Effects of Imperfect Information on 2014 Farm Bill Program Enrollment

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ABSTRACT

BACKGROUND AND PURPOSE: The 2014 Farm Bill required Kansas wheat producers to make a series of enrollment decisions that were both complicated and based on incomplete information. With this bill, producers were required to complete a one-time enrollment in one of three programs (ARC-CO, PLC, or ARC-IC) to serve as a safety net for poor crop prices and/or yields over the subsequent five-year life of the legislation. Analyzing the effects of incomplete information on producers' decisions provides an opportunity to identify challenges associated with program selection under the 2014 Farm Bill and suggest changes for future farm support legislation. **METHODS:** Kansas county-level enrollment data for wheat base acres obtained from USDA-FSA are used to model aggregate producer sign-up decisions as a function of estimated 2014 payments, county-level yield variability, prior farm program enrollment, and extension programming efforts at the county and state level. This OLS model is subsequently replicated using individual producer data from surveys conducted during fifteen extension meetings held across Kansas. The model based on individual data is a regression of stated preferences for the three programs as a function of farm size, farmer demographics, risk preferences, and knowledge of the Farm Bill. **RESULTS:** Comparisons of model results from the aggregated enrollment data and the individual survey data offer greater insights into the factors affecting producer decisions. Specifically, aggregate enrollment decisions are primarily explained by expected payments for the first year of the program. For counties with a positive expected payment for 2014 under the ARC-CO program, enrollment in that program was higher. However, when the regression is repeated using individual data, other factors affect the enrollment decision such as the number of years a producer has been farming, the size of the farm, their membership in commodity associations, and their preferences for risk protection. **CONCLUSIONS:** The 2014 Farm Bill required producers to select participation in a single support program for the five-year life of the legislation. This decision had to be made without knowing exactly how crop prices and yields would behave in the future. It is important to understand how producers made their decisions based on incomplete information to inform future legislative efforts for an effective farm safety net. This research expands that understanding by analyzing both aggregate and individual data to determine the factors that influence program choice.

Introduction

From the implementation of the first farm bill in the United States with the Agricultural

Adjustment Act (AAA) of 1933, various commodity producer protection programs have seen a

rise and fall within the agricultural sphere. As the agricultural industry has evolved from a time

of high labor inclusion rates, modest productivity and high government intervention as was the

case in the 1930s and 40s to its current state of large sums of land being very effectively utilized

by a small number of farmers, such has been the change in farm subsidies offered by the various

farm bills from 1933 to 2014. These changes are illustrated by the development of farm

programs from production controls and parity income discussions during the early years of the

Farm Bill to the current revenue protection and price support programs utilized in 2014.

This paper will seek to analyze the two major programs of the 2014 Farm Bill and

illustrate how conditions of incomplete information played a role in Kansas wheat producer

enrollment choices in the Agriculture Risk Coverage (ARC-CO) and Price Loss Coverage (PLC)

programs. By utilizing Farm Service Agency (FSA) Farm Bill Enrollment Data obtained from a

Freedom of Information Act (FOIA) request as well as survey data collected from attendees of

program informational meetings conducted by K-State Research and Extension Services, two

separate models are developed for analysis. An OLS regression compares county level

enrollment data to an aggregation of the survey results in order to analyze county level

enrollment factors as well as whether or not the survey results are representative of the state's

actual wheat program enrollment. A logit model is constructed to analyze the survey results in

order to determine producer-specific enrollment considerations.

As wheat production represents the majority of Kansas cropping systems with an

overwhelming 53% share of base acreage, the analysis of predicted and actual enrollment is

crucial in giving insight into producers' decision-making process. Termination of payments, land price changes as a result of mass farm foreclosures, federal spending concerns, and commodity supply changes are all potential threats facing agriculture that could be affected by the program producers selected. Due to the nature of the five-year enrollment period for the 2014 Farm Bill, it is imperative to understand how producers made their program selection in order to analyze and mitigate any potential risks for future farm legislation based off of potential losses that producers (or government entities responsible for distributing subsidies) might face over the life of the current bill if catastrophic losses occur.

