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Research Report 14-3

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Agricultural and Food Policy Center

Department of Agricultural Economics
Texas AgriLife Research
Texas AgriLife Extension Service
Texas A&M University

College Station, Texas 77843-2124
Telephone: (979) 845-5913
Fax: (979) 845-3140
http://www.afpc.tamu.edu

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James W. Richardson
Joe L. Outlaw
George M. Knapek
J. Marc Raulston
Peter Zimmel

Agricultural and Food Policy Center
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Introduction

The Agricultural and Food Policy Center at Texas A&M University (AFPC), and researchers from the Food and Agricultural Policy Research Institute at the University of Missouri (FAPRI-MU), University of California at Merced and University of California at Santa Cruz have teamed together in a grant project to study farmer adaptation to climate change. This project is supported by Agriculture and Food Research Initiative Competitive Grant no. 2012-68002-19872 from the USDA National Institute of Food and Agriculture (NIFA). However, any findings and views expressed are the authors' own, and might not reflect those of USDA or NIFA. The AFPC's primary role in this project is to gather farmers' perceptions and potential reactions to possible climate change impacts on localized growing conditions.

This working paper is the first step in a multi-step approach to gather information from producers and pass this information along to climate change modelers. Specifically, the AFPC has met with and gathered data from producers from select representative farms representing different parts of the United States on their perception of climate change. Additionally, in the latter years of the project, the AFPC will follow up with these same producers and present distributions of localized weather, yield, and price estimates under various climate change scenarios. Representative farm panels will gauge their adaptation strategy when confronted with different circumstances caused by climate change.

The two Iowa representative farms (IAG1350 and IAG3400) were chosen to participate in this study. Detailed information about the two Iowa farms and the data gathered from the producers is presented in the Methodology section. Other representative farms in the study include: TXNP3000, TXNP10000, NEG2400, NEG4300, KSNW4000, KSNW5500, NDG2500, NDG8000, MOCG2300, MOCG4000, and ALC3000. Figure 1 shows the location of the representative farms involved in this study. An advantage of this selection of farms is that they represent key corn-growing regions in the Corn Belt, as well as locations to the North and South of this region. Project results will investigate climate information needs of farmers in and near the main corn area and how they adapt to potential changes in growing conditions and markets, including in the course of crop selection.

Methodology and Description of the Representative Farm Process

Panel Process

AFPC has developed and maintains data to simulate 96 representative crop farms, dairies, and livestock operations chosen from major production areas across the United States. The representative farm approach treats a farm business unit as a unique system

characterized by local features and resources to which the farm manager adapts. Local conditions are internalized in the creation and simulation of each farm.

Figure 1. Locations of AFPC Representative Farms Utilized in Climate Project.

Information necessary to simulate the economic activity on these representative farms is developed from panels of producers using a consensus-building interview process. Producers in a location have been chosen that represent full time producers in the area utilizing the expertise of local extension staff who serve as facilitators. The panel members are tasked with providing the data needed to build a farm that is representative of their operations. Data include size of operation, land tenure, commodities produced, production practices, fixed costs, variable costs, equipment complement, yields, and prices received for their commodities. These data span the most recent 1-3 years. Often, two farms are developed in each region using separate panels of producers: one is representative of moderate size full-time farm operations, and the second panel usually represents farms two to three times larger.

Once the farm level data are reviewed, the panel data are combined with the latest baseline projections of agricultural commodity markets and rates of change in input costs produced by FAPRI-MU and associated institutions (FAPRI-MU, 2013) and simulated using the Farm Level Income and Policy Simulation (FLIPSIM) model (Richardson and Nixon, 1986). The producer panels are provided pro-forma financial statements for their representative farm and are asked to verify the accuracy of simulated results for the past year and the reasonableness of a six-year projection (Richardson *et al*., 2013). Each panel must approve the model's ability to reasonably reflect the economic activity on their representative farm prior to using the farm for policy analyses. If panelists

determine that the financial results are not valid, the input data will be revised. This process continues until the panel judges that the Representative Farm has been correctly constructed.

Description and Characteristics of Iowa Representative Farms

The two Webster County Iowa feed grain and oilseed farms are located near Fort Dodge, Iowa, in the northwestern quadrant of the state. Figure 1 shows the geographic location of this tandem of representative farms along with the other representative farms included in this project. Original development of these representative farms occurred in 1990, and many original participants and family members of those participants are still cooperating with the AFPC representative farm project. These farms were originally established as corn and soybean farms in a 50/50 annual rotation. Over time, technological advances in plant breeding and pest control along with evolving cultural practices allowed producers to plant a higher percentage of crop acres to corn in response to market forces.

