Factors Affecting 2014 Farm Bill Commodity Program Enrollment Factors for Kansas Farmers

by

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B.S., Kansas State University, 2015

A THESIS

submitted in partial fulfillment of the requirements for the degree

MASTER OF SCIENCE

Department of Agricultural Economics
College of Agriculture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2017

Approved by:

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Abstract

BACKGROUND AND PURPOSE: The 2014 Farm Bill required Kansas 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 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 **c**ounty-level enrollment data 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 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 legislation. **RESULTS:** Comparisons of model results from the aggregated enrollment data and the individual survey data offer insights into the factors affecting producer decisions. Specifically, aggregate enrollment decisions are difficult to explain given many unobservable enrollment considerations at a county level. 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 risk preferences. **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.

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Acknowledgements

I owe an immense amount of gratitude to the many people that have supported and encouraged me throughout my time here at Kansas State. First and foremost, I would like to thank Dr. Taylor as well as Dr. Tonsor and Dr. Flinchbaugh for their incredible guidance and patience throughout this process. They always proved to be an effective soundboard for ideas as well as an invaluable resource for learning about numerous aspects of agricultural economics and policy.

Next I would like to thank Dr. Vincent, Dr. Ross and the rest of the METSS team for allowing me to continue working with them despite switching my research focus. Being a part of their team provided new and interesting research opportunities and the chance to grow in fields outside my area of expertise. Whether it was a tutorial on how to run a STATA command or work parties to clean data, there was never a dull moment.

While at K-State I have been blessed to work with many incredible educators that pushed the boundaries of what I thought I knew as well as challenged me to always continue learning, no matter what the topic. To those faculty and staff, specifically Dr. Schurle, I want to thank you for taking the time to challenge me and for helping me to fall in love with learning again.

Last but certainly not least, I would like to thank my family and friends for the love, support, laughs, and shoulders to cry on they have offered me over the last six years. To Mom, Jared, and Lindsey, I would never be where I am if you had not always demanded more from me. Your motivation and desire to excel in all aspects of your lives has inspired me to always wake up and strive to be a better version of myself than I was the day before. To my friends, thank you for serving as my sanity when the stresses of school, work, and job searching became too much. I love you all and cannot thank you enough.

Dedication

I would like to dedicate this paper to the person that taught me to love agriculture, to never get out-worked, and to never stop fighting for the things you believe in most. Dad, I never liked the idea of superheroes when I was growing up because you were the only hero I needed. Thank you for instilling in me the belief that one person can make a big impact in the lives of others. I love you so much.

Chapter 1 - 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 farm bills to the current revenue protection and support programs utilized in 2014.

This paper analyzes the two major programs of the 2014 Farm Bill and illustrates how conditions of incomplete information played a role in Kansas producers' enrollment choices in the Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC) programs. Three primary research questions have been identified for this analysis to provide a contribution to the literature: i) What factors affected producer enrollment in commodity programs at both the aggregate and individual level? ii) What role did incomplete information play in determining program selection? (That is, did producers have to rely on alternative criteria to select a program given a lack of quality information available for their primary enrollment considerations?) iii) What do the results of this research suggest for the development and implementation of future farm policy?

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 information 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. Additionally, it will assess whether or not the survey results are representative of the state's actual program enrollment for the state's four main crops: wheat, corn, soybeans and grain sorghum. A logit model is then estimated using individual-level data to determine producer-specific enrollment considerations.

As agricultural production represents the largest sector of the Kansas economy, valued at over $64 million annually (43% of the total economy), the analysis of predicted and actual enrollment is crucial in giving insight into producers' decision-making processes (Floros 2016). 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 safety net program that producers selected. Additionally, the current downturn facing the agricultural sector coupled with political pressure to reduce federal expenditures only intensifies the need for an effective and economically sustainable safety net. Due to the nature of the one-time enrollment for the five-year life of the 2014 Farm Bill, it is imperative to understand how producers made their program selection. Understanding this decision-making process will assist in mitigating any potential risks for future farm legislation based off of potential losses that producers (or government entities responsible for distributing subsidies) might face if catastrophic losses occur.

Chapter 2 - Political Context

Framing the evolution of U.S. farm policy programs begins with looking at the state of agriculture in the 1920s and 30s. The country was in the midst of the Great Depression while those living in the Midwest struggled with a dust bowl that greatly affected agricultural production. Overproduction of commodities in addition to increased nationalism after World War I reduced trade opportunities and led to a steep decline in agricultural prices. The creation of the Agricultural Adjustment Act of 1933 was intended to bring farm income to parity with non-farm income by limiting production and implementing a price floor for crops (Zulauf and Orden 2014). Over time, U.S. agricultural policy evolved to include nutrition programs, conservation, and rural development. Crop insurance and disaster relief also saw inclusion beginning in the 1970s and 80s. While price-based income supports were maintained, production quotas were replaced in favor of direct payments with the 1996 Farm Bill. With the exception of program name changes and minor details (such as what price a floor would be set at), commodity programs saw few major changes from 1996 to 2008 (Zulauf and Orden 2014).

The design and eventual passage of the *Agricultural Act of 2014* was the result of three years of cantankerous debate. External factors threatening the bill's survival included an economic recession, political unrest caused by a conservative revolution from the Tea Party, record high farm incomes as a result of high commodity prices, and multiple competing interests across the food and fiber sector. Additionally, trade disputes over U.S. farm policy at the World Trade Organization (WTO) and potential bilateral and multilateral trade agreements affected the design of the legislation. Understanding the lead-up to the political firestorm that occurred over the 2014 Farm Bill becoming law requires analysis of the bill's predecessor— *The Food,*

Conservation, and Energy Act of 2008—and its role in shaping the 2014 Farm Bill's key provisions.

From 2003 through the passage of the 2008 Farm Bill, farm incomes reached record highs as a result of tremendous price spikes and relatively good harvests. Prior to passing the 2008 bill, there was a belief that farm incomes would only continue to increase. However, crop prices continued to be volatile while producer costs increased, creating a precarious situation for the farm economy. The United States Department of Agriculture (USDA) sought the opinion of a variety of industry stakeholders and producers in 2006 to discuss what direction the 2008 Farm Bill should take (Woolverton and Young 2009). Those wishing to limit or end farm subsidies saw high farm incomes as an opportunity to limit spending on commodity programs. Other opponents to farm safety net spending felt that funds would be better utilized by boosting conservation, energy, and nutrition programs. Representatives of farm groups believed that programs under the 2002 Farm Bill were beneficial and should be continued without major changes. However, some industry groups advocated for changes that would provide payments to reflect changes to farm revenues—a system that no previous farm legislation had implemented.

As a result of these discussions, USDA outlined proposals for the 2008 legislation that would continue commodity support while making farm subsidies more market oriented and in-line with agreements under the WTO (Woolverton and Young 2009).The final bill mostly met these provisions by providing decoupled direct and counter-cyclical payments (CCP) tied to base acreage as opposed to planted acres. Additionally, for the first time, a revenue-based program was introduced as a commodity safety net. Titled Average Crop Revenue Election (ACRE), the program 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. 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 (USDA-FSA 2009).

Despite positive assessments from economists indicating that ACRE payments were all but certain for major crops such as corn, wheat, and soybeans, national enrollment in 2009 represented roughly only 13% of base acreage on 7.8% of FSA farm numbers (Rejesus 2013). [1] In Kansas, only 11% of Kansas producers enrolled in the ACRE program in 2013 (USDA-FSA 2015). There are many potential reasons for why ACRE enrollment was low compared with the traditional programs. Through a mail survey of Iowa farmers, Edwards (2011) found that 87% of those surveyed stated they did not enroll in ACRE due to the complexity of the program. Another 85% and 82% of producers feared losing their direct payments and the possibility of losing loan deficiency payments, respectively. Other potential reasons for forgoing ACRE enrollment for these producers included incomplete farm yield data, unlikelihood of receiving a payment, marketing loan rates, discrepancy between farm and state yields, negotiations with landlords, and satisfaction with traditional farm safety nets.

An analysis conducted by Woolverton and Young (2009) for the Economic Research Service (ERS) of USDA postured that several factors contributed to ACRE enrollment including forgone direct payments, price and yield uncertainties, and learning and transaction costs

[1] This discrepancy indicates that larger farms were more apt to enroll in ACRE.

associated with program complexity and negotiations with landlords (Woolverton and Young 2009). Additionally, a study utilizing survey data conducted by Mitchell et al. (2012) found that attitudes and beliefs affected producers' intentions but found little evidence to support that it altered their actual enrollment decision. Additionally, they argued that since producers enrolled in ACRE in such low numbers, despite most economic reports indicating the benefits of enrolling in ACRE, producers considered more than just the potential payouts of the program (Mitchell et al. 2012).

Regardless of the lack of enrollment for ACRE, the lead-up to the 2014 Farm Bill still involved contentious discussions on the need for a revenue based program. Whereas the 2008 bill (passed by a Democratic majority in Congress) focused efforts on expanding nutrition programs, such as the supplemental nutrition assistance program (SNAP), and mostly maintaining the status quo for commodity programs, the 2014 bill discussion saw a politically divided Congress. Given that farm incomes were so high, some stakeholders sought to eliminate direct payments entirely and direct all support money into enhanced revenue programs and the strengthening of crop insurance. As the federal deficit rose (bolstered by high SNAP and crop insurance indemnity payments), industry groups calling for programs that captured price and yield risk but accounted for high incomes were pitted against fiscal conservatives in the newly formed Tea Party. Discussions to reach a consensus for a 2012 bill could not be reached and most provisions of the 2008 bill were extended through September 2013 as an emergency measure (Orden and Zulauf 2015).

The 2012 elections proved to further complicate farm policy discussions as sequestration of the federal budget began in March of 2013 and affected $6 billion in farm safety net and conservation funding over the following 10 year period. Gridlock amongst Congress and the

White House continued, and led to a partial government shutdown in early October of 2013. In mid-October, negotiations were reached and the federal debt ceiling was extended. House Republicans seized on this opportunity to criticize spending on both commodity and nutrition programs and managed to pass bills that separated the two titles from each other. However, amidst scrutiny about the lack of progress towards a final bill and pressure to pass major legislation, the House and Senate reconciled to pass the Agricultural Act of 2014. It was signed into law in February of 2014 (Orden and Zulauf 2015).

While political tensions certainly affected the programs offered in the 2014 legislation, competing interests across regions also played a role in the types of support offered. In research conducted by Barnett and Coble (2011), they illustrated the difference in desired farm programs between Midwestern farmers that grew primarily corn, wheat, and soybeans as opposed to Southern farmers growing cotton, rice, and peanuts. Despite many Southern farmers growing larger amounts of corn and soybeans than in previous times, their base acres (and thereby commodity payments) were primarily in high value crops such as rice and cotton. Due to the high direct payments associated with the crops tied to Southern base acreage, less than 1% of acres in Southern states such as Arkansas, Texas, Georgia, Mississippi and Louisiana were enrolled in the ACRE program (Barnett and Coble 2011).

Surprisingly, Barnett and Coble found that despite the fact that yield risk tends to be higher in Southern states, producers in Southern regions purchase less crop insurance than their Midwest counterparts. This preference against insurance illustrates why Southern farmers were not in favor of reallocating Farm Bill money to insurance programs. As Southern producers were better off by not enrolling in ACRE and benefitted little from crop insurance due to their lack of participation, they had the incentive to lobby for price based programs that had traditionally been

included in previous bills (Barnett and Coble 2011). Speculation surrounding the severity of regional disagreement on 2014 programs was so great that it was believed to be the cause of the removal of Senator Pat Roberts of Kansas as the ranking member of the Senate Agriculture Committee in favor of Senator Thad Cochran of Mississippi (Wyant 2013).

The resulting legislation comprised of programs that appeased both Midwestern farmers seeking revenue programs while also maintaining price-based income supports for Southern farmers. Additionally, cotton supports were altered to address Brazil's WTO case against the U.S. by offering an insurance based program in place of direct payments and CCP that was titled "Stacked Income Protection Plan", or STAX for short (USDA-RMA 2013). As this analysis focuses on producers of Kansas's major commodities, only an explanation of ARC and PLC will be further explained.

PLC served as the successor for the CCP and direct payment programs. All direct payments were eliminated and payment triggers for commodities were set at a national reference price that was permanent for the five year life of the legislation. 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. Payments are issued on 85% of base acreage. In conjunction with PLC, producers had the option in enrolling in an optional insurance program titled Supplemental Coverage Option (SCO). This program triggered an indemnity payment when there was a yield or revenue loss at the county level. 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 (USDA-CCC 2015). Due to the high payment cap, PLC was widely viewed by experts as a catastrophic coverage option.