Literature Review

Historical Context of Farm Support Legislation

With the passage of the 2008 Farm Bill came the introduction of the first ever revenue based protection program. Average Crop Revenue Election, or ACRE, utilized national commodity prices and state-level yields to determine if a producer's market revenue had declined to such a degree it triggered a payment. Producers could receive a payout equivalent to up to 22.5% of their revenue if either (or both) yield or price reductions caused a loss at the state level. The difference between a state's guarantee and actual state revenue would then represent the payment a producer would receive. This program was introduced in conjunction with counter-cyclical payments and direct payments which had been implemented in previous farm bill legislation (*Average Crop Revenue Election (ACRE) Program Backgrounder* 2009). In order to enroll in the ACRE program, producers were required to forego any counter-cyclical payments in addition to a 30% reduction in rates for loan deficiency payments (LDPs) and a 20% reduction in direct payment values. Despite predictions that ACRE enrollment would be high, national enrollment in 2009 represented roughly only 13% of base acreage (Rejesus 2013). In Kansas,

only 11% of Kansas producers enrolled in the ACRE program in 2013 (Farm Service Agency 2015).

Summary of 2014 Programs

Intense political posturing occurred throughout the 2014 Farm Bill writing process. While Midwest and Northern states that grew crops such as wheat, corn, and soybeans embraced the push for an enhanced revenue-based program similar to ACRE, Southern states that grew crops such as peanuts and rice favored price protection programs that had been offered in previous bills. As a result, commodity protection programs offered in the 2014 Farm Bill closely resemble two programs offered in the 2008 bill.

Price Counter-Cyclical Payments (PC) that relied on the Direct Payment Rate (which was eliminated for 2014) in the 2008 Farm Bill were simplified to a national reference "strike" price that serves as a price floor for the PLC program in the 2014 Farm Bill. The per bushel strike prices of the major Kansas commodities are as follows: wheat-- $5.50, corn-- $3.70, soybeans-- $8.40, and sorghum-- $3.95. PLC payments are limited to $125,000 per producer, per entity, with another $125,000 offered if a spouse contributes to the operation. PLC serves as the default program and any producer that did not enroll by the deadline automatically was assigned PLC and forfeited any 2014 payments (*2014 – 2018 Crop Year Appendix to CCC-861, Price Loss Coverage (PLC) and Agriculture Risk Coverage with County Option (ARC-CO) Program Contract and CCC-862, Agriculture Risk Coverage with Individual Option (ARC-IC) Program Contract 2015*).

Despite the low enrollment rates of the ACRE program, the 2014 bill saw the reintroduction of an improved ACRE program. The ARC-CO program was simplified to safeguard against a decline in a producer's revenue by commodity or at the individual level for

aggregate farm income protection based on national prices and county level yields.[1] ARC-CO

differed from ACRE in that it only covered 10% of revenue losses, after subtracting a 14%

deductible from the revenue guarantee. Additionally, payments would be received on 85% of

base acreage (Reid, Barnaby, and Taylor 2014).

In order to calculate a county's ARC estimated payment, the Olympic Average (OA)

price and yield first needed to be determined. The 2009-2013 NASS data were averaged after the

high and low value of the five-year range are removed. For every year of the bill, there is a new

OA price and yield as the five-year span used to calculate the average shifts to include the year

prior (National Agricultural Statistics Service 2015). The OA price is then used in conjunction

with the 2014 Marketing Year Average (MYA) price. The MYA price calculation is found by

weighing the price received nationally for wheat marketed throughout the twelve-month

marketing period. For the yield calculation, a special exception was needed when comparing the

OA yield to the 2014 yield. Since NASS data did not include a 2014 yield for every county,

yields in some counties were estimated using data from crop insurance or other sources. In this

model, the proxy for a county yield in 2014 is a five-year average of historical yields.

After calculating OA prices and yields, the calculation of estimated payments was made

based on the language of the bill. The components of an ARC-CO payment include benchmark

revenue, maximum payment limits, guarantees, and actual revenue. The benchmark revenue is

determined by multiplying the OA yield and MYA price. This figure is then multiplied by 0.1 in

order to determine the maximum payment. As previously noted, the 14% deductible on ARC-CO

implies that only the difference between 76% and 86% of revenue can be paid out. Lastly, the

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[1] For the intended purpose of this study and the very low enrollment rates of ARC-Individual, it will not be included

in this analysis.

actual revenue is the realized revenue for the county. It is calculated by multiplying the county level average yield for the year by the MYA price. The actual revenue is then subtracted from the guarantee. If this value is positive, a producer will receive a payment equivalent to the lesser of the difference of the guarantee and actual revenue or the maximum payment. If the difference in the guarantee and actual revenue is negative, no payment will be triggered.