As of our most recent update in April 2013, the moderate-sized farm (IAG1350) plants 880 acres of corn and 470 acres of soybeans each year for a 65 percent corn/35 percent soybean rotation. AFPC simulations of the representative farm financial performance based on aggregate market data from the FAPRI January 2013 baseline, suggest that this farm generated 64 percent of its receipts from corn and 36 percent from soybeans in 2012.

The large-sized Iowa feed grain and oilseed farm (IAG3400) currently plants 2,040 of its crop acres to corn and 1,360 acres to soybeans. This farm is less aggressive in planting corn in consecutive years on the same ground, as it is currently achieving a 60 percent corn/40 percent soybean rotation. AFPC simulation results for this farm suggest that it earned 71 percent of its 2012 receipts from corn production and the remainder from soybean production.

The region of Iowa in which these representative farms are found is highly productive, with budgeted corn yields at 210 bushels per acre for the moderate-sized farm and 190 bushels per acre for the large-sized farm. Soybean budgeted yields are 52 bushels per acre for the smaller farm and 50 bushels per acre for the larger farm. Conventional tillage is the norm for the area, although a few producers plant no-till soybeans into standing corn stalks. Cropland of the region consists of predominantly silty clay loam soils. Major soils of the region are Loamy Wisconsin Glacial Till and include the Clarion, Nicollet, and Webster Series. Table 1 identifies planting and harvest date ranges, tillage practices, and other farm-specific attributes of the two Iowa representative farms.

Table 1. Attributes of Iowa Representative Feedgrain and Oilseed Farms.

Crop	Corn	Soybeans
Estimated Planting Date	April 10-April 25	May 1-May 10
Estimated Harvest Date	Oct 10-Oct 20	Sept 25-Oct 10
Yield Range (bushels/Acre)	190-210	50-52
Major Pests	Corn Rootworm	Aphids
Irrigated	No	No
Tillage Practice	Conventional*	Conventional (some no-till)*
Soil Texture	Silty Clay Loam	Silty Clay Loam

* For a description of tillage practices, refer to: http://www.extension.iastate.edu/publications/pm1901c.pdf

Financial Summary

A baseline financial outlook for each of the two Iowa feedgrain farms was established using FLIPSIM assuming commodity prices and rates of change for input prices reported in the December 2013 FAPRI Baseline. The farms were simulated 500 iterations using a distribution of possible price and yield combinations, allowing the model to incorporate price and production risk into the analysis. Table 2 includes 2012 asset values for the two farms along with mean projected outcomes for selected financial measures over the 2013-2018 study period. Additionally, Figures 2 and 3 illustrate the historical Net Cash Farm Income (NCFI) for each of the two farms along with a range of projected NCFI outcomes for 2013-2018. Ninety percent of the projected NCFI results fall within the outer two red lines, 50 percent of the results fall between the inner two blue lines, and the mean NCFI is depicted by the black line in the center. The bar graph at the bottom indicates the annual probability of the farm experiencing a cash flow deficit at the end of each projected year.

The Agricultural and Food Policy Center evaluates and scores the overall financial condition of its representative farms. Overall financial condition is a composite ranking based on the probability of a farm facing cash flow stress and the probability of a farm's real net worth declining over the course of the study period. Farms are classified as good, marginal, or poor based on these criteria.

IAG1350 experiences an increasing likelihood of facing cash flow stress throughout the projection period. With a 43 percent chance of negative ending cash in 2018, the farm receives a "marginal" score with respect to its liquidity measure; however, increasing land values and cash built earlier in the period allow the farm to build wealth throughout the period, thus it receives a "good" ranking with respect to its equity. Using an algorithm developed at AFPC to take both measures into account, the farm receives a "marginal" overall financial ranking. IAG3400 is projected to have a lower chance of facing cash flow problems by the end of the projection period, with only a 22 percent chance of a negative ending cash balance in 2018. The larger farm also is expected to

have a minimal chance of losing real net worth by the end of the projection period, thus the farm is classified in "good" overall financial condition.

Table 2. Financial Characteristics of Iowa Representative Feedgrain and Oilseed Farms.