The reformed ACRE program, ARC, came with two different options— individual (ARC-I) or county (ARC-CO). ARC-I utilized all covered commodities grown on a farm to compare total farm revenue to that of the county. If a producer's total revenue was below that of the county guarantee, a producer would receive a payment representing the difference. The payment was calculated based on 65% of base acreage and covered losses in between 14%-24% to coincide with crop insurance deductibles. This 10% revenue safety net represented a much more shallow coverage than that offered by PLC. As ARC-I was coupled to a producer's yields and market prices, it is viewed as non-compliant by WTO standards (Schnepf 2015). Additionally, as approximately one percent of producers enrolled in ARC-I nationwide it proved to not be a popular program among producers (USDA-FAS 2016b).[2]

Whereas ARC-I utilized farm yields, ARC-CO based its payment structure and guarantees on yields of the county. As was the case with ARC-I, ARC-CO was effective in covering losses on 76%-86% of revenues. However, it covered 85% of base acreage as opposed to ARC-I's 65%. Revenue benchmarks for ARC-CO utilized a moving Olympic Average (OA) for prices and yields. Marketing Year Average (MYA) prices for the previous five years are averaged after dropping the highest and lowest price. This process is also used to calculate the OA yield. The OA yield is then multiplied by the higher of either the OA price or the national reference price to determine the county guarantee. When a producer's revenue falls below this threshold, they receive a payment (USDA-FSA 2016a). Originally, county yields were figured based on the FSA office assigned to a producer for program enrollment. However, given that

[2] Due to its noncompliance and low enrollment rates, ARC-I was not included in this analysis or reviewed in-depth.

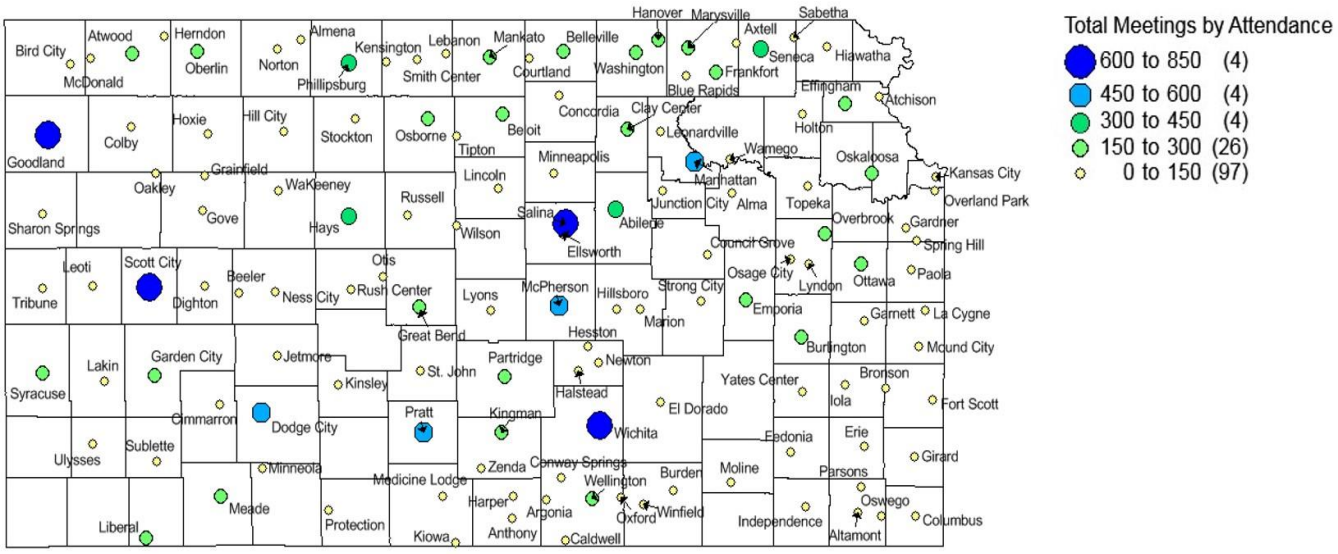
some counties did not have FSA offices, changes were later made to allow each county their own yield calculation.

The flexibility offered by PLC and ARC achieved lawmakers' goal of appeasing producers in Midwestern and Southern states. Fiscal conservatives also considered the bill a success as the elimination of direct payments created a $41 billion reduction over a ten year period (Orden and Zulauf 2015). Additionally, farms with adjusted gross income (AGI) three year averages above $900,000 were ineligible for payments (Durst and Williams 2016). However, given that producers were only able to make program selections once limited the ability of estimating actual costs of the commodity programs. As yields and prices can fluctuate, forecasts of expected payouts in later years of the legislation hold little value as they vary wildly (Orden and Zulauf 2015). With the exception of ARC-I, 2014 commodity programs also continue a market-oriented approach by remaining decoupled from current production—although provisions of the 2014 bill allowed producers the opportunity to update their historical yield and crop base acreage allocations.

While this update gave producers the ability to have payments more accurately reflect their operation, it also presented them with even more choices to weigh when considering a program choice. With the complexity of ARC payments and the multiple payment outcomes given different yield and crop base acreage update strategies, producers were forced to weigh many alternatives. The original sign-up deadline was extended to April 7th, 2015 in order to give producers more time to educate themselves on various enrollment outcomes (USDA-FASb 2015). In the state of Kansas, the 2014 Farm Bill saw the largest joint educational effort in the state's history. Extension agents, economists at Kansas State University, and Kansas Farm Management Association (KFMA) specialists held 179 meetings with 11,256 producers and

performed 3,253 individual consultations for over 8,743 Farm Service Agency farm numbers between mid-October 2014 and the end of March 2015 as illustrated by figure 2.1.

Figure 2-1: Educational Meeting Attendance



Chapter 3 - Literature Review

Decision-making under Incomplete Information

For both the PLC and ARC programs, pricing and/or yield estimates were largely unknown for later years of the legislation and led to producers enrolling in a program based on incomplete market information. Therefore it is important to understand how producers made this enrollment decision given their risk profiles. By jointly estimating parameters for individual risk preferences and production functions, Chavas and Holt (1996) were able to analyze what behaviors producers exhibited when making decisions under conditions of uncertainty. Their research utilized corn-soybean allocation choices under production and price uncertainty from 1954-1985. Special care was given to capture the effect of farm policy programs on prices and incomes received at the farm level. The results of the analysis indicated that corn-soybean farmers displayed downside risk aversion as well as decreasing absolute risk aversion (Chavas and Holt 1996).

According to research by Martin Weber (1987), traditional subjective expected utility theory's strong information assumptions can be relaxed in order to create a framework for individuals to make decisions under conditions of uncertainty. His approach sought to make the theoretical decision-making framework more applicable to real-life scenarios. Weber argued that a general model for decision-making under conditions of incomplete information could be developed by aggregating an individual's attributed preferences and allowing for alternatives to be ranked. In order for this framework to be applicable, the function of preferences and ranked alternatives must implicitly or explicitly answer four basic questions:

1. What is the value of a decision's consequence on the desired objective of a decision?

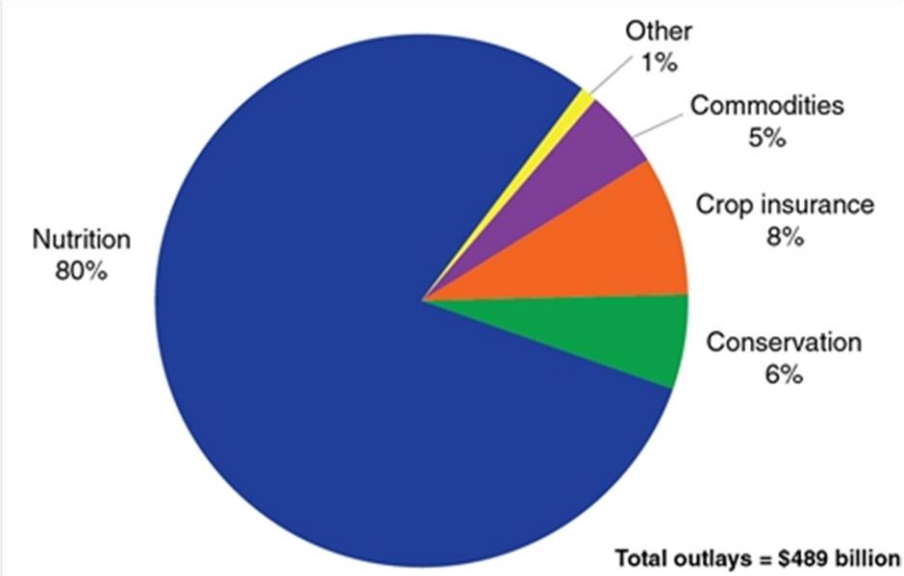
2. What is the individual's risk profile for the given decision?
3. What is the aggregation of evaluation for objectives for each consequence?
4. What is the aggregation of consequences for each objective? (Weber 1987).

Producers enrolling in 2014 Farm Bill programs would likely have followed a similar framework in selecting a commodity program. A producer would have selected a program given their individual risk preferences, desired objectives for Farm Bill program utilization (minimize losses, maximize payments, etc.), and any potential consequences they foresaw for each program option.

Economic Implications of the 2014 Farm Bill

Amidst concerns over the federal deficit as well as the enactment of a budget sequestration in 2013, one of the main goals of the 2014 bill was to reduce federal spending from previous years. The Congressional Budget Office (CBO) estimated outlays to total $489 million from 2014-2018. Figure 3.1 indicates that the vast majority of expenditures were earmarked for nutrition programs with only 5% of the budget allocated to commodity programs.

Figure 3-1: Expected Outlays for 2014 Farm Bill (2014-2018)



Source: USDA Economic Research Service using data from Congressional Budget Office, Cost Estimates for the Agricultural Act of 2014, Jan 2014.

Initial CBO estimates released prior to the bill's enactment indicated that the total value of payments issued under the 2014 Farm Bill would be less than those of the 2008 bill by $14.3 billion over the 2014-2023 period (CBO 2014b). Additionally, the revised commodity programs were predicted to reduce the federal deficit by $16.6 billion over that same period (CBO 2014b). This was in part due to the elimination of direct payments and maximum payment limits placed on both the PLC and ARC programs, in addition to caps placed on payment eligibility for high income producers. However, given the variability of future prices and yields when compared to forecasts, actual payment values are unknown. It is also important to note that CBO projections only included programs authorized with mandatory funding and does not include estimates for any discretionary funding set by Congress (USDA-ERS 2014).

Updated baseline projections released by the CBO in January of 2017 estimate that between 2017-2027, PLC and ARC will increase expenditures by nearly $6.4 billion more than forecasted in March of 2016. However, this increase is largely due to a $12.8 billion increase in

PLC outlays. Conversely, ARC is expected to see a decrease in expenditures of $6.4 billion when compared with the 2016 projections over the same period (CBO 2014a). The wildly varied estimate of outlays illustrates the many uncertainties associated with a one-time enrollment for a five year piece of legislation. Just as producers were uncertain what each program would pay, the CBO and members of Congress tasked with designing the bill were equally as unprepared to provide definitive and accurate estimates of the programs' cost.

Farm Policy Preferences

The design and implementation of farm policy programs that provide adequate safety nets to farmers in various regions and across commodities has proved increasingly complicated over the course of history. One of the most unique (and challenging) aspects of U.S. agriculture is its diversity. According to research published by Offutt in 2002, farm net worth for the largest farm operations is twice of that for smaller "family" farms and four times that of the average American household. Additionally, as farm operators and owners become increasingly more educated, they are more likely to diversify and engage in income-earning activities aside from their farming operation. Lastly, an increased push for the development of urban farms has created a disparity between farm incomes in rural and urban areas (Offutt 2002).

Offutt also argued that when considering preferences for farm policies at the individual level, the understanding that farm operators are both producers and consumers is often overlooked. Too much emphasis is placed on commodity markets and prices as well as farm incomes to assess producers' welfare. Interestingly, increases in farm families' well-being has been accredited to the increase in off-farm employment for many farming operations. Further, Offutt argues that traditional empirical methods for evaluating how individual producers benefit or lose from various farm policies relies too heavily on inadequate data. These data have the

potential to be thin and non-representative of a producer as well as too aggregated to accurately assess the effects of farm policies at the micro level. Given the aforementioned diversity across producers in the U.S., a one-size fits all modeling approach for examining the effects of agricultural policies does little to explain their impact at a disaggregated level. Understanding both producers' consumption choices and utility functions as well as their production functions, beliefs and attitudes about the role of farm policy programs, and their levels of risk aversion should all be considered when estimating farm policies and their outcomes (Offutt 2002).

Producer Risk Profiles

In conjunction with Federal Crop Insurance programs, Kansas producers utilize commodity program selections available under the 2014 Farm Bill as an ad-hoc method of risk management for their farming operation. Various studies have attempted to standardize risk management priorities for a given subset of producers based on characteristics such as farming experience, farm size, etc. with mixed results. Utilizing Agricultural Resource Management Survey (ARMS) data, Cole and Kirwan (2009) analyzed the factors effecting a producer's decision to hedge their crop—a decision used as a proxy for engaging in risk management strategies. The data included information from over 50,000 commercial farms between the years 1999 to 2005. By using a linear probability model, they were able to estimate specific farm and producer characteristics to estimate the likelihood of the farm engaging in hedging.