Data

Given the multi-model approach of this analysis, data was collected from a variety of sources. The county-level estimation utilized complete FSA data for 2013 Kansas wheat ACRE enrollment and 2014 Farm Bill program wheat enrollment figures and county classifications for whether or not a county was eligible for separate payments based on whether acres were irrigated and non-irrigated.[2] Additionally, National Agricultural Statistics Service (NASS) historical yield information, 2014 National Marketing Year Average (MYA) pricing data, and Kansas State University extension educational meeting information was used.

The ARC-CO enrollment figures used in the aggregate cross-comparison model as well in the development of the second, individual-based analysis were obtained from surveys designed by faculty and staff of Kansas State University. The two surveys were collected before and after explanatory educational efforts at fifteen Farm Bill program information meetings. These meetings were conducted across the state of Kansas between October of 2014 and March of 2015 and attended by over 11,000 farmers, landowners, and farm managers. In total, approximately 1,400 producers completed both a pre and post survey that could be used in the

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[2] In the state of Kansas, 7 counties were designated as split counties and therefore eligible for separate payments for irrigated and non-irrigated acres of wheat. The remaining 98 counties were designated as blended and payments were not based on irrigation practice.

cross comparison analysis and individual program models. The surveys included questions such as an attendee's classification (farmer, landowner, manager, lender, etc.), the number of acres owned and rented, the number of years of experience, participation in farm and commodity groups, a producer's choice in information sources (meetings, online videos, newspapers, talking with other producers, etc.), anticipated annual payouts, expectations of future yields and prices, anticipated program selection both before and after program information was provided, insurance coverage, as well as statements that attempted to quantify risk preferences. It is important to note that the survey only captured expected payments, program choice, and crop selection for a respondent's largest FSA farm.

The variables (listed in parentheses) include characteristics of the respondent and the farms they own or operate, characteristics of their risk preferences, and which program they planned to enroll in, which was asked both before and after the educational meeting. Respondents were asked the number of years they had been farming, owned farmland, or managed farmland (*Experience*). The average response to this question was 28.8 years. The percent of income a respondent receives from agricultural activities (*Income*) averaged 74.3%. The respondents were also asked to give the number of agricultural acres they own (*OwnAcres*) and rent (*RentAcres*). Owned acres average 1,020 acres, while the average for leased land is 1,355 acres.

The timing of the enrollment decision and the amount of information available to producers is likely a contributing element of their decision process. The 2014 Farm Bill was passed in February 2014 and final enrollment occurred in the spring of 2015. This lag in timing meant that the first payment under the 2014 Farm Bill, the 2014 crop year payment, would not actually be made until October 2015. As such, the information used to determine the 2014 ARC-

CO payments was partially available to producers prior to the enrollment deadline. To assist producers with their enrollment decision, KSRE generated, and updated periodically, estimates of the 2014 ARC-CO payment using publically available information.[3] The variable (*KSUPay*) is a county-level estimate of the expected 2014 payment for wheat based on all the information available during the enrollment period. The variable averaged $21.34 per acre, with 11.9% of respondents being from counties with no expected payment for 2014 under the ARC-CO program. The date of the meeting they attended was also recorded to determine the number of days in advance of the FSA signup deadline they were answering the survey (*Days*), which averaged 71 days. This variable captures some of the uncertainty and information availability (e.g. rule clarifications, MYA price and yield updates) that was changing over the time period in which decisions were being made.

Respondents were asked if they had enrolled in the ACRE program during the 2009 Farm Bill (*ACRE2009*) and 19.1% of respondents answered positively. This question was asked to determine if they had first-hand experience with a revenue-based program. The primary difference between ACRE and ARC-CO is the formula for determining payments. ACRE was based on state, rather than county, yields. The similarities between the programs are the use of a MYA price and the uncertainty of future payments.

In an attempt to identify likely sources of information and involvement in the agriculture industry, respondents were asked if they are members of any prominent farm organizations. Membership in the Kansas Farm Bureau (*KFB*) membership averaged 59.6%, while American

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[3] The estimated payments were not considered final because some information and rule clarification from FSA still needed to be made. Similar estimates for the remaining years of the farm bill were not made because information needed would not be available until later in 2015 or 2016.

Farm Bureau (*AFB*) membership averaged 4.7% of respondents. Membership in any of the

Kansas commodity groups (*KSCommodity*) averaged 19.4% of respondents, while membership

in the Farmers Union (*FU*) averaged 3.2% and all other organizations (*OtherMember*) accounted

for 5.3% of respondents.

The most common answers to the question of where they obtained their information on

the 2014 Farm Bill were in-person meetings (*InPerson*) with an average response of 72.8% and

from other producers (*OtherProd*) which was marked by 59.4% of respondents. The other

information sources were from magazines and newspapers (*PrintNews*) with 56.5%, web-based

(*Online*) with 22.3%, radio or television (*RadioTV*) with 21.5%, and all other sources

(*OtherSource*) with 13.2% of respondents.