	IAG1350 --$1,000--	IAG3400 --$1,000--
Assets, 2012	5,904.0	14,195.0
Receipts, 2013-2018	1,084.1	2,463.4
Payments, 2013-2018	29.7	58.2
NCFI, 2013-2018	157.6	458.0
Cash Reserves, 2018	77.4	775.6
Nominal Net Worth, 2018	6,349.2	15,622.6

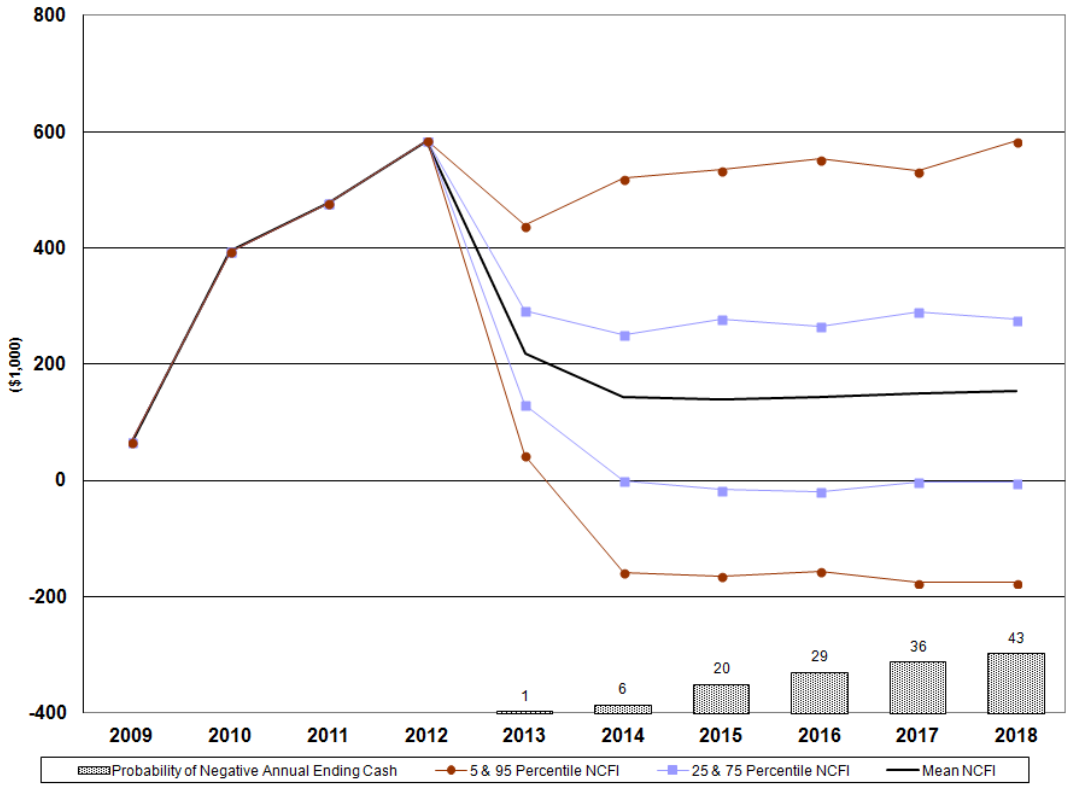

Figure 2. Net Cash Farm Income and Probabilities of Negative Ending Cash for IAG1350, 2009-2018.