Their research yielded several key results. In broad terms, risk management practices for farms behave similarly to those of households or firms. However, they also found evidence to suggest that farms did not follow financial theory. Key findings of their analysis indicate that older farmers were shown to be less likely to engage in hedging their crops. This could be due to a variety of factors such as lower levels of technological literacy. A producer's experience as

well as their education levels proved to have little to no significant impact on a producer's decision to engage in hedging practices. Lastly, their results suggested that farms that grow a larger variety of crops are less likely to engage in hedging activities as their business is sufficiently diversified in order to mitigate the effects of risk (Cole and Kirwan 2009).

While aggregate analysis like that conducted by Cole and Kirwan can yield insights into aggregate risk management by farms, understanding the components of an individual producer's risk management strategy is a trying and complex task. The many uncertainties and exogenous factors facing agriculture coupled with the many, varied factors of production creates a heterogeneous distribution of where an individual producer could fall on a risk spectrum. Determining how exactly a producer employs commodity programs to contribute to their specific risk management system proves equally difficult. While some producers select programs in order to maximize payments, others make enrollment selections based on mitigating their losses in low revenue years.

Plastina and Hart (2014) determined commodity program selection was a function of an individual's price and yield expectations, the producer's production model, as well as a producer's unique risk profile. In their study, they utilized the Iowa State University Farm Bill Analyzer Microsoft Excel tool[3] to conduct a Monte Carlo simulation of prices and yields in order to calculate randomized estimated payments. The results of their research indicated that price expectations were an important component in the expected payment calculation. They also concluded that differing risk profiles caused some producers to enroll in programs that did not

[3] This tool utilized historical and user-provided data to project potential farm and county yields. Additionally, producers were able to select from three separate price forecasts and anticipated price volatility levels in order to estimate a payment value based on their market expectations.

maximize anticipated payment values. Risk averse producers concerned about low yields and prices, for instance, could be more inclined to select a program that did not maximize payment, but instead, minimized potential losses. The results of their research indicate that payment maximization, while an important program selection determinant, did not fully explain how producers were making their enrollment decisions. Furthermore, their research suggests that there are a variety of factors that cannot be captured when analyzing the roll that risk management plays on an individual producer's program choice (Plastina and Hart 2014).

Analysis of Revenue Based Program Enrollment

Revenue based farm support programs were not utilized prior to the 2008 Farm Bill. This prevented extensive analysis from being conducted about the benefits and losses of such a program for different stakeholders or to attempt to determine the mechanisms by which a producer made an enrollment decision. Despite their differences, ARC and ACRE both required producers to reevaluate what role they desired their farm safety nets to serve. While a more complex decision, electing to enroll in a revenue protection program gave producers the opportunity to better protect themselves from downside risk since yield and price components were both factored into triggering a payment in the new revenue based system. Understanding potential factors contributing to ACRE enrollment is crucial in making informed assumptions about the thought process implemented by producers in selecting ARC in 2014.

Role of Revenue Assistance Programs

During the lead-up to the creation and passage of the 2008 Farm Bill, lawmakers and farm policy analysts alike sought to reform U.S. commodity programs. As was the case in 1983 and the early 1990s, studies were conducted to analyze the effects of a revenue based program. An analysis conducted by Coble and Dismukes (2008) attempted to capture both payment values

and risk reduction ability for three alternatives to the 2002 Farm Bill programs. The three alternatives included a revenue based program as a function of the same base acres and program yields used in calculating the CCP program authorized by the 2002 bill. The design of Coble and Dismukes's revenue payment was issued on 85% of base acreage and guaranteed up to 90% of a farmer's revenue given the aggregation level of the model: national, state, or county.

While this formulation differed from how ACRE (the first-ever revenue-based commodity program) functioned, it very closely resembled ACRE's successor: ARC-CO. The results of their analysis indicated that revenue programs triggered larger payment amounts for corn, wheat, and soybeans than the current 2002 programs as well as offering higher percentages of risk reduction. Their results showed variation between levels of aggregation. Specifically, county-level revenue programs averaged payment values of $5.50, $3.77, and $9.34 per acre higher than the current programs for corn, soybeans, and wheat, respectively. Risk reduction values averaged near par for corn, with soybeans and wheat seeing an increase of 0.92% and 3.57%.

The results of this analysis also illustrate that, since revenue is a function of both prices and yields, it captures a natural hedge between the two. As such, revenue based programs are no more or less likely to alter government expenditures on commodity programs. Other factors including prices, revenue guarantees, and the geographic level to which a revenue program calculated payments would drive the costs of a revenue program and could vary. As their results indicated, more disaggregated regions triggered higher payments for all three crops when compared to 2002 programs or national and state aggregations. An additional component of their research explored the role of such programs in conjunction with other aspects of farm policy legislation including crop insurance and LDPs and found that while revenue programs are

effective at risk reduction, their joint use with other programs can actually cause losses in risk reduction efficiency (Coble and Dismukes 2008).

Factors Affecting ACRE Program Enrollment

Given what is now known about how revenue based programs perform when compared to previous Farm Bill programs, it is imperative to understand what specific factors lead a producer to break with familiarity and enroll in ACRE. In an analysis conducted by the ERS on ACRE enrollment, primary factors driving program selection included the following: price expectations, yields expectations, correlation between state and farm-level yields, a producer's risk preferences, the costs of learning the program and negotiating with renters (when applicable), as well as the changes to a producer's previous subsidy payment under the 2002 bill. As previously stated, a producer was required to forfeit 20% of their direct payments in the event that they selected ACRE as their program choice. Additionally, it was an irrevocable decision—once a producer was enrolled in ACRE, they were bound to it for the remaining life of the bill. For producers of high value crop base acres such as rice, there was less incentive to enroll in ACRE due to this forfeiture. With direct payment values averaging nearly $100 per acre, ACRE offered little promise in offsetting the lost revenue from a mandatory reduction in direct payments regardless of whether the CCP program was expected to payout (Woolverton and Young 2009).

As ACRE was a revenue based program, yield and price components were both factored into calculating expected payment values. However, given the ongoing volatility of commodity markets at the time of the bill's implementation, price fluctuations weighed much heavier in a producer's enrollment decision. Due to the high prices that commodities had seen in the years preceding the debate of the bill, target prices for the CCP remained high for corn, wheat, rice and

soybeans. As a result, the likelihood of one of these crops triggering a CCP payment was unlikely except in the event of catastrophic price decline. CCP did offer low target prices for cotton and peanuts, however, making them more attractive to producers of those crops. Projections for the 09/10 crop year by USDA indicated that price guarantees for the ACRE program were at least 10% lower than the CCP target for barley, oats, corn, grain sorghum, and wheat. When calculating a two year average, soybeans and cotton prices were also nearly 10% lower than the guarantee.

To illustrate factors affecting ACRE enrollment, ERS simulated producers of several basic commodities across four regions of the Great Plains and South:

1. Producer from Iowa growing corn/soybeans
2. Producer from South Dakota growing primarily wheat
3. Producer from Georgia growing corn/cotton
4. Producer from Mississippi growing soybeans/rice

The farms were designed to represent typical planted and base acreage by utilizing National Agricultural Statistics Service (NASS) and ARMS data. As ACRE was a state level revenue program, payments to each farm were estimated assuming that farm-level benchmark revenue equaled the state guarantee for each state. In each simulation, revenue shortfalls of 0%, 5%, 10%, 15% and 20% were estimated given the historic base acreage of each farm (Woolverton and Young 2009).

For the first farm, a 10% revenue shortfall would trigger payments of $8.08, $19.58, and $20.13 on base acres of corn, soybeans, and wheat, respectively. Maximizing payments, this producer's ACRE payment for 2009 would total $9,865. By comparison, the direct payment reduction for this farm would total $9,900 over the four year life of the legislation—illustrating

that ACRE provided a larger safety net for this specific state/crop mix. For the South Dakota wheat farm, a producer would receive an ACRE payment large enough to offset lost direct payments even without a reduction in expected revenues given 2009 projections. The Georgia cotton farm would require a 15% reduction in revenue for one year in order to offset four years of direct payments. However, given the likelihood that cotton base would generate CCP or potential qualifying for marketing-loans, this producer would not likely benefit from enrolling in ACRE. In order to offset the high direct payments for rice base acres on the final farm, a producer would require a reduction in revenue of at least 12% for one year. Given that USDA had projected rice prices to be only 8% lower than the ACRE guarantee, CCP proved to be the more attractive program.

As indicated by the simulations and anticipated pricing structures, ACRE served as a superior alternative to CCP and direct payments for corn, grain sorghum, wheat, and soybeans. Rice, cotton, and peanuts generated larger payment values when electing not to enroll in ACRE. However, despite this payment analysis, many producers rejected ACRE and opted for the programs similar to those offered by the 2002 Farm Bill. This indicates that other factors such as those suggested in Woolverton and Young's research (including risk preferences and transaction costs associated with learning the program and negotiating with landlords) factored heavily into a producers decision (Woolverton and Young 2009).

Research presented by Mitchell et al. (2012) further supported ERS's broad assessment of what factors contributed to enrolling in ACRE. In an attempt to capture producers' sign-up intentions, the analysis utilized a mail survey that was carried out prior to the ACRE sign-up deadline to construct a multivariate logit. Mitchell et al. summarized other studies that reinforced ERS's analysis that producers growing crops such as corn, wheat, and soybeans would benefit

from the ACRE program. Additionally, the researchers also described how additional research had concluded that ACRE provided better risk protection based on its increased threshold of minimum revenue when compared to current insurance programs. However, no analysis had yet compared producers' intentions with actual enrollment—a topic Mitchell et al.'s analysis intended to focus on. Their research sought to utilize recognized enrollment factors (i.e. potential payouts, risk preferences, learning and transaction costs, demographics, etc.) in order to determine how closely producer enrollment intentions mirrored actual ACRE signups. By incorporating elements of theory of planned behavior, Mitchell et al. presented the first research illustrating the impact that potentially unobservable characteristics such as attitudes and beliefs had on program selection (Mitchell et al. 2012).

The survey utilized data from randomly sampled farms in Mississippi, Texas, North Carolina, and Wisconsin. NASS was contracted to conduct the survey in order to utilize farms from its records. Farms with the lowest 20% of gross incomes were eliminated from the sample in order to capture commercial farms. Additionally, producers were required to produce corn, wheat, rice, soybeans or grain sorghum in order to participate. Surveys were mailed to 6,000 farms across the four states of which 1,380 provided viable responses. Since the survey was administered prior to the sign-up deadline, producers were asked to indicate their intentions for sign-up at the time they completed the survey.[4] Producers were given the following three options: 1) continue with programs utilized in the 2002 Farm Bill (direct payments and CCP) 2)

[4] The survey administered by NASS asked producers to indicate their intended program election only for one FSA farm serial number. It is possible that a single producer could have multiple FSA farms enrolled in differing programs.

continue with 2002 Farm Bill programs but consider switching to ACRE in later years 3) enroll in ACRE for 2009.

Summary statistics from the survey data indicated that producer demographics were representative of the population when compared with the 2007 Census of Agriculture Summaries. Independent variables utilized by the survey included whether a producer believed ACRE would pay more than 2002 programs, if a producer believed ACRE provided better risk protection than 2002 programs and producer indicated willingness to accept risk as well as their. Producers' perceived risk from a farm program as well as whether the producer was a member of a farm organization such as the National Farmers Organization, the National Farmers Union, or the Grange were also included. Additionally, the survey employed a Likert scale assessment to ask producers separate questions about whether yield or price risk would serve as a major source of income risk within the next five years. The analysis further utilized variables capturing the level at which the household was invested in agriculture and thereby dependent on farm income, the farm's debt, the producer's dependency on government payments to contribute to the farm operation, if the producer was a college graduate, the producer's age, farm size, percent of farms enrolled in a commodity program for 2007, and the percent of farms paying cash rent to a landlord for either buildings or land. Categorical variables were also included for the primary crop grown on the farm (corn, soybeans, cotton) and the location of the farm (North Carolina, Texas, Wisconsin). Lastly, the average county farm size for 2007 was also included (Mitchell et al. 2012).

The summary statistics of the logit model indicated that 2.8% of producers intended to switch to ACRE in 2009 with another 31.3% potentially switching in subsequent years. Additionally, 3% of producers anticipated that ACRE would provide a larger payout than 2002

programs while 8% of producers felt that ACRE would provide better risk protection than 2002 programs. For producers expressing the intention of switching to ACRE in 2009, a college degree or having soybeans as their primary crop increased the likelihood of switching to ACRE in 2009 at a 10% significance level. A producer's reliance on government payments also positively impacted switching in 2009 but at a 5% significance. Believing ACRE paid more or that if offered better protection increased the chance a producer would switch to ACRE in 2009 at a 1% significance level. The largest marginal effects on 2009 ACRE enrollment, however, were if a producer belonged to the previously mentioned farm organizations or if the producer's primary crop was cotton. These characteristics negatively impacted the likelihood of a producer switching to ACRE in 2009 at a 1% significance level. For producers indicating that they intended to wait and consider switching to ACRE, the only statistically relevant factors included their risk aversion (which reduced the chance of enrolling in ACRE) and if their age was greater than 65 years old (which increased the likelihood of participating in ACRE). Both results were significant at the 5% level (Mitchell et al. 2012).