There were also a series of questions related to risk preferences and expectations.

Respondents were asked to list what type, if any, of crop insurance they carry and the coverage

level. From their answers a continuous variable equal to the percent of coverage (*Coverage*) was

created with an average value of 44.5%. However, the average level of coverage by respondents

who purchase crop insurance is 73%, while 43.0% of respondents have no coverage for their

wheat acres. Questions regarding expected outcomes under the farm bill were also asked to

gauge the anticipated impact of the program in terms of payments and risk protection.

Respondents were asked which program would have the highest payout over the life of the farm

bill and could choose between ARC-CO, PLC, or "Don't know" (*ARCCOPay, PLCPay, DkPay).*

Responses to this question ranged from 48.7% choosing ARC-CO to 34.4% choosing PLC, with

16.9% answering "Don't know". Similarly, respondents selected which program they though

would provide the greatest risk protection (*ARCCORisk, PLCRisk, DkRisk*). The majority of

respondents, 53.2%, chose ARC-CO, followed by 29.5% answering "Don't know", and 17.4% choosing PLC.

Respondents were asked a series of questions intended to elicit their risk preferences. A set of Likert scale questions were composed following Franken, Pennings, and Garcia (2014) to assess producer risk preferences. The final models presented here use responses regarding the level of agreement with the following statement: "I accept more risk in my farming business than other crop producers." The variable (*RiskAttitude*) is measured on a 5-point scale (1=Strongly Agree, …, 5=Strongly Disagree), with an average value of 3.6.

Both pre- and post-meeting survey instruments included a question asking respondents what they expected to receive in dollar per acre annual payments. The possible answers included $0 per acre, $1 to $30 per acre, $31 to $60 per acre, $61 to $90 per acre, and more than $90 per acre. The amount people expected to receive in annual payments is a function of their expectations of prices and yields over the life of the legislation. Information presented during the educational meeting had the potential to influence those expectations and, therefore, their preferred program. Two variables were created from these data to represent changes in expectations before and after attending the meeting. The first is a binary variable equal to one if the respondent chose a different category for their expected payments and their post-meeting answer was greater in magnitude than their pre-meeting answer and zero otherwise (*HighPay*). On average, 11.9% of respondents expected higher program payments after attending the meeting. The second variable is similarly defined using their pre- and post-meeting responses, but equals one if there post-meeting answer was a lower dollar amount and zero otherwise (*LowPay*). This variable has an average value of 26.0%, indicating just over a quarter of the respondents expected lower program payments after attending the meeting.

Models

County-Level and Aggregate Cross Comparison

Due to unobservable characteristics present when analyzing county level enrollment, a limited number of variables were identified as potential factors affecting program selection and included in the cross comparison model. These factors included the estimated payment a producer anticipated to receive from the ARC program, the risk variability of a county, educational information provided to producers about program specifics, a producer's familiarity with a revenue-based Farm Bill program, and the potential for a split production method altering a producer's payment (i.e. producing on both irrigated and non-irrigated acres). The following model was used to estimate potential enrollment factors:

(1)   ARC_Enroll: f (Est_Pay, Yield_Std, Edu, ACRE_Perc, Split_DV)

ARC_Enroll represents either the percentage of producers in a county enrolling in the ARC program for wheat according to FSA data or the number of producers stating in their post-educational meeting survey that they intended to enroll in the ARC program. Electing to enroll in the ARC program was determined to be a function of the following explanatory variables:

- Est_Pay: The 2014 estimated payment calculation for the ARC program at the time of the enrollment deadline[4]

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[4] In order to account for FSA enrollment data including only one percentage for counties that had an irrigated/non-irrigated split payment, a blended payment was calculated. All counties listed as split counties by FSA for wheat had their previous five year planted acreage history pulled from NASS. Irrigated and non-irrigated acre payment weights were then determined by summing the total acres planted and the percentage that irrigated and non-irrigated acres comprised of the total. This weighted percentage was then applied to the estimated irrigated and non-irrigated payments for each split county to create one blended payment representative of the payments and portion of planted acres for both irrigated and non-irrigated acres.