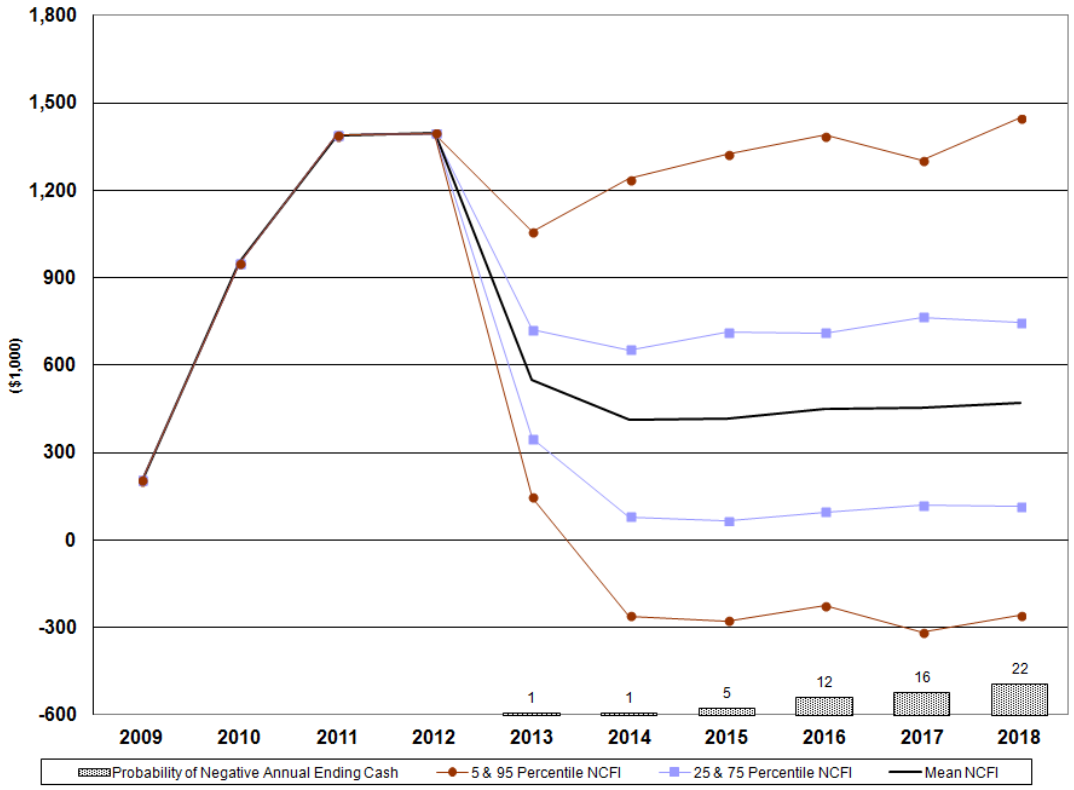

Figure 3. Net Cash Farm Income and Probabilities of Negative Ending Cash for IAG3400, 2009-2018.

Attitudes toward Climate Change

One of the objectives of this project is to discuss climate change and how it may be impacting their operation now and into the future. Most producers were quick to point out that the climate has been changing since the beginning of time and are not particularly quick to agree or concede that climate change, if it is indeed occurring, is the result of human activities. Anecdotally, at least one producer admitted he feels the climate is changing, as he can now confidently plant his corn crop earlier in the spring without fear of the crop freezing.

Climate Change Adaptation

While at least two other areas we visited in conjunction with this project were dealing with severe drought, this group of producers experienced excessive rainfall and flooding during the 2012 growing season. Drought conditions seem to spark producers into considering of alternative crops and adaptation strategies much more readily than conditions that are excessively wet, thus this group was the least concerned of our three groups with adapting to conditions if they are indeed changing.

Conclusions and future areas of the study

The first phase of the project focused on producers' attitudes and opinions on climate change. In general, the Iowa group's thoughts on climate change are evolving as pointed out earlier in the paper. Additionally, vital production information was gathered. This information will be used to feed climate and economic models to forecast specific regional climate change impacts and to simulate agricultural commodity market impacts.

Future project work

The information obtained at this initial meeting will be transferred into climate models which will produce regional climate impacts. These impacts will be translated into crop yield and price ranges. Results will be of particular interest as farmers who have not had climate change impacts communicated to them in terms of yield and price impacts that speak directly to their bottom lines. Our project team will disseminate these findings at the next representative farm update in Iowa planned for 2015.

A Final Note

Results of our study will help farmers understand what climate change means for them. In the areas with Representative Farms, project reports will disseminate specific estimates and list adaptation strategies real farmers have identified. For farmers in other regions, the scale of impacts and the nature of adaptation options will inform decision making by alerting them to the ranges of possible outcomes, including the impacts on risk, and help them to assess the priority of developing adaptation strategies.

Our project, the first to exploit climate research findings and link them through yield and market effects to an existing extension network to deliver climate impacts to farmers, will be a step towards identifying and moving toward a sustainable adaptation to climate change. Moreover, by delivering results to farmers and policy makers, as well as academic audiences, investment and policy decisions will be better informed, helping the US agriculture and food sector to be sustainable in the context of new climate conditions.

References

FAPRI-MU. *U.S. Baseline Briefing Book*. Columbia, MO: Food and Agricultural Policy Research Institute, University of Missouri-Columbia, FAPRI-MU Report #01-13, March 8, 2013.

Resources Conservation Practices: Consider the Strip-Tillage Alternative. Ames, IA: Iowa State University Extension, PM 1901c, May 2008.

Richardson, James W. and Clair J. Nixon. *Description of FLIPSIM V: A General Firm Level Policy Simulation Model*. College Station, TX: Texas Agricultural Experiment Station, Bulletin B-1528, July 1986.

Richardson, James W., Joe L. Outlaw, George M. Knapek, J. Marc Raulston, Brian K. Herbst, David P. Anderson, Henry L. Bryant, Steven L. Klose, and Peter Zimmel. *Representative Farms Economic Outlook for the December 2013 FAPRI/AFPC Baseline*. College Station, TX: Agricultural and Food Policy Center, Department of Agricultural Economics, AFPC Working Paper 13-4, December 2013.