The results of this research indicate that producer intentions do not always materialize. Given the complexity of the ACRE program and the time between the completion of the survey and the sign-up deadline, producers had the opportunity to be subjected to or seek out additional information about the program and alter their program selections accordingly. This suggests that while attitudes and beliefs of individual producers could have affected their intended program choice, there is little evidence to support that these perceptions affected actual enrollment for the ACRE program. It should be noted, however, that given the information published by economists and other professionals describing the many potential advantages of choosing ACRE over the traditional farm support programs, it is evident from the low ACRE enrollment rates that

producers considered more than just the anticipated payment for each enrollment option. This key observation serves as a critical factor in continuing to analyze how producers make farm support program enrollment decisions (Mitchell et al. 2012).

Chapter 4 - Model Development and Data

As the literature suggests, there is little research that has the ability to accurately identify individual producers' farm policy program preferences. Also, given that the current programs had not been utilized in previous legislation, the considerations made by producers in 2014 are currently unknown. Understanding the key distinctions between aggregate and individual level enrollment considerations is crucial in the model development of this analysis. When analyzing enrollment factors at a county level, there are many unobservable characteristics that define each producer's enrollment decision that are ultimately ignored when analyzed above the micro level. Aggregation of producer enrollment considerations also rely on strict assumptions that all the producers in a county have the same risk profile. However, the literature suggests that varying degrees of risk preferences was a central determinant of how producers went about selecting a safety net.

It is important, therefore, for this analysis to combine elements of both aggregated and micro level decision-making. This analysis first compares observable enrollment characteristics for ARC enrollment at the county level. Survey data are then aggregated to compare to actual FSA enrollment figures for the four major crops of Kansas: wheat, corn, soybeans and grain sorghum. Upon completion of this aggregate comparison, the surveys are then further analyzed in an attempt to determine producer specific enrollment characteristics. The survey design implemented in this research closely follows Mitchell et al. (2012) and includes such factors as producer demographics, risk preferences, education and information sources, price and yield expectations, program expectations, and whether or not a producer had participated in the ACRE program in 2009. The results of this analysis are one of the first of its kind in analyzing factors affecting ARC enrollment and contribute to the available research regarding producer selection

of a revenue based program. Additionally, this research provides insight for policymakers designing future farm bills to understand the evolution of producer enrollment considerations from ACRE to ARC. Enrollment breakdowns by crop in addition to base acreage (prior to allowable updates under the 2014 bill) can be found in table 4.1.

Table 4-1: Program Enrollment and Base Acreage by Crop

Crop	ARC-CO Enrollment	PLC Enrollment	ARC-I Enrollment	Base Acreage
Wheat	66.4%	33.4%	0.2%	49.5%
Corn	76.3%	23.4%	0.3%	21.1%
Soybeans	78.9%	0.2%	20.9%	12.9%
Grain Sorghum	44.9%	55.0%	0.1%	15.6%

Given the multi-model approach of this analysis, data were collected from a variety of sources. Model estimation employs county-level FSA data for 2013 Kansas ACRE enrollment and 2014 Farm Bill program enrollment figures. FSA county classifications for whether or not a county was eligible for separate payments based on if acres were irrigated or non-irrigated is also used.[5] Additionally, NASS historical yield information, 2014 National MYA pricing data, and Kansas State University extension educational meeting information are utilized.

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

[5] In this analysis, FSA designated 7 counties as split for wheat, 29 for corn, 16 for soybeans and 2 for grain sorghum.

designed by faculty and staff of the Agricultural Economics Department at Kansas State University. The two surveys were collected before and after explanatory educational efforts at fifteen out of 179 Farm Bill program informational 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 cross comparison analysis and individual program models. The surveys include 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 complete pre and post survey instruments can be found in Appendix B.

Chapter 5 - Methods

County-Level and Aggregate Cross Comparison

Due to unobservable characteristics present when analyzing county level enrollment, a limited number of variables are identified as potential factors affecting program selection and included in the cross comparison model. These factors include 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 is used to estimate potential enrollment factors:

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

where *ARC_Enroll* represents either the percentage of producers in a county enrolling in the ARC program according to FSA data or the percentage of producers in a county stating in their post-educational meeting survey that they intended to enroll in the ARC program. Electing to enroll in the ARC program is analyzed utilizing an OLS regression.

The variable *Est_Pay* includes what ARC payments were expected to be prior to the enrollment deadline. The anticipated 2014 MYA price was pulled from the final FSA publication on March 10, 2015, prior to the cut-off (USDA-FAS 2015a). Projected prices are as follows:

- Wheat: $6.00
- Corn: $3.70
- Soybeans: $10.20
- Grain Sorghum: $3.90

Payment estimates are then calculated based on the wording of the legislation. First, a benchmark revenue for each county is figured. This value represents the OA yield times the OA price. As producers were only entitled to up to 10% revenue recovery on losses, the benchmark revenue is then multiplied by 0.1 to represent the maximum payment a producer could receive for their crop. As ARC covered losses on acreage between 76% and 86% of revenue, the benchmark revenue is also multiplied by 0.86 to determine a county's guarantee. Actual expected revenue is determined by multiplying the 2014 NASS yield by the expected 2014 MYA price provided by FSA. However, given that many counties were missing 2014 NASS yields, a yield plug is used. To replicate likely producer calculation strategies, this plug represents the previous five years' yield average. This yield value is used in the event that a county was missing its 2014 NASS yield. The difference between the guarantee and expected revenue is then determined. If this value is positive, a producer could expect to receive the smaller of either the maximum payment or the difference between the guarantee and expected revenue. [6]

Twenty-year historical county level yield data pulled from NASS databases is used in figuring a county yield standard deviation for the *Yield_Std* variable. This variable attempts to quantify risk measures at an aggregate level across counties. As NASS data is incomplete,

[6] 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 is calculated. All counties listed as split counties by FSA had their previous five year planted acreage history pulled from NASS. Irrigated and non-irrigated acre payment weights are then determined by summing the total acres planted and the percentage that irrigated and non-irrigated acres comprised of the total. This weighted percentage is 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.

however, some counties had thin yield inputs. The availability of NASS yields also differ by commodity. While Risk Management Agency (RMA) yield data could have been utilized to supplement missing NASS data, it was not information available to producers and thus inaccurate in mimicking how a producer might have gone about making their enrollment decision.

Previously mentioned extension educational efforts comprise the formation of the variable *Edu*. This includes any group meetings conducted by FSA extension agents, Kansas State University faculty and staff, or KFMA economists. It did not, however, include any individual consultation work. The variable *ACRE_Perc* represents the percent of producers in a county that enrolled in ACRE for the 2013 term. *Split_DV* is a categorical variable that captures the varying payments that a producer could receive for planting both irrigated and dryland acres. FSA made irrigated and non-irrigated designations prior to the enrollment deadline, and as such, producers had the ability to make separate payment calculations for acres under both production methods. As this model represents a county-level decision, however, it does not allow for separate analysis based on acreage designation.

Model construction is then repeated for the three remaining crops. Summary statistics of FSA ARC enrollment indicates that 62.7% of wheat producers, 74.5% of corn producers, 74.8% of soybean producers, and 44% of grain sorghum producers enrolled in the ARC program. Payment values average $15.98, $34.60, $8.07, and $12.47, respectively. Educational efforts average slightly above two meetings per county for all crops. This is to be expected as meetings were not commodity specific. Yield standard deviations vary substantially by county and by commodity. Corn has the highest variability at nearly 23.5 bushels per acre. Grain sorghum has an average variation of 17.8 while soybeans and wheat have averages of 8.3 and 10.3. ACRE

enrollment was low for all four crops and averaged between approximately 0.5% and 1%. Grain sorghum saw the fewest counties receiving irrigated designations with 1.9% of counties. Wheat had 6.7% of counties while soybeans had 15.2% and corn had nearly 26.7%. Complete summary statistics of these variables can be found in tables 5.1-5.4.

Table 5-1: Wheat FSA ARC Enrollment 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	.627	.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	2.181	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	.0667	.2506	0	1

Observations: 105

Table 5-2: Corn FSA ARC Enrollment 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	.7451	.1757	.1099	.9787
Explanatory Variables					
Est_Pay	2014 Estimated Payment Calculation for the ARC program	34.5985	31.7025	0	104.742
Yield_Std	20 year historical, county-level yield standard deviation	23.4988	4.7188	13.4583	34.2799
Edu	Number of total educational meetings held within a county prior to the enrollment deadline	2.2	1.9135	0	12
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	.0136	.0491	0	.47
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	.2667	.4443	0	1

Observations: 104

Table 5-3: Soybean FSA ARC Enrollment 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	.7477	.1754	0.2	.9842
Explanatory Variables					
Est_Pay	2014 Estimated Payment Calculation for the ARC program	8.0715	15.6719	0	63.9257
Yield_Std	20 year historical, county-level yield standard deviation	8.3308	1.6474	3.8442	12.5819
Edu	Number of total educational meetings held within a county prior to the enrollment deadline	2.1905	1.922	0	12
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	.0084	.0194	0	.1111
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	.1524	.3611	0	1

Observations: 105

Table 5-4: Grain Sorghum FSA ARC Enrollment 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	.4404	.201	0.04	.8428
Explanatory Variables					
Est_Pay	2014 Estimated Payment Calculation for the ARC program	12.4737	16.5801	0	52.53
Yield_Std	20 year historical, county-level yield standard deviation	17.8278	3.7158	9.8725	24.7502
Edu	Number of total educational meetings held within a county prior to the enrollment deadline	2.2	1.9135	0	12
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	.0054	.012	0	.0691
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	.019	.1373	0	1

Observations: 105

This process is similarly repeated for the survey data. First, pre and post survey responses are merged utilizing a pre-assigned survey ID number. Responses that came from attendees residing out of the state of Kansas are dropped. The data are then cleaned in order to help eliminate inaccurate responses or data entry error. The dependent variable is generated from a categorical variable on the survey. Producers indicated whether or not they intended to enroll in the ARC program or not. “Yes” responses are divided by the total number of responses from a

county in order to determine the percentage of producers in a county that intended to enroll in ARC for each crop. This percentage is then utilized in the same manner as the FSA enrollment percentage.[7] The same payment values determined in the FSA model are assigned to counties that had survey responses. Additionally, the same yield variations, educational efforts, ACRE enrollment percentages, and county designations are also used. The responses are then aggregated in such a way that each county had only one observation. The same OLS regression utilized in the FSA model is then rerun for each crop using the aggregate survey responses. Summary statistics for this model closely mirror those in the FSA model with slight variations due to observation size. Tables 5.5-5.8 contain aggregated summary statistics.

[7] For some county/crop combinations, there were extreme thinness in responses. In order to maintain an acceptable observation size, these thin observations were kept in the analysis.

Table 5-5: Wheat Aggregate ARC Enrollment 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	10.339	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 5-6: Corn Aggregate ARC Enrollment Summary Statistics

	Definition	Mean	Std. Dev.	Min	Max
Dependent Variable					
ARC_Enroll	Percentage of producers that enrolled in ARC for the 2014 Farm Bill	.5286	.2804	0	1
Explanatory Variables					
Est_Pay	2014 Estimated Payment Calculation for the ARC program	22.1637	27.2352	0	104.742
Yield_Std	20 year historical, county-level yield standard deviation	23.4544	4.7295	13.4583	34.2799
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	.014	.0498	0	.47
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	.2745	.4485	0	1

Observations: 102

Table 5-7: Soybeans Aggregate ARC Enrollment 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	.4926	.3317	0	1
Explanatory Variables					
Est_Pay	2014 Estimated Payment Calculation for the ARC program	6.4584	15.6998	0	63.9257
Yield_Std	20 year historical, county-level yield standard deviation	8.3255	1.6564	3.8442	12.5819
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	.0086	.0197	0	.1111
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	.1569	.3655	0	1

Observations: 102

Table 5-8: Grain Sorghum Aggregate ARC Enrollment 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	.3159	.2344	0	1
Explanatory Variables					
Est_Pay	2014 Estimated Payment Calculation for the ARC program	12.4632	16.3583	0	52.53
Yield_Std	20 year historical, county-level yield standard deviation	18.0433	3.545	10.1018	24.7502
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	.0056	.0121	0	.0691
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	.0196	.1393	0	1

Observations: 102

Individual Survey Response Model

The individual survey responses are analyzed utilizing a logit model, given the structure of the survey design. As previously stated, producers were asked to indicate which of the three programs they intended to enroll in for each of the crops their farm had base acreage allocated to. The dependent variable *(ARC-CO)* in this model reflects if the respondent indicated that ARC

was their preferred program choice. It is set equal to one if the respondent chose ARC and equal to zero if they chose PLC. The empirical model is specified as follows

(2) $$z_i = f(Days_t, Title_{i,}, Experience_i,\ Income_i, OwnAcres_i, RentAcres_i, ACRE2009_i,$$
$$Coverage_i, RiskAttitude_i, KSUPay_c, HighPay_i, LowPay_i,$$
$$InPerson_i, Online_i, PrintNews_i, RadioTV_i, OtherProd_i, OtherSource_i,$$
$$KFB_i, AFB_i, KSCommodity_i, FU_i, OtherMember_i, ARCCORisk_i,$$
$$PLCRisk_i, DkRisk_i, ARCCOPay_i, PLCPay_i, DkPay_i,\ BaseUpdate_{i,}\ BaseNo_{i,}, BaseDK_{i,}\ Split_{i,}),$$

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.