- Yield_Std: Twenty-year historical county level NASS yield standard deviations

- Edu: The number of Farm Bill informational meetings held by Kansas FSA Extension Agents, Kansas State University Agricultural Economists and Kansas Farm Management Association (KFMA) within a county prior to the enrollment deadline

- ACRE_Perc: The percentage of producers in a county that enrolled in ACRE in 2013

- Split_DV: A binary variable representing whether or not the county was designated as a split county and eligible for separate irrigated and non-irrigated sign-ups

Summary statistics for both the county and individual variables can be found in Tables 1 and 2.

The model listed in equation (1) was constructed first for analysis of county-level enrollment in ARC versus PLC. An OLS regression was performed to determine what factors were significant at a county level. The survey responses were then aggregated for comparison. The independent variables remained the same regardless of survey respondent. The ARC enrollment number was determined by calculating the percentage of survey respondents in a county that indicated in their post-informational meeting survey that they intended to enroll in the ARC program for wheat. The percentage of survey respondents choosing the ARC program was then regressed on the same independent variables from the county-level estimation to determine if enrollment factors relevant at the county level were similar to those relevant to individual producers. The results of this analysis is presented in Table 4.

Binary Logit Model of Program Choice

The dependent variable of the binary logit choice model is the preferred program each respondent picked either ARC-CO or PLC. The dependent variable (*ARC-CO*) is set equal to one if the respondent chose ARC-CO and equal to zero if they chose PLC. The empirical model is specified as follows

(2) $z_i = f(Days_t, Experience_i, Income_i, OwnAcres_i, RentAcres_i, ACRE2009_i,$

$Coverage_i, RiskAttitude_i, KSUPay_c, HighPay_i, LowPay_i,$

$InPerson_i, Online_i, PrintNews_i, RadioTV_i, OtherProd_i, OtherSource_i,$

$KFB_i, AFB_i, KSCommodity_i, FU_i, OtherMember_i,$

$ARCCORisk_i \; PLCRisk_i, DkRisk_i, ARCCOPay_i \; PLCPay_i, DkPay_i,),$

where the subscript *i* denotes a variable specific to the respondent, the subscript *t* denotes a

variable specific to one of the 15 meeting locations, and the subscript *c* denotes a variable

specific to the county in which the respondent lives.

Results

County-Level and Aggregate Cross Comparison

In both the county-level and aggregated survey regressions, the estimated 2014 payment

had a statistically significant impact on the percentage of wheat base acres enrolled in ARC. At

the county level, a one-dollar increase in the anticipated ARC payment increased enrollment in

the ARC program by nearly 1%. For the individual responses, a one-dollar payment increase

contributed to a .5% increase in ARC enrollment. Additionally, ACRE enrollment was

statistically significant in the county-level model at a 10% level. A 1% increase in ACRE

enrollment for a county increased the likelihood of a producer enrolling in ARC by 1.4%. As

indicated by the low R^2 values of .2658 and .0728 respectively, the models capture a small

portion of factors that producers considered when making an enrollment decision. As the results

suggest, the survey responses for wheat program enrollment served as a representative sample of

the statewide enrollment factors. Additionally, a representative sampling indicates that results

provided by the individual logit modeling could provide valuable insights into how wheat

producers across the state of Kansas selected a protection program.

Binary Logit Model

Table 5 contains the results of the binary logit model.[5] The dependent variable equals one if the producer selected ARC-CO for their wheat base acres. Membership in one of the Kansas commodity groups increased the probability a producer would select ARC-CO over PLC. Characteristics that decreased the probability of choosing ARC-CO for their wheat base acres, and instead increased the likelihood of selecting PLC, included having more years of experience farming and a larger number of owned acres. PLC was also more likely to be chosen if the respondent selected PLC as the program having either the highest level of risk protection or the largest expected annual payout. They also were more likely to enroll in PLC if they stated they "Didn't know" which program offered the best risk protection or highest payout.[6] The tendency of producers to prefer a program they believed would either offer a higher payout or better risk protection supports the planned behavior theory (Azjen 1991) and is consistent with findings by Mitchell, et al. (2012).

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[5] The variables discussed in the results section are determined to be statistically significant using the threshold of a 90% confident interval.

[6] According to FSA rules, if no program is selected, the farm will be automatically enrolled in PLC.

Policy Implications and Conclusion

Several characteristics of the respondents affected their expected enrollment decisions and may be useful indicators of enrollment preferences in drafting future farm policy. The membership variables included in the model control for several unobservable characteristics of Kansas commodity group members, including (but not limited to) access to different information sources and familiarity with the policy-making process. It is also possible that members of the commodity groups are more active in their industry or have a different philosophy on the role of government programs in providing risk management. Work by Mitchell (2012) found statistically significant impacts of farm organization membership on ACRE enrollment, suggesting that this characteristic reflects beliefs or attitudes that affect behavior.

