes in the both the ratings and rankings

Table 2. Means and Standard Deviations of Ratings of Importance of Sources of Risk for TFCW Participants in 1991, 2011 and 2012^{1,2}

Source of Risk or Uncertainty	1991 N = 80	2011 N = 39	2012 N = 37
Crop prices	4.31 ^a (0.87)	4.31 ^a (0.80)	4.08 ^a (0.89)
Crop yields	4.21 ^a (0.91)	4.08 ^a (0.73)	3.84 ^a (1.04)
Injury, illness or death of the operator	3.86 ^a (1.30)	3.82 ^a (1.17)	3.94 ^a (1.17)
Government commodity programs	3.83 ^b (1.08)	4.38 ^a (0.67)	3.38 ^c (1.23)
Government environmental regulations	3.81 ^a (1.03)	3.72 ^a (0.89)	4.19 ^a (0.70)
Cost of inputs	3.70 ^b (0.89)	4.13 ^a (0.70)	3.97 ^b (0.97)
Cost of capital goods	3.66 ^b (0.94)	3.66 ^b (0.85)	4.03 ^a (0.77)
Technology	3.54 ^a (1.03)	3.56 ^a (0.79)	3.58 ^a (0.81)
Interest rates	3.48 ^a (1.09)	3.41 ^a (1.07)	3.74 ^a (1.01)
Family relationships	3.36 ^a (1.42)	3.13 ^a (1.44)	3.42 ^a (1.25)
Land rents	3.18 ^b (1.16)	3.71 ^a (1.18)	3.78 ^a (1.07)
Credit availability	3.05 ^b (1.29)	2.92 ^b (1.11)	3.61 ^a (1.20)
Family labor force	2.96 ^a (1.28)	2.82 ^a (1.19)	3.14 ^a (1.22)
Average of 13 sources of risk	3.61 ^a (0.60)	3.68 ^a (0.47)	3.72 ^a (0.56)

¹ TFCW participants responded on a Likert-type scale at 1 (very unimportant) to 5 (very important) in responding to risk; ² Numbers in a row with the same superscript letters are not significantly different

of many of the specific sources of risk. Crop prices, crop yields and input costs consistently were the higher rated sources of risk for farmers. Considerable concern has been expressed by Extension personnel and others working with farmers on the absolute level and year-to-year changes in crop land rent. Farmers never rated land rent above 3.78 on the 5-point source of risk scale. This suggests that rentals to family members, flexible cash leases and informal, long-term leases mute the variability of land rents and their importance as a source of risk for many individual producers.

4. Responses to risk

Producers may make a variety of responses to manage their risks. It is likely that farmers are concerned about the events which may have the largest impact of the businesses and these concerns may change over time. In broad terms, the 1991 survey was taken in a period of adjustment to new weed control and tillage practices. The 2001 survey was taken at a time when farmers were stressing marketing practices. Commodity prices had declined relative to the earlier period of farmers seeking "Freedom to Farm." The 2012 period was a period of higher prices for both commodities and inputs. However, the survey was conducted in early July 2012, this was just before the drought became severe and crop prices increased sharply.

TFCW participants were asked to evaluate 15 managerial responses to risk on a 5-point Likert-type scale. As discussed previously, a 1 indicates that the managerial response is not important and a 5 indicated the managerial response was very important to the respondent. The managerial responses considered all five areas of risk. However, there was not necessarily a direct correspondence between the source of risk and the response. For example, yield variability may be a source of risk. A direct management effect might be the use of irrigation by a farmer to reduce variability of actual yields. In contrast, another farmer might use crop insurance to ameliorate the financial consequences of yield variability. The distribution of yields is unchanged, but distribution of net revenue is improved. In both situations, some risk management has been achieved.

Table 3 presents the means and standard deviations of 15 responses to risk for participants in the 1991, 2001 and 2012 TFCW surveys. The responses to risk are listed in descending order of their ratings in 1991. The average ratings of the 15 responses were not significantly different across the three TFCWs. Being a low-cost producer, using debt-leverage management and maintaining financial reserves were the top three risk responses and were followed by cash forward contracts and life insurance for key personnel for the 1991 TFCW. Participating in the government commodity program, being a low cost producer and cash forward contracting became the top rated responses in 2001.

It is interesting to note the substantial increase in the rating of crop/revenue insurance and the very large decline in the importance of the government program between 2001 and 2012. The government made major changes in farm policy which were recognized and acted upon by farmers. Farmers purchased revenue insurance for the 2012 crops in record numbers, and significant numbers received insurance indemnities. Given the continuation of subsidies to crop insurance and greater emphasis in farm policy, there is likely to be increased use in the future. There were a number of marketing related responses and their ratings have tended to increase over time. Cash forward contracting, hedging with futures, minimum price contracts and options require different skills of producers and will affect future activities. Off-farm investments rate higher than off-farm employment by these large-scale producers. However, for small-scale producers, this ranking is likely to be reversed.