The survey data are cleaned in the same manner as the aggregation model. *Days* represents the length of time a meeting (and therefore a survey response) was from the FSA sign-up deadline. It varies by location and ranged from 53 to 85 days. The *Title* variable represents a categorical variable if a survey respondent identified as a producer or not. The percentage of income that a respondent derived from production comprises the *Income* variable. *OwnAcres* and *RentAcres* are continuous variables for a producer's total acreage. *ACRE2009* represents if a producer stated they enrolled in the ACRE program. *Coverage* denotes the percent coverage a producer has enrolled through federal crop insurance. A Likert Scale is utilized to create the variable *RiskAttitude.* It measures on a 5-point scale (1=Strongly Agree, …, 5=Strongly Disagree) for the following statement: "I accept more risk in my farming business than other crop producers." The same payment calculation that is included in the aggregate model represents the variable *KSUPay.* The variables *HighPay* and *LowPay* are categorical variables that attempt to capture changes to payment expectations caused by educational efforts.

Respondents were asked on both the pre and post survey to select what range of payments they anticipated their preferred program to pay. If a respondent's payment expectations were higher for their selected program choice on the pre survey than the post survey, they are designated as "*HighPay.*" Conversely, if a respondent's expectations were higher after engaging in educational efforts, they are classified as "*LowPay.*" *InPerson*, *Online*, *PrintNews, RadioTV, OtherProd* (other producers), and *OtherSource* represent where producer's received their information regarding program specifics. Respondents completing the survey had the option of selecting multiple sources. Additionally, *KFB* (Kansas Farm Bureau), *AFB* (American Farm Bureau), *KSCommodity* (i.e. Kansas Corn Growers Association, Kansas Soybean Association, etc.), *FU* (Farmers' Union), and *OtherMember* are categorical variables representing respondents' affiliation with various farm organizations.

The variables *ARCCORisk, PLCRisk, and DkRisk* are utilized in an indicator variable that dropped *ARCCORisk*. Producers were asked to select which program they felt offered better risk protection over the life of the Farm Bill—ARC, PLC or did not know. The same method is used for the variables *ARCCOPay, PLCPay, and DkPay.* Producers were asked to identify which program they felt would offer the highest payout for their FSA farm—ARC, PLC, or did not know. Indicator variables are created and equal one if a producer intended to update their base acreage (*BaseUpdate)* and zero otherwise. Similarly, variables for producers who did not intend to update (*BaseNo),* or had not yet decided if they would update their information (*BaseDK)* are used. Lastly, the dummy variable *Split* represents if s producer's FSA farm number was located in a county designated by FSA as eligible for separate irrigated and non-irrigated payments. As no specific survey question addressed production methods, the creation of the *Split* variable is necessary in order to account for the possibility that a producer could have made separate

decisions for their irrigated and non-irrigated acres. After checking for model misspecification, the marginal effect of each variable is calculated. This process is repeated for the remaining three crops.

Complete summary statistics are available in tables 5.9-5.12. Intended enrollment in ARC ranges from nearly 67% for wheat to 33% for grain sorghum. Corn and soybean ARC preferences are 52% and 43%, respectively. Average experience across all crops analyzed is 29.29 years with roughly 74% of respondents' incomes being derived from crop production. Large farm acreage discrepancies cause high standard deviations in acres owned and rented with 987 and 1265 being the average. For all four crops, respondents identified as having slightly above average risk aversion with a Likert Scale mean of 3.65. In-person meetings and other producers serve as the most popular information sources while membership in the Kansas Farm Bureau serves as the most popular affiliation with an agricultural organization/industry group. Grain sorghum has the fewest respondents from split counties at less than 2%. Wheat has 6.5% followed by soybeans (16.1%) and corn (33%).

Table 5-9: Wheat Individual ARC Enrollment Summary Statistics

Variable	Definition	Mean	Std. Dev.	Min	Max
Dependent Variable					
ARC-CO	Binary variable equal to 1 if ARC-CO was preferred program after education	.6670	.4715	0	1
Explanatory Variables					
Days	Number of days prior to enrollment deadline educational meeting was attended	71.0176	10.0613	53	85
Title	Binary variable equal to 1 if respondent identified as a producer	.3740	.4841	0	1
Experience	Number of years involved in production agriculture	29.0649	15.4366	0	70
Income	Percentage of income derived from agriculture	73.6013	28.3978	0	100
OwnAcres	Number of agricultural acres owned	1008.545	1842.167	0	35,000
RentAcres	Number of agricultural acres rented	1295.186	2079.982	0	31,000
ACRE2009	Binary variable equal to 1 if respondent enrolled in ACRE program during previous Farm Bill	.1947	.3962	0	1
Coverage	Percentage of crop insurance coverage carried on wheat acres	40.7173	36.2398	0	85
RiskAttitude	Likert scale response to statement: "I accept more risk in my farming business than other crop producers."	3.6451	1.1296	1	5
KSUPay	K-State estimate of 2014 county payment for ARC-CO per acre	21.3585	9.8621	0	34.76

Table 5-9: Wheat Individual ARC Enrollment Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
HighPay	Binary variable equal to 1 if expected payment from preferred program was higher after attending educational meeting	.1111	.3144	0	1
LowPay	Binary variable equal to 1 if expected payment from preferred program was lower after attending educational meeting	.2871	.4527	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	.7184	.4500	0	1
Online	Binary variable equal to 1 if source is online materials	.2167	.4122	0	1
PrintNews	Binary variable equal to 1 if source is newspaper or magazine	.5358	.4990	0	1
RadioTV	Binary variable equal to 1 if source is radio or television	.1947	.3962	0	1
OtherProd	Binary variable equal to 1 if source is other producers	.5875	.4926	0	1
OtherSource	Binary variable equal to 1 if source is from other outlets	.1320	.3387	0	1
Industry Membership	Categorical variables denoting membership in various groups				
KFB	Binary variable equal to 1 if member of Kansas Farm Bureau	.5688	.4955	0	1
AFB	Binary variable equal to 1 if member of American Farm Bureau	.0451	.2076	0	1

Table 5-9: Wheat Individual ARC Enrollment Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
KSCommodity	Binary variable equal to 1 if member of a Kansas commodity group	.1859	.3893	0	1
FU	Binary variable equal to 1 if member of Farmers Union	.0308	.1729	0	1
OtherMember	Binary variable equal to 1 if member of other organization	.0506	.2193	0	1
Risk Protection	Categorical variables indicating the program with best risk protection				
PLCRisk	Binary variable equal to 1 if selected PLC	.3289	.4701	0	1
DkRisk	Binary variable equal to 1 if selected “Don’t Know”	.1778	.3825	0	1
Highest Payout	Categorical variables indicating the program with highest annual payout				
PLCPay	Binary variable equal to 1 if selected PLC	.1718	.3774	0	1
DkPay	Binary variable equal to 1 if selected “Don’t Know”	.3060	.4611	0	1
Updating Base Acreage	Categorical variables indicating preference for updating base acreage				
BaseNo	Binary variable equal to 1 if selected "No"	.1054	.3073	0	1
BaseDk	Binary variable equal to 1 if selected “Don’t Know”	.3187	.4662	0	1
Split	Binary variable equal to 1 if farm resides in a county designated by FSA as eligible for split irrigated and non-irrigated payments	.0638	.2445	0	1

Observations: 909

Table 5-10: Corn Individual ARC Enrollment Summary Statistics

Variable	Definition	Mean	Std. Dev.	Min	Max
Dependent Variable					
ARC-CO	Binary variable equal to 1 if ARC-CO was preferred program after education	.5248	.4996	0	1
Explanatory Variables					
Days	Number of days prior to enrollment deadline educational meeting was attended	70.6960	10.3865	53	85
Title	Binary variable equal to 1 if respondent identified as a producer	.4493	.4978	0	1
Experience	Number of years involved in production agriculture	28.8120	15.3446	0	70
Income	Percentage of income derived from agriculture	76.5432	26.8027	0	100
OwnAcres	Number of agricultural acres owned	1116.139	2057.867	0	35,000
RentAcres	Number of agricultural acres rented	1442.267	2258.044	0	31,000
ACRE2009	Binary variable equal to 1 if respondent enrolled in ACRE program during previous Farm Bill	.2217	.4157	0	1
Coverage	Percentage of crop insurance coverage carried on corn acres	36.8135	36.6727	0	85
RiskAttitude	Likert scale response to statement: “I accept more risk in my farming business than other crop producers.”	3.6070	1.1066	1	5
KSUPay	K-State estimate of 2014 county payment for ARC-CO per acre	27.5224	29.0274	0	104.742

Table 5-10: Corn Individual ARC Enrollment Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
HighPay	Binary variable equal to 1 if expected payment from preferred program was higher after attending educational meeting	.1175	.3222	0	1
LowPay	Binary variable equal to 1 if expected payment from preferred program was lower after attending educational meeting	.2863	.4524	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	.7533	.4314	0	1
Online	Binary variable equal to 1 if source is online materials	.2511	.4340	0	1
PrintNews	Binary variable equal to 1 if source is newspaper or magazine	.5301	.4995	0	1
RadioTV	Binary variable equal to 1 if source is radio or television	.2247	.4177	0	1
OtherProd	Binary variable equal to 1 if source is other producers	.5962	.4910	0	1
OtherSource	Binary variable equal to 1 if source is from other outlets	.1322	.3389	0	1
Industry Membership	Categorical variables denoting membership in various groups				
KFB	Binary variable equal to 1 if member of Kansas Farm Bureau	.5918	.4919	0	1

Table 5-10: Corn Individual ARC Enrollment Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
AFB	Binary variable equal to 1 if member of American Farm Bureau	.0543	.2268	0	1
KSCommodity	Binary variable equal to 1 if member of a Kansas commodity group	.2217	.4157	0	1
FU	Binary variable equal to 1 if member of Farmers Union	.0308	.1730	0	1
OtherMember	Binary variable equal to 1 if member of other organization	.0646	.2460	0	1
Risk Protection	Categorical variables indicating the program with best risk protection				
PLCRisk	Binary variable equal to 1 if selected PLC	.3304	.4707	0	1
DkRisk	Binary variable equal to 1 if selected “Don’t Know”	.1755	.3807	0	1
Highest Payout	Categorical variables indicating the program with highest annual payout				
PLCPay	Binary variable equal to 1 if selected PLC	.1507	.3580	0	1
DkPay	Binary variable equal to 1 if selected “Don’t Know”	.2836	.4511	0	1
Updating Base Acreage	Categorical variables indicating preference for updating base acreage				
BaseNo	Binary variable equal to 1 if selected "No"	.1003	.3006	0	1

Table 5-10: Corn Individual ARC Enrollment Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
BaseDk	Binary variable equal to 1 if selected "Don't Know"	.2886	.4535	0	1
Split	Binary variable equal to 1 if farm resides in a county designated by FSA as eligible for split irrigated and non-irrigated payments	.3113	.4634	0	1

Observations:
681

Table 5-11: Soybeans Individual ARC Enrollment Summary Statistics

Variable	Definition	Mean	Std. Dev.	Min	Max
Dependent Variable					
ARC-CO	Binary variable equal to 1 if ARC-CO was preferred program after education	.4304	.4954	0	1
Explanatory Variables					
Days	Number of days prior to enrollment deadline educational meeting was attended	72.3251	11.5209	53	85
Title	Binary variable equal to 1 if respondent identified as a producer	.4669	.4994	0	1
Experience	Number of years involved in production agriculture	29.4124	15.1374	0	70
Income	Percentage of income derived from agriculture	76.0832	26.1457	0	100
OwnAcres	Number of agricultural acres owned	918.6777	2022.511	0	35,000
RentAcres	Number of agricultural acres rented	1191.006	1786.81	0	21,000
ACRE2009	Binary variable equal to 1 if respondent enrolled in ACRE program during previous Farm Bill	2136	.4102	0	1
Coverage	Percentage of crop insurance coverage carried on soybean acres	37.7165	36.7425	0	85
RiskAttitude	Likert scale response to statement: “I accept more risk in my farming business than other crop producers.”	3.6207	1.1244	1	5