Another characteristic that affects behavior is the impact of producer experience on program selection. Producers with more years of experience in agriculture are more likely to select the PLC program. This may be due to the similarity of the PLC program to the target price programs of previous farm bills. However, it may also be due to their longer horizon of profitability outcomes relative to producers with fewer years of farming experience.

Understanding the impact of years of experience in agriculture on policy preference requires some context for the profitability of farming in Kansas in the years leading up to the enrollment period for the 2014 Farm Bill. The net returns per farm operator for the years 2006 to 2015 are shown in figure 1. Net returns dropped below $100,000 per operator for the first time in seven years in crop year 2014 (KFMA 2016). They fell even more dramatically in the 2015 crop year. With the enrollment deadline occurring in the spring of 2015, most producers had yet to feel the impact of significantly lower commodity prices that would reduce returns to farming. Instead, their recent experience was primarily high returns due to high commodity prices. The

logit and multinomial logit model results indicate that producers with fewer years of experience were more likely to choose ARC-CO, a revenue based program, while producers with more years of experience were more likely to select PLC, which only triggers a payment when prices fall below a reference price. More experienced producers may have preferred PLC because they have more first-hand experience with lower prices than the less experienced producers who may weight their beliefs more heavily toward recent experience. This explanation is similar to the results found in Coble, et al. (2004), where producers who had low income years were more likely to prefer keeping with the old programs than changing to new programs. More broadly, this behavior is consistent with loss aversion and reference point aspects of prospect theory in decision making (Babcock 2015, Barberis 2013, Bocqueho, Jacquet, and Reynaud 2014). Future research could explore these behavioral aspects in more detail to further explain diverse response to farm bill program alternatives.

References

AgManager. "Kansas Farm Management Association Executive Reports." Accessed October 1, 2016. http://www.agmanager.info/kfma.

Babcock, B.A. 2015. Using Cumulative Prospect Theory to Explain Anomalous Crop Insurance Coverage Choice. *American Journal of Agricultural Economics*. 97:1371-1384.

Barberis, N.C. 2013. Thirty Years of Prospect Theory in Economics: A Review and Assessment. *Journal of Economic Perspectives*. 27:173-196.

Bocqueho,G., F.Jacquet, and A. Reynaud. 2014. Expected Utility or Prospect Theory Maximisers? Assessing Farmers' Risk Behavior from Field-Experiment Data. *European Review of Agricultural Economics*. 41:135-172.

Coble, K.H., T.O. Knight, G.F. Patrick, and A.E. Baquet. 2004. "Understanding the Economic Factors Influencing Farm Policy Preferences." *Review of Agricultural Economics*, 24(2): 309-321.

Farm Service Agency. 2013 National ACRE Sign-Ups. July 2015. Raw data. United States Department of Agriculture, Washington D.C.

Franken, J.R.V., J.M.E. Pennings, and P. Garcia. 2014. "Measuring the Effect of Risk Attitude on Marketing Behavior." *Agricultural Economics*. 45:525-535.

Mitchell, P.D., R.M. Rejesus, K.H. Coble, and T.O. Knight. 2012. "Analyzing Farmer Participation Intentions and County Enrollment Rates for the Average Crop Revenue Election Program." *Applied Economic Perspectives and Policy*, 34(4): 615-636.

National Agricultural Statistic Service. "Table 1: ARC-CO Yields, Prices, Revenue, and Payment Rates as of Nov. 6, 2015." November 6, 2015.

Reid, Robin, G.A. Barnaby, and Mykel Taylor. "Frequently Asked Questions: Title I Programs
of the 2014 Farm Bill." November 1, 2014. Accessed December 9, 2015.
http://www.agmanager.info/policy/commodity/2012/FAQ_2014FarmBill.pdf.

Rejesus, Roderick M. *Participation in the Average Crop Revenue Election Program (ACRE):
Lessons for the Next Farm Bill*. North Carolina State University. NC State Economics. May
& June 2013. https://ag-econ.ncsu.edu/wp-
content/uploads/2015/12/may13_participation_ACRE.pdf.

Schnitkey, Gary, and Carl Zulauf. "Estimated National 2014 ARC-CO and PLC Payments."
FarmdocDAILY. August 6, 2015. Accessed December 2, 2015.
http://farmdocdaily.illinois.edu/2015/08/estimated-national-2014-arc-co-and-plc-
payments.html.