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Table 3. Means and Standard Deviations of Ratings of Importance of Responses to Risk by the 1991, 2001 and 2012 TFCW Participants.^{1,2}

Risk Management Response	1991 N = 80	2001 N = 39	2012 N = 37
Being a low-cost producer	4.26 ^a (0.88)	4.35 ^a (0.75)	3.93 ^a (0.97)
Debt-leverage management	3.93 ^a (1.14)	3.50 ^a (1.06)	3.69 ^a (1.23)
Maintaining financial/credit reserve	3.93 ^a (0.94)	3.58 ^a (1.03)	3.58 ^a (1.13)
Cash forward contracting	3.86 ^b (1.00)	4.21 ^a (0.74)	3.47 ^b (1.23)
Producing specialty crop or crop under contract	3.86 ^a (1.00)	2.97 ^b (1.42)	2.81 ^b (1.28)
Government program participation	3.78 ^b (1.10)	4.50 ^a (0.73)	2.92 ^c (1.30)
Diversification of enterprises	3.60 ^a (1.09)	3.70 ^a (1.02)	3.42 ^a (0.97)
Hedging prices with futures contracts	3.21 ^b (1.26)	3.87 ^a (0.99)	3.86 ^a (0.99)
Life insurance for key personnel	3.17 ^a (1.46)	3.62 ^a (1.21)	3.40 ^a (1.45)
Geographic dispersion of production	3.11 ^a (1.08)	2.83 ^a (1.08)	3.00 ^a (0.99)
Commodity options	2.70 ^b (1.28)	3.55 ^a (0.98)	3.03 ^b (1.10)
Off-farm investments	2.64 ^b (1.16)	3.26 ^a (1.09)	3.20 ^a (1.21)
Minimum price contract	2.49 ^a (1.17)	2.62 ^a (0.91)	2.72 ^a (1.19)
Crop yield/revenue insurance	2.18 ^c (1.31)	3.45 ^b (1.22)	4.06 ^a (1.18)
Off-farm employment	2.13 ^a (1.29)	2.39 ^a (1.44)	1.97 ^a (1.20)
Using production practices which work under a variety of conditions	NA	3.69 ^a (0.89)	4.00 ^a (0.91)
Average of 15 responses to risk	3.24 ^a (0.52)	3.47 ^a (0.51)	3.27 ^a (0.40)

¹ TFCW participants responded on a Likert-type scale of 1 (very unimportant) to 5 (very important);

² Numbers in a row with the same superscript letter are not significantly different

5. Sources of information

Information is essential in the decision-making process. For agricultural producers, decisions often involve assessment of new technology and production and marketing practices with only limited knowledge about the possible consequences. Early adopters of a successful innovation may gain a considerable economic advantage. Unsuccessful innovations can have many negative consequences. Consultants may be used by large-scale producers for a variety of reasons.

Consultants may be viewed as complement to or a substitute for the management skills of the agricultural producer. Liability issues and cost may also be factors affecting whether and how consultants are used.

Table 4 reports the means and standard deviations of farmers' ratings of the value of 10 sources of information for management decisions. The 1991 TFCW participant group rated only their own records and the internet and computerized information systems above 3.0, the mid-point of the rating scale. Ratings by the 2001 and 2012 TFCW groups were generally higher. Ratings of sales and support personnel increased sharply perhaps reflecting the "packages of technology" developed by agri-businesses. County Extension was the lowest rated source of information in 2012. The relatively higher ratings of state Extension staff and field days and conferences may reflect a possible bias. All of the respondents were attending a university on-campus workshop with a registration fee of \$400 for 2013.

Because of inadequate time allocated for the questionnaire, responses on the costs and use of consultants by producers participating in the 2012 TFCW were incomplete. Use of professional assistance for accounting and tax preparation was very high among those responding. Given the complexity of US taxes, especially for farmers, this is not unexpected. Consultants in this area were rated at 3.65 on the 5-point Likert-type scale for the value information for management decisions. Producers indicated less use of consultants in the areas of production, marketing and management. Farmers' ratings of the value of information provided were 3.07, 3.18 and 3.24 for consultants in the production, marketing and management areas, respectively.

Table 4. Means and Standard Deviations of Ratings the Value for Management of Information Sources by Participants in the 1991, 2001 and 2012 TFCWs. ¹

Sources of Information	1991 N = 80	2001 N = 34	2012 N = 37
Farm magazines	2.65 (0.64)	3.00 (0.89)	2.97 (1.06)
Ag newsletters	2.86 (0.84)	3.03 (1.03)	2.77 (1.01)
County Extension	2.04 (0.92)	2.42 (1.13)	1.84 (0.97)
State Extension	2.98 (1.04)	3.34 (0.99)	3.19 (1.22)
Field days, conferences	2.73 (0.93)	3.38 (0.85)	3.39 (1.12)
Sales/support personnel	1.74 (0.57)	3.31 (0.98)	3.23 (1.09)
Lenders	2.26 (0.90)	2.72 (1.11)	2.77 (1.10)
Other producers	2.81 (0.98)	3.24 (0.91)	3.19 (1.06)
Internet/computer	3.10 (1.00)	3.68 (1.00)	3.31 (1.09)
Own records	4.30 (0.73)	4.37 (0.71)	3.84 (1.02)

¹ TFCW participants responded on a Likert-type scale of 1 (very unimportant) to 5 (very important)

6. Conclusions and implications

This study uses information collected from participants in the 1991, 2001 and 2012 TFCWs to identify sources of and responses to risk of the greatest importance to producers over time. What were the most important sources of and responses to risk also varied across producers. When producers consider a number of sources and responses to risk, the results demonstrate that there was considerable variation among producers at a specific point in time. There were also significant changes in ranking of the both the sources of and responses to risk. Similar patterns also were observed for sources of information.

The transfer of innovations and knowledge to agricultural producers is difficult. The near constant change in agriculture and risk further complicates the process. However, the process can be improved by increased understanding of the farmers' decision making. The specific results of this study may be of limited applicability. What is important is the recognition of the real differences in the views of producers over time. Knowledge of their sources of information can also be useful in planning educational programs, especially those programs with little or no direct contact between the individuals involved.