KSUPay	K-State estimate of 2014 county payment for ARC-CO per acre	5.2353	13.6236	0	63.9257

Table 5-12: Soybeans Individual ARC Enrollment Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
HighPay	Binary variable equal to 1 if expected payment from preferred program was higher after attending educational meeting	.0945	.2928	0	1
LowPay	Binary variable equal to 1 if expected payment from preferred program was lower after attending educational meeting	.2968	.4572	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	.7807	.4142	0	1
Online	Binary variable equal to 1 if source is online materials	.2457	.4309	0	1
PrintNews	Binary variable equal to 1 if source is newspaper or magazine	.5425	.4987	0	1
RadioTV	Binary variable equal to 1 if source is radio or television	.2042	.4035	0	1
OtherProd	Binary variable equal to 1 if source is other producers	.5690	.4957	0	1
OtherSource	Binary variable equal to 1 if source is from other outlets	.1267	.3329	0	1
Industry Membership	Categorical variables denoting membership in various groups				
KFB	Binary variable equal to 1 if member of Kansas Farm Bureau	.5992	.4905	0	1

AFB	Binary variable equal to 1 if member of American Farm Bureau	.0643	.2455	0	1

Table 5-13: Soybeans Individual ARC Enrollment Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
KSCommodity	Binary variable equal to 1 if member of a Kansas commodity group	.2212	.4154	0	1
FU	Binary variable equal to 1 if member of Farmers Union	.0378	.1909	0	1
OtherMember	Binary variable equal to 1 if member of other organization	.0756	.2646	0	1
Risk Protection	Categorical variables indicating the program with best risk protection				
PLCRisk	Binary variable equal to 1 if selected PLC	.3441	.4755	0	1
DkRisk	Binary variable equal to 1 if selected “Don’t Know”	.1521	.3595	0	1
Highest Payout	Categorical variables indicating the program with highest annual payout				
PLCPay	Binary variable equal to 1 if selected PLC	.1374	.3446	0	1
DkPay	Binary variable equal to 1 if selected “Don’t Know”	.25	.4334	0	1
Updating Base Acreage	Categorical variables indicating preference for updating base acreage				
BaseNo	Binary variable equal to 1 if selected "No"	.0832	.2764	0	1
BaseDk	Binary variable equal to 1 if selected “Don’t Know”	.3129	.4641	0	1
Split	Binary variable equal to 1 if farm resides in a county designated by FSA as eligible for split irrigated and non-irrigated payments	.0775	.2676	0	1

Observations: 529

Table 5-14: Grain Sorghum Individual ARC Enrollment Summary Statistics

Variable	Definition	Mean	Std. Dev.	Min	Max
Dependent Variable					
ARC-CO	Binary variable equal to 1 if ARC-CO was preferred program after education	.3272	.4694	0	1
Explanatory Variables					
Days	Number of days prior to enrollment deadline educational meeting was attended	70.2890	10.1569	53	85
Title	Binary variable equal to 1 if respondent identified as a producer	.3589	.4800	0	1
Experience	Number of years involved in production agriculture	28.5822	15.1229	0	70
Income	Percentage of income derived from agriculture	73.8777	28.1193	0	100
OwnAcres	Number of agricultural acres owned	1024.425	1967.708	0	35,000
RentAcres	Number of agricultural acres rented	1465.812	2253.781	0	31,000
ACRE2009	Binary variable equal to 1 if respondent enrolled in ACRE program during previous Farm Bill	.1904	.3929	0	1
Coverage	Percentage of crop insurance coverage carried on grain sorghum acres	33.7507	35.9828	0	85

RiskAttitude	Likert scale response to statement: "I accept more risk in my farming business than other crop producers."	3.6131	1.1024	1	5
KSUPay	K-State estimate of 2014 county payment for ARC-CO per acre	11.0469	15.7316	0	52.53

Table 5-15: Grain Sorghum Individual ARC Enrollment Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
HighPay	Binary variable equal to 1 if expected payment from preferred program was higher after attending educational meeting	.1082	.3109	0	1
LowPay	Binary variable equal to 1 if expected payment from preferred program was lower after attending educational meeting	.2671	.4428	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	.7452	.4360	0	1
Online	Binary variable equal to 1 if source is online materials	.2397	.4272	0	1
PrintNews	Binary variable equal to 1 if source is newspaper or magazine	.5603	.4967	0	1
RadioTV	Binary variable equal to 1 if source is radio or television	.1986	.3992	0	1
OtherProd	Binary variable equal to 1 if source is other producers	.5986	.4905	0	1

OtherSource	Binary variable equal to 1 if source is from other outlets	.1288	.3352	0	1
Industry Membership	Categorical variables denoting membership in various groups				

Table 5-16: Grain Sorghum Individual ARC Enrollment Summary Statistics, cont.

Variable	Definition	Mean	Std. Dev.	Min	Max
AFB	Binary variable equal to 1 if member of American Farm Bureau	.0521	.2223	0	1
KSCommodity	Binary variable equal to 1 if member of a Kansas commodity group	.2014	.4013	0	1
FU	Binary variable equal to 1 if member of Farmers Union	.0301	.1712	0	1
OtherMember	Binary variable equal to 1 if member of other organization	.0521	.2223	0	1
Risk Protection	Categorical variables indicating the program with best risk protection				
PLCRisk	Binary variable equal to 1 if selected PLC	.3384	.4735	0	1
DkRisk	Binary variable equal to 1 if selected “Don’t Know”	.1754	.3806	0	1
Highest Payout	Categorical variables indicating the program with highest annual payout				
PLCPay	Binary variable equal to 1 if selected PLC	.1915	.3937	0	1
DkPay	Binary variable equal to 1 if selected “Don’t Know”	.3017	.4593	0	1
Updating Base Acreage	Categorical variables indicating preference for updating base acreage				

BaseNo	Binary variable equal to 1 if selected "No"	.1076	.3101	0	1
BaseDk	Binary variable equal to 1 if selected “Don’t Know”	.3056	.4610	0	1
Split	Binary variable equal to 1 if farm resides in a county designated by FSA as eligible for split irrigated and non-irrigated payments	.0198	.1372	0	1
Observations: 730					

Chapter 6- Results

County-Level and Aggregate Cross Comparison

Complete results of this analysis can be found in tables 6.1-6.4. Listed below are a summary of statistically significant factors affecting ARC enrollment for the four major Kansas crops.

Wheat

In both the county-level and aggregated survey regressions, the estimated 2014 payment has 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 is 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 .0245 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.

Table 0-1: Wheat Cross Comparison Results

Variable	Definition	FSA County-Level Data (Obs=105) Coefficient (Std. Err.)	P-Value	Individual Survey Data (Obs=102) Coefficient (Std. Err.)	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	0	.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	.5	.007 .014	.62
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	1.423 .766	.07	- 1.83 1.21	.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: .0245**	

Corn

When analyzing actual ARC enrollment for corn at the county level, estimated 2014 payments are statistically significant at a 1% level. A one-dollar payment increase led to a modest 0.3% increase in program enrollment. At the aggregated level, yield standard deviation increased enrollment by 1.2%. Additionally, being located in a split county decreased the likelihood of enrolling in ARC by .2%. These results are significant at a 5% and 1% significance level, respectively. These results indicate that survey responses for corn are not necessarily representative of state enrollment factors. This is likely attributable to the thin survey responses for many counties that have corn production. Additionally, increased production of corn and soybeans in recent years are not reflected in the state's current base acreage. The higher use of irrigation in the production of corn and soybeans could also be a factor in explaining the discrepancy in results across the two models.

Table 0-2: Corn Cross Comparison Results

Variable	Definition	FSA County-Level Data (Obs=105)		Individual Survey Data (Obs=102)	
		Coefficient (Std. Err.)	P-Value	Coefficient (Std. Err.)	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	.003 .001	0	.001 .001	.23
Yield_Std	20 year historical, county-level yield standard deviation	.003 .004	.51	.012 .006	.05

Table 0-3: Corn Cross Comparison Results, cont.

Variable	Definition	FSA County-Level Data (Obs=105) Coefficient (Std. Err.)	P-Value	Individual Survey Data (Obs=102) Coefficient (Std. Err.)	P-Value
Edu	Number of total educational meetings held within a county prior to the enrollment deadline	- .001 .009	.9	.003 .014	.83
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	.347 .332	.3	.094 .532	.86
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	- .031 .038	.42	- .196 .061	0
		Adjusted R^2: .1595		**Adjusted R^2: .1301**	

Soybeans

As was the case with the corn comparison, the soybean analysis does not yield similar results across models. Enrollment in ACRE and if a county is designated as split are statistically significant at the 5% level. ACRE enrollment increased the likelihood of enrolling in ARC by 1.96%. Conversely, a split designation decreased ARC enrollment by 0.11%. In the aggregation model, increased yield standard deviation increased ARC enrollment by nearly 6% while a split county designation decreased enrollment by 0.34%. Both of these results are significant at the 1% level. As previously mentioned in the analysis of corn enrollment, thin responses for counties producing soybeans, low soy base acreage, and increased use of irrigation are potential causes of

the varied results. It is interesting to note that the R^2 value for soybeans increased from .1675 in the FSA model to .2457 in the aggregate model.

Table 0-4: Soybeans Cross Comparison Results

Variable	Definition	FSA County-Level Data (Obs=105)		Individual Survey Data (Obs=102)	
		Coefficient (Std. Err.)	**P-Value**	**Coefficient (Std. Err.)**	**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	.001 .001	.3	- .002 .002	.38
Yield_Std	20 year historical, county-level yield standard deviation	.011 .01	.31	.059 .018	0
Edu	Number of total educational meetings held within a county prior to the enrollment deadline	.008 .009	.4	.022 .015	.15
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	1.96 .852	.02	.99 1.46	.5

Table 0-5: Soybeans Cross Comparison Results, cont.

Variable	Definition	FSA County-Level Data (Obs=105) Coefficient (Std. Err.)	P-Value	Individual Survey Data (Obs=102) Coefficient (Std. Err.)	P-Value
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	- .111 .046	.02	- .342 .079	0
		Adjusted R^2: .1675		**Adjusted R^2: .2457**	

Grain Sorghum

Estimated ARC payments for 2014 as well as yield standard deviation are statistically significant factors affecting FSA enrollment for grain sorghum. Both variables increased the likelihood of enrolling in ARC by 0.6% (1% significance level) and 0.8% (10% significance level). At the aggregated level, educational efforts is the only significant factor. With the exception of corn, grain sorghum was the only crop of the four analyzed to have a projected 2014 price below that of the reference price established in the PLC program. As a result, grain sorghum enrollment favored PLC.

Table 0-6: Grain Sorghum Cross Comparison Results

Variable	Definition	FSA County-Level Data (Obs=105)		Individual Survey Data (Obs=102)	
		Coefficient (Std. Err.)	P-Value	Coefficient (Std. Err.)	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	.006 .001	0	.002 .002	.22
Yield_Std	20 year historical, county-level yield standard deviation	.008 .005	.09	.005 .007	.48
Edu	Number of total educational meetings held within a county prior to the enrollment deadline	.006 .009	.5	.023 .012	.06
ACRE_Perc	Percentage of producers that enrolled in ACRE in 2013	.656 1.46	.66	- 2.862 1.986	.15
Split_DV	Binary variable representing whether a county was allowed separate irrigated and non-irrigated program sign-ups	.089 .122	.47	.127 .166	.45
		Adjusted R^2: .2833		**Adjusted R^2: .0323**	

Individual Survey Response Model

Complete results of this analysis can be found in tables 6.6-6.9. Listed below are a summary of statistically significant factors affecting ARC enrollment for the four major Kansas crops.

Wheat

Twelve variables are identified to significantly alter ARC enrollment for Kansas wheat producers. *Days, Coverage, KSCommodity, LowPay,* and *KSUPay* all positively impacted selection of ARC. *LowPay* has the largest marginal effect—increasing ARC enrollment by 6.9% if a producer's payment expectations were higher after attending educational meetings. This result is significant at a 5% level. Membership in a commodity organization (*KSCommodity)* increased ARC selection by 6.8% at a 10% significance level. *Days, Coverage,* and *KSUPay* all have minimal positive marginal effects on ARC enrollment at 0.2%, 0.1%, and 0.8%, respectively. Factors negatively impacting ARC selection include *Experience, AFB, PLCRisk, DkRisk, PLCPay, DkPay,* and *BaseDk. PLCRisk* and *DkRisk* have large marginal impacts of 21.4% and 20.1% with both results being significant at a 1% level. Additionally, *PLCPay* and *DkPay* decreased enrollment at a rate of 39.6% and 13.5%, respectively. These results are also significant at the 1% level.