United States, Department of Agriculture, Farm Service Agency. (2015). *2014 – 2018 Crop Year
Appendix to CCC-861, Price Loss Coverage (PLC) and Agriculture Risk Coverage with
County Option(ARC-CO) Program Contract and CCC-862, Agriculture Risk Coverage with
Individual Option (ARC-IC) Program Contract*. Retrieved December 29, 2015, from
https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/arc-
plc/pdf/ccc861andccc862_appendix_a77a.pdf

United States. Department of Agriculture. Farm Service Agency. *Average Crop Revenue
Election (ACRE) Program Backgrounder*. April 24, 2009.
https://www.fsa.usda.gov/Internet/FSA_File/acrebkgrd.pdf.

Table 1: County-Level Summary Statistics

Variable	Definition	Mean	Std. Dev.	Min	Max
Dependent Variable					
ARC_Enroll	Percentage of producers that enrolled in ARC for the 2014 Farm Bill	.6270	.2004	0	.937
Explanatory Variables					
Est_Pay	2014 Estimated Payment Calculation for the ARC program	15.9816	12.3205	0	34.76
Yield_Std	20 year historical, county-level yield standard deviation	10.3475	1.2108	7.5074	14.1235
Edu	Number of total educational meetings held within a county prior to the enrollment deadline	2.1810	1.9054	0	12
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	.0113	.0221	0	.1116
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	.06667	.2506	0	1

Observations: 105

Table 2: Aggregated Survey Summary Statistics

Variable	Definition	Mean	Std. Dev.	Min	Max
Dependent Variable					
ARC_Enroll	Percentage of producers that enrolled in ARC for the 2014 Farm Bill	.6405	.2733	0	1
Explanatory Variables					
Est_Pay	2014 Estimated Payment Calculation for the ARC program	16.4517	12.1858	0	34.76
Yield_Std	20 year historical, county-level yield standard deviation	10.3390	1.2234	7.5074	14.1235
Edu	Number of total educational meetings held within a county prior to the enrollment deadline	2.2353	1.9252	0	12
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	.0116	.0224	0	.1116
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	.0686	.2541	0	1

Observations: 102

Table 3. Summary Statistics of Survey Responses

Variable	Definition	Mean	Std. Dev.	Min	Max
Dependent Variable: Logit Model					
ARC-CO	Binary variable equal to 1 if ARC-CO was preferred program after education	0.74	0.44	0	1
Dependent Variables: Multinomial Logit Model					
ARC-CO_nochange	Binary variable equal to 1 if ARC-CO was preferred program before and after education	0.43	0.49	0	1
PLC_nochange	Binary variable equal to 1 if PLC was preferred program before and after education	0.16	0.37	0	1
ARC-CO_switch	Binary variable equal to 1 if ARC-CO was the preferred program only after education	0.32	0.47	0	1
PLC_switch	Binary variable equal to 1 if PLC was the preferred program only after education	0.09	0.29	0	1
Explanatory Variables					
Days	Number of days prior to enrollment deadline educational meeting was attended	70.89	10.11	53	85
Experience	Number of years involved in production agriculture	28.78	15.20	0	68
Income	Percentage of income derived from agriculture	74.32	27.51	0	100
OwnAcres	Number of agricultural acres owned	1,020.04	1,880.37	0	35,000
RentAcres	Number of agricultural acres rented	1,355.66	2,179.32	0	31,000
ACRE2009	Binary variable equal to 1 if respondent enrolled in ACRE program during previous Farm Bill	0.19	0.39	0	1
Coverage	Percentage of crop insurance coverage carried on wheat acres	44.48	36.01	0	100
RiskAttitude	Likert scale response to statement: "I accept more risk in my farming business than other crop producers."	3.62	1.13	1	6

Table 3. Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
KSUPay	K-State estimate of 2014 county payment for ARC-CO per acre	21.34	9.82	0	34.76
HighPay	Binary variable equal to 1 if expected payment from preferred program was higher after attending educational meeting	0.26	0.44	0	1
LowPay	Binary variable equal to 1 if expected payment from preferred program was lower after attending educational meeting	0.12	0.32	0	1
Information Sources	Categorical variables denoting sources of information on the Farm Bill				
InPerson	Binary variable equal to 1 if source is in-person meetings	0.73	0.45	0	1
Online	Binary variable equal to 1 if source is online materials	0.22	0.42	0	1
PrintNews	Binary variable equal to 1 if source is newspaper or magazine	0.56	0.50	0	1
RadioTV	Binary variable equal to 1 if source is radio or television	0.22	0.41	0	1
OtherProd	Binary variable equal to 1 if source is other producers	0.59	0.49	0	1
OtherSource	Binary variable equal to 1 if source is from other outlets	0.13	0.34	0	1
Industry Membership	Categorical variables denoting membership in various groups				
KFB	Binary variable equal to 1 if member of Kansas Farm Bureau	0.60	0.49	0	1
AFB	Binary variable equal to 1 if member of American Farm Bureau	0.05	0.21	0	1
KSCommodity	Binary variable equal to 1 if member of a Kansas commodity group	0.19	0.40	0	1
FU	Binary variable equal to 1 if member of Farmers Union	0.03	0.18	0	1
OtherMember	Binary variable equal to 1 if member of other organization	0.05	0.22	0	1