There are several potential causes for these results. As PLC was the default program and all established producers would have had familiarity with a price based option, producers' preferences could have been biased towards PLC. Additionally, given producer's risk aversion, a more familiar (and less complicated) program could have had more appeal than one that was unfamiliar and complex. At a 5% significance level, membership in the American Farm Bureau as well as uncertainty of updating base acreage reduced the likelihood of enrolling in ARC by 12.2% and 6.1%. Lastly, increased farm experience negatively impacted ARC enrollment by 0.2% for every year of experience a producer possessed. One potential cause of experience reducing a producer's preference could come from the possibility that more experienced producers have experienced very low commodity prices such as during the 1980s. To a producer

that had seen extreme decline in crop prices, the potential for prices to decline again would make a price based program much more appealing given its catastrophic payout ability.

Table 0-5: Wheat Individual Results

Variable	Coefficient	Std. Err.	Marginal Effect	P Value
Dependent Variable: ARC-CO				
Days	0.014	0.008	0.002	0.09
Title	0.161	0.191	0.026	0.40
Experience	-0.01	0.006	-0.002	0.10
Income	1.20E-03	3.30E-03	0.000	0.70
OwnAcres	-3.80E-04	4.20E-04	0.000	0.37
RentAcres	-5.80E-05	3.90E-04	0.000	0.14
ACRE2009	-0.289	0.219	-0.047	0.19
Coverage	6.00E-03	2.00E-03	0.001	0.02
RiskAttitude	9.00E-03	0.074	0.001	0.90
InPerson	0.007	0.202	0.001	0.97
Online	0.188	0.212	0.031	0.38
PrintNews	0.071	0.189	0.012	0.71
RadioTV	0.058	0.225	0.009	0.80
OtherProd	-0.159	0.184	-0.026	0.39
OtherSource	0.232	0.256	0.038	0.37
KFB	0.13	0.179	0.021	0.47
AFB	-0.744	0.373	-0.122	0.05
KSCommodity	0.416	0.229	0.068	0.07
FU	0.32	0.486	0.052	0.51
OtherMember	0.022	0.357	0.004	0.95
HighPay	-0.083	0.275	-0.014	0.76
LowPay	0.423	0.208	0.069	0.04
KSUPay	0.047	0.009	0.008	< 0.000
PLCRisk	-1.254	0.2	-0.214	< 0.000
DkRisk	-1.186	0.248	-0.201	< 0.000
PLCPay	-2.091	0.242	-0.396	< 0.000
DkPay	-0.8	0.215	-0.135	< 0.000
BaseNo	-0.439	0.287	-0.073	0.13
BaseDk	-0.371	0.191	-0.061	0.05
Split	0.366	0.341	0.06	0.28
Constant	0.367	0.751		0.78
Pseudo R^2	0.2136			
Number of Obs.	874			

Corn

Factors positively impacting enrollment in ARC for corn producers include *Title, Income, Coverage, Online, RadioTV, OtherMember,* and *KSUPay.* The largest positive, marginal change came from the variable *OtherMember* (14.8%) and is significant at a 5% level. Information sources including *Online* and *RadioTV* increased enrollment by 9.7% and 10.5%, respectively. If a survey respondent identified as a producer increased ARC enrollment by 7.9% at a 1% significance level. Variables increasing enrollment by less than 1% include *Income, Coverage,* and *KSUPay.* As seen in the wheat results, *PLCRisk, DkRisk, PLCPay, DkPay,* and *BaseDk* all negatively impacted ARC enrollment. The impact of these variables range from 6.3% (*BaseDk)* to 26.8% (*PLCPay).* Additionally, *RiskAttitude* reduced the likelihood of enrolling in ARC by 2.3%, supporting the notion that a producer's risk preferences factor into their expectations of payment and risk protection for ARC and PLC. *Experience* also had similar impacts on corn enrollment in ARC: increased experience levels reduced likelihood of selecting ARC by 0.2% for every year of experience. The *Split* categorical variable also proves statistically significant and reduced ARC selection by 5.3%. This is unsurprising given the larger number of counties designated as split for corn and soybeans than for that of wheat and grain sorghum. This result is significant at a 10% level.

Table 0-6: Corn Individual Results

Variable	Coefficient	Std. Err.	Marginal Effect	P Value
Dependent Variable: ARC-CO				
Days	-0.005	0.009	-0.001	0.57
Title	0.459	0.174	0.079	0.01
Experience	-0.013	0.006	-0.002	0.02
Income	0.009	3.00E-03	0.002	0.01
OwnAcres	8.20E-05	6.20E-05	0.000	0.19
RentAcres	1.07E-05	4.70E-05	0.000	0.82
ACRE2009	-0.155	0.215	-0.027	0.47
Coverage	2.50E-02	3.00E-03	0.004	< 0.000
RiskAttitude	-0.131	0.074	-0.023	0.08
InPerson	0.209	0.194	0.036	0.28
Online	0.561	0.213	0.097	0.01
PrintNews	-0.082	0.183	-0.014	0.65
RadioTV	0.61	0.219	0.105	0.01
OtherProd	-0.017	0.179	-0.003	0.93
OtherSource	0.127	0.246	0.022	0.61
KFB	0.13	0.173	0.023	0.45
AFB	-0.426	0.396	-0.074	0.28
KSCommodity	0.115	0.219	0.020	0.60
FU	0.696	0.453	0.120	0.12
OtherMember	0.855	0.362	0.148	0.02
HighPay	-0.178	0.268	-0.031	0.51
LowPay	0.219	0.198	0.038	0.27
KSUPay	0.005	0.003	0.001	0.09
PLCRisk	-0.621	0.196	-0.109	0.002
DkRisk	-0.668	0.247	-0.117	0.01
PLCPay	-1.493	0.253	-0.268	< 0.000
DkPay	-0.597	0.205	-0.109	0.004
BaseNo	0.055	0.278	0.010	0.84
BaseDk	-0.36	0.189	-0.063	0.06
Split	-0.304	0.183	-0.053	0.10
Constant	1.24	0.758		0.87
Pseudo R^2	0.2494			
Number of Obs.	874			

Soybeans

Income, Coverage, InPerson, Online, OtherMember, and *LowPay* represent factors positively impacting ARC enrollment for soybeans. While *Income* and *Coverage* had minimal impacts of less than 1%, information sources of *InPerson* and *Online* increased ARC selection by 5.3% and 7.6%. Other significant marginal effects include *OtherMember* (18.9%) and *LowPay* (8.7%)—both of which are significant at a 1% level. *DkRisk, PLCPay, DkPay,* and *Split* followed similar effects shown in ARC selection for corn. Marginal effects were determined to decrease ARC enrollment by 11.2% for *DkRisk,* 26% for *PLCPay,* 13.3% for *DkPay,* and 14.1% for *Split.* All of these results are found to be significant at a 1% level. Unlike corn and wheat, not updating base acreage (*BaseNo)* is found to be significant as opposed to *BaseDk.* It caused a 9.8% decline in likelihood of choosing ARC.

Table 0-7: Soybeans Individual Results

Variable	Coefficient	Std. Err.	Marginal Effect	P Value
Dependent Variable: ARC-CO				
Days	0.011	0.009	0.002	0.22
Title	0.192	0.177	0.030	0.28
Experience	-0.006	0.006	-0.001	0.31
Income	0.010	0.003	0.002	0.003
OwnAcres	-5.03E-05	0.0000459	0.000	0.273
RentAcres	-1.07E-04	0.0000484	0.000	0.027
ACRE2009	-0.103	0.224	-0.016	0.645
Coverage	0.031	0.003	0.005	< 0.000
RiskAttitude	-0.111	0.077	-0.017	0.15
InPerson	0.335	0.206	0.053	0.10
Online	0.483	0.217	0.076	0.03
PrintNews	0.181	0.192	0.028	0.35
RadioTV	0.100	0.227	0.016	0.66
OtherProd	-0.132	0.189	-0.021	0.49
OtherSource	-0.315	0.263	-0.050	0.23
KFB	-0.161	0.182	-0.025	0.38
AFB	-0.381	0.410	-0.060	0.35

Table 0-7: Soybeans Individual Results, cont.

Variable	Coefficient	Std. Err.	Marginal Effect	P Value
KSCommodity	0.199	0.223	0.031	0.37
FU	0.589	0.475	0.093	0.22
OtherMember	1.196	0.374	0.189	0.001
HighPay	-0.405	0.275	-0.064	0.14
LowPay	0.551	0.207	0.087	0.01
KSUPay	0.003	0.006	0.000	0.67
PLCRisk	-0.218	0.203	-0.035	0.28
DkRisk	-0.718	0.272	-0.112	0.01
PLCPay	-1.628	0.276	-0.260	< 0.000
DkPay	-0.781	0.217	-0.133	< 0.000
BaseNo	-0.627	0.301	-0.098	0.04
BaseDk	-0.244	0.200	-0.039	0.22
Split	-0.953	0.270	-0.141	< 0.000
Constant	-1.225	0.816		0.13
Pseudo R^2	0.2989			
Number of Obs.	874			

Grain Sorghum

Grain sorghum has the fewest significant factors impacting ARC enrollment. *Days* and *Coverage* increased ARC selection by less than 1% each with both at a 5% significance level. *Title, OtherProd, PLCRisk, DkRisk,* and *PLCPay* negatively affected enrollment. At a 10% significance level, *OtherProd* caused a marginal decline of 5.4%. Substantial decreases were caused by *Title (*11.6%), *PLCRisk* (19.4%), *DkRisk (*17.6%), and *PLCPay (*19%). These results are significant at the 1% level.

Table 0-8: Grain Sorghum Individual Results

Variable	Coefficient	Std. Err.	Marginal Effect	P Value
Dependent Variable: ARC-CO				
Days	0.016	0.008	0.003	0.05
Title	-0.590	0.164	-0.116	< 0.000
Experience	-0.004	0.005	-0.001	0.41
Income	-0.001	0.003	0.000	0.78
OwnAcres	-2.03E-05	4.10E-05	0.000	0.62
RentAcres	-2.35E-05	0.0000378	0.000	0.53
ACRE2009	0.041	0.197	0.008	0.84
Coverage	0.004	0.002	0.001	0.05
RiskAttitude	0.003	0.069	0.001	0.96
InPerson	-0.042	0.184	-0.008	0.82
Online	0.076	0.194	0.015	0.70
PrintNews	0.133	0.173	0.026	0.44
RadioTV	0.058	0.199	0.012	0.77
OtherProd	-0.277	0.169	-0.054	0.10
OtherSource	-0.366	0.234	-0.072	0.12
KFB	-0.175	0.162	-0.034	0.28
AFB	0.338	0.344	0.066	0.33
KSCommodity	0.233	0.199	0.046	0.24
FU	-0.145	0.447	-0.029	0.75
OtherMember	0.260	0.323	0.051	0.42
HighPay	-0.139	0.248	-0.027	0.57
LowPay	0.064	0.186	0.130	0.73
KSUPay	0.004	0.005	0.001	0.42
PLCRisk	-0.959	0.187	-0.194	< 0.000
DkRisk	-0.852	0.237	-0.176	< 0.000
PLCPay	-1.054	0.261	-0.190	< 0.000
DkPay	-0.167	0.193	-0.035	0.39
BaseNo	-0.103	0.263	-0.020	0.70
BaseDk	-0.241	0.180	-0.047	0.18
Split	0.550	0.532	0.108	0.30
Constant	-0.674	0.710		0.34
Pseudo R^2	0.093			
Number of Obs.	874			

Chapter 7 - Policy Implications

The results of both the aggregate and individual analyses across all four crops indicate the many different considerations that producers weighed when selecting a farm safety net program. Additionally, given the different pricing, yield, and production possibilities across commodities, it is difficult to give an aggregate response for enrollment factors of Kansas producers that grew multiple crops. While these results yielded statistically significant program selection factors, the limited scope of survey analysis certainly did not capture all enrollment considerations. Additionally as noted by Mitchell (2012), the survey was only capable of capturing producers' enrollment intentions given the possibility that new information or changes in preference could alter their enrollment choice before the sign-up deadline.

Interpreting the results of this analysis and potential impacts of 2014 Farm Bill program design requires understanding the geopolitical and farm financial climate leading up to the program sign-up. Prior to the deadline, producers had seen some of the highest net farm returns in their lifetimes. As a result, they had yet to feel the full effects of the declining farm economy that began in 2014. Significant considerations taken by future legislative efforts should take care to consider producer experience, risk preferences and both past and future commodity market scenarios when designing farm policy. Whereas recent farm policy design has taken a more retroactive development approach, future legislators should take care to also assess what the future may hold for the production agriculture industry.

As producers were only allowed to make a one-time program selection over the life of the bill, extensive planning was required on their part to fully assess the possible scenarios facing their operation given different commodity price and yield combinations. The incomplete information dilemma that faced producers hindered their ability to most effectively select a

program that would best protect them over the five year life of the legislation.[8] As a result, producers were forced to rely on past experiences, information provided from third party sources (such as commodity organizations), or make their decision at random. The complex design of ARC also gave producers incentive to consider a more easily understood alternative in PLC. Given the drastic change in program options from 2002-2014 as well as the complexity of the ARC program, legislators should consider utilizing as many working aspects of ARC and PLC as possible. Adjustments should be made where necessary in order to best benefit the largest number of producers based on the desired congressional goals of the legislation. This would allow producers to become familiar with the intricacies of the program and best be able to judge if it provides the greatest risk protection for their individual operation as opposed to only understanding its effects at an aggregate level.