Table 3. Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
Risk Protection	Categorical variables indicating the program with best risk protection				
ARC-CORisk	Binary variable equal to 1 if selected ARC-CO	0.49	0.50	0	1
PLCRisk	Binary variable equal to 1 if selected PLC	0.34	0.48	0	1
DkRisk	Binary variable equal to 1 if selected "Don't Know"	0.17	0.38	0	1
Highest Payout	Categorical variables indicating the program with highest annual payout				
ARC-COPay	Binary variable equal to 1 if selected ARC-CO	0.53	0.50	0	1
PLCPay	Binary variable equal to 1 if selected PLC	0.17	0.38	0	1
DkPay	Binary variable equal to 1 if selected "Don't Know"	0.29	0.46	0	1

Table 4: County-Level and Aggregate Cross-Comparison Regression Results

Variable	Definition	FSA County-Level Data		Individual Survey Data	
		Coefficient (Std. Dev.)	P-Value	Coefficient (Std. Dev.)	P-Value
Dependent Variable					
ARC_Enroll	Percentage of producers that enrolled in ARC for the 2014 Farm Bill				
Explanatory Variables					
Est_Pay	2014 Estimated Payment Calculation for the ARC program	.008 (.001)	.00	.005 (.002)	.06
Yield_Std	20 year historical, county-level yield standard deviation	-.001 (.014)	.95	.001 (.023)	.98
Edu	Number of total educational meetings held within a county prior to the enrollment deadline	.006 (.009)	.50	.007 (.014)	.62
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	1.423 (.766)	.07	-1.830 (1.207)	.13
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	-.039 (.069)	.57	-.058 (.107)	.59
		Adjusted R^2: .2658		**Adjusted R^2:.0728**	

Table 5. Logit Regression Model Results

Variable	Coefficient	Std. Err.	Odds Ratios	Std. Err.	P Value
Dependent Variable:	*ARC-CO*				
Days	-0.01	0.01	0.99	0.01	0.212
Experience	-0.01	0.01	0.99	0.01	0.089
Income	2.63E-03	3.53E-03	1.00	3.54E-03	0.457
OwnAcres	-8.83E-05	4.37E-05	1.00	4.37E-05	0.043
RentAcres	-5.28E-05	3.94E-05	1.00	3.94E-05	0.181
ACRE2009	-0.25	0.24	0.78	0.19	0.304
Coverage	-2.74E-03	2.71E-03	1.00	2.70E-03	0.311
RiskAttitude	2.05E-03	0.08	1.00	0.08	0.980
InPerson	0.28	0.22	1.32	0.29	0.207
Online	0.29	0.23	1.34	0.31	0.208
PrintNews	-0.20	0.21	0.82	0.17	0.345
RadioTV	0.22	0.24	1.25	0.30	0.361
OtherProd	-0.28	0.20	0.76	0.15	0.161
OtherSource	0.31	0.30	1.36	0.41	0.299
KFB	-0.15	0.20	0.86	0.17	0.460
AFB	-0.51	0.45	0.60	0.27	0.257
KSCommodity	0.81	0.26	2.24	0.59	0.002
FU	0.19	0.56	1.20	0.67	0.739
OtherMember	0.51	0.47	1.67	0.79	0.276
LowPay	-0.10	0.30	0.90	0.27	0.736
HighPay	0.29	0.23	1.34	0.31	0.198
KSUPay	0.01	0.01	1.01	0.01	0.175
PLCRisk	-1.65	0.22	0.19	0.04	< 0.000
DkRisk	-0.90	0.28	0.41	0.12	0.001
PLCPay	-2.57	0.25	0.08	0.02	< 0.000
DkPay	-0.97	0.23	0.38	0.09	< 0.000
Constant	3.70	0.90	40.46	36.53	< 0.000
Pseudo R^2	0.248				
Number of Obs.	869				