While this analysis does provide insight into how a producer in Kansas might have selected a farm safety net, it leaves many more questions than answers. Understanding why a specific enrollment factor was of particular significance to a producer can be challenging. It is important that moving forward, the design of farm policy takes into consideration individual characteristics of producers, their operations, and their risk preferences. Given the different scopes of PLC and ARC (catastrophic versus shallow coverage), legislators should also seek to identify what goals they hope to accomplish in the design of farm policy. Should programs maximize payments to producers or limit them in order to reduce federal outlays? Should special care be given to design programs that disproportionately benefit less experienced producers over

[8] Given the transaction costs associated with offering the producers the ability to re-enroll in a program, a compromise should be found to strike a balance between administrative costs of enrolling producers in FSA programs while reducing deadweight loss accrued by producers as a result of incomplete information.

more experienced? Additionally, given the results of this research, should lawmakers consider directives that provide additional funding for educational efforts in order for producers to make an informed program choice?

Although not within the scope of this research, other potential considerations should be taken to assess the effectiveness of these programs in conjunction with Federal Crop Insurance also provided under the Farm Bill. Other research opportunities by which to inform the legislative process include completing the cross comparison and logit models for other Kansas crops in addition to major crops in other states that utilized similar extension surveys. Additionally, this opportunity could be expanded to represent a multivariate approach capable of identifying switching patterns across respondents. For producers initially stating a preference for ARC but indicating PLC as their program of choice in the post survey, what factors contributed to the decision to change program choice? This process could be repeated for producers intending to enroll in PLC but selecting ARC, as well as for identifying what factors contributed to a respondent maintaining their initial choice. This process would strengthen what is currently known about extension efforts to educate about farm policy as well as deepen the understanding for how expectations and beliefs weigh into a program selection.

Chapter 8 - Conclusion

Regardless of the results of this research, what is clear is that the U.S. agricultural economy is currently in a precarious state. Moving forward given the uncertainty surrounding commodity markets, it is imperative that future farm legislation have an effective design by which to protect producers from downside risk. The two programs offered by the 2014 Farm Bill offered flexible options in order for producers to select a program that fit their risk preferences and production scheme. However, given the five year commitment of the enrollment choice, producers were faced with a scenario in which little information was available for them to make an informed decision. Additionally, given the complexity of the ARC program as well as the option to update base acreages and yields, producers were overwhelmed with choices.

These results suggest that expectations such as what program a producer felt would pay more or offer better risk protection weighed heavily into their selection decision. Other relevant factors included updating base acreage as well as if a county offered split irrigated and non-irrigated payments for crops that had a larger number of split county designations. Risk attitudes factored heavily into a producer's intended program choice although it should be noted that stated producer program preference is not always the program in which they enroll in as noted by Mitchell (2012). Other factors affecting enrollment preferences included information sources that producers utilized to educate them about their options in addition to affiliations with agricultural organizations such as a commodity group.

As previously stated, a one-time enrollment decision over a five year program left producers with much uncertainty surrounding which program would offer the best protection for their operation. Differing expectations across producers for how various protection programs should function (i.e. minimize losses or maximizing payments) led to a variety of factors

affecting enrollment at the individual level. Further complicating producers' decisions included understanding how updating base acreage and yields would affect their program choice. Limited information available concerning commodity yields and prices in the later years of the legislation forced producers to rely on estimates and expectations for years 2017 and 2018. This situation could prove challenging if the farm economy is in a drastically different state between 2014 and 2018. A program selection that functioned effectively for a producer in 2014 might not provide the desired safety net in 2018 if substantial changes occur in commodity markets, weather, etc.

The results of this research also suggest that legislators should consider producers' expectations and preferences when designing farm policy. Additionally, they should take care to not have a one-dimensional approach to policy design—both a retroactive and forward looking approach should be utilized in order to develop the most efficient safety net programs that also meet the intended outcomes of the legislation. Producers' payment and risk preferences as well as their outlook for the agricultural sector are founded in their experiences and information available to them. As such, legislators should offer programs that allow producers the opportunity to fully assess the impacts of their enrollment choice and select a program that meets their specific needs for farm policy. In order for this to occur, farm legislation should consider what aspects of previous farm bills worked/didn't work, what the current state of the farm economy looks like as well as what considerations should be made when writing the legislation, as well as what the farm economy might look like in future years of the life of a farm bill.

Understanding the factors affecting Farm Bill program selection at the individual level is a complex task. Recognizing the diverse needs and expectations of producers is the first step in designing farm policy that benefits the greatest number of producers. By providing both a revenue and price based program, the 2014 Farm Bill offered producers the choice between

catastrophic and shallow risk coverage based on their risk preferences and expectations of the future farm economy. Moving forward, farm safety net programs should continue to evolve to meet the current and future market possibilities in order to best protect American producers.

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Appendix A - List of Acronyms

AAA	Agricultural Adjustment Act
ACRE	Average Crop Revenue Election
ARC	Agriculture Risk Coverage
ARMS	Agricultural Resource Management Survey
CBO	Congressional Budget Office
CCP	Counter-cyclical Payments
ERS	Economic Research Service
FSA	Farm Service Agency
FOIA	Freedom of Information Act
KFMA	Kansas Farm Management Association
LDP	Loan Deficiency Payments
MYA	Marketing Year Average
NASS	National Agriculture Statistics Service
OA	Olympic Average
PLC	Price Loss Coverage
RMA	Risk Management Agency
SCO	Supplemental Coverage Option
STAX	Stacked Income Protection Plan
SNAP	Supplemental Nutrition Assistance Program
USDA	United States Department of Agriculture
WTO	World Trade Organization

Appendix B - Survey Instruments

2014 Farm Bill Pre-Survey Questions

Thank you for taking the time to answer our survey questions. You answers will be anonymous. This survey is part of a research project designed to aid policy makers in decisions on future farm policy.

1. Which best describes you?
    a. _____ landowner (you lease out most of your ag land)
    b. _____ farmer/rancher (you primarily operate ag land)
    c. _____ farm manager (you manage land for others)
    d. _____ lender
    e. _____ educator
    f. _____ other, please specify: _____

2. How many total acres of cropland do you own and/or rent?
    a. Owned land: _____ acres
    b. Rented land: _____ acres

3. How many years have you been farming, owned farmland, or managed farmland?
    a. _____ years

4. What percent of your primary source of agricultural income is from crops?
    a. _____ %

5. Did you sign up for the ACRE program under the 2008 Farm Bill?
    a. _____ yes
    b. _____ no
    c. _____ don't know

6. Have you gathered information about the 2014 Farm Bill programs from any of the following sources, including today's meeting? (check all that apply)
    a. _____ in-person meetings
    b. _____ online videos or webinars
    c. _____ newspapers or magazines
    d. _____ radio or television
    e. _____ talking to other producers
    f. _____ other, please specify: _____

7. Are you a member of any farm organizations? (check all that apply)

    a. _____ Kansas Farm Bureau
    b. _____ American Farm Bureau
    c. _____ Kansas commodity groups (corn, wheat, grain sorghum, soybean)
    d. _____ Farmers Union
    e. _____ other, please specify: _____

8. Do you own or operate cropland that is registered with the Farm Service Agency (FSA) and has a unique FSA farm number?

    a. _____ yes
    b. _____ no
    c. _____ don't know

9. How many FSA farms do you own or operate?

    a. _____ farms

*Of these farms, please select your **largest** (in acres) FSA farm to answer the following questions:*

10. What state is your FSA farm located in?

    a. _____

11. What county is your FSA farm primarily located in?

    a. _____

12. Which of the following crops have you planted on your FSA farm in the past 5 years? (select all that apply)

    a. _____ wheat
    b. _____ corn
    c. _____ soybeans
    d. _____ grain sorghum
    e. _____ other, please specify: _____

13. On your FSA farm, which of the following crops has the largest number of FSA base acres? (please select only one)

    a. _____ wheat

b. _____ corn
c. _____ soybeans
d. _____ grain sorghum
e. _____ other, please specify: _____

14. If you rent this farm, what type of lease do you have?

a. _____ crop share
b. _____ fixed cash rent
c. _____ other, please specify: _____

*Please answer the following questions for your FSA farm as if you are the **sole** decision maker:*

15. Did you, or are you planning to, update the FSA program yields for any of your base acre crops?

a. _____ yes
b. _____ no
c. _____ don't know

16. Did you, or are you planning to, reallocate the FSA base acres on your farm?

a. _____ yes
b. _____ no
c. _____ don't know

17. If you enrolled **today** in the farm bill programs, which program(s) would you select for the following commodities on your FSA farm:

	Wheat	Corn	Grain Sorghum	Soybeans
Agricultural Risk Coverage at the Individual Level (ARC-IC)	☐	☐	☐	☐
Agricultural Risk Coverage at the County Level (ARC-CO)	☐	☐	☐	☐
Price Loss Coverage (PLC)	☐	☐	☐	☐
Supplemental Coverage Option (SCO)	☐	☐	☐	☐

18. For the programs you listed in the previous question, what do you expect the annual payouts to be?
    a. _____ $0 per acre/year
    b. _____ $1 - $30 per acre/year
    c. _____ $31 - $60 per acre/year
    d. _____ $61 - $90 per acre/year
    e. _____ more than $90 per acre/year

19. Please rate your agreement with these statements (circle one number for each statement)

	Strongly Agree ⟷ Strongly Disagree					Don't Know
I usually like "playing it safe" (for instance, "locking in a price") instead of taking risks for market prices of my crops.	1	2	3	4	5	*
When selling/marketing my crops, I prefer financial certainty to financial uncertainty.	1	2	3	4	5	*
When selling/marketing my crops, I am willing to take higher financial risks in order to realize higher average returns.	1	2	3	4	5	*
I like taking financial risks with my farming business.	1	2	3	4	5	*
I accept more risk in my farming business than other crop producers.	1	2	3	4	5	*
With respect to the conduct of business, I dislike risk.	1	2	3	4	5	*

20. Did you buy crop insurance for the 2014-2015 season? If yes, please check the type and fill in the percentage of coverage:

	Wheat	Corn	Grain Sorghum	Soybeans
Revenue Protection	☐	☐	☐	☐
Yield Protection	☐	☐	☐	☐
Revenue Protection-Harvest Price Exclusion	☐	☐	☐	☐
% of Coverage				

We encourage you to utilize related Agricultural Act of 2014 (Farm Bill) resources available at www.AgManager.info. If you have any questions regarding this survey, please contact Dr. Mykel Taylor (mtaylor@k-state.edu) or Dr. Glynn Tonsor (gtonsor@k-state.edu).

2014 Farm Bill Post Survey Questions

*Please answer the following questions for your **largest** (in acres) FSA farm as if you are the **sole** decision maker:*

1. If you signed up today for the farm bill programs, which program(s) would you select for the following commodities on your FSA farm:

	Wheat	Corn	Grain Sorghum	Soybeans
Agricultural Risk Coverage at the Individual Level (ARC-IC)	☐	☐	☐	☐
Agricultural Risk Coverage at the County Level (ARC-CO)	☐	☐	☐	☐
Price Loss Coverage (PLC)	☐	☐	☐	☐
Supplemental Coverage Option (SCO)	☐	☐	☐	☐

2. For the programs you listed in the previous question, what do you expect the annual payouts to be?

    a. _____ $0 per acre/year
    b. _____ $1 - $30 per acre/year
    c. _____ $31 - $60 per acre/year
    d. _____ $61 - $90 per acre/year
    e. _____ more than $90 per acre/year

The following questions help us to better understand your outlook on farming and government programs. Even if you are not sure, please give us your best guess.

3. Which program do you think will have the highest total payout across the next five years?

    a. _____ Agricultural Risk Coverage at the Individual Level (ARC-IC)
    b. _____ Agricultural Risk Coverage at the County Level (ARC-CO)
    c. _____ Price Loss Coverage (PLC)
    d. _____ don't know

4. Which program do you think offers the most income risk protection for your farm over the next five years?

a. _____ Agricultural Risk Coverage at the Individual Level (ARC-IC)
b. _____ Agricultural Risk Coverage at the County Level (ARC-CO)
c. _____ Price Loss Coverage (PLC)
d. _____ don't know

5. What do you expect commodity prices to do in the next five years?

a. _____ increase from current prices
b. _____ decrease from current prices
c. _____ stay about the same as current prices
d. _____ don't know

6. What do you expect yields in your county to do over the next five years?

a. _____ increase from historic yields
b. _____ decrease from historic yields
c. _____ stay about the same as historic yields
d. _____ don't know

7. What do you expect **your farm's** yields to be over the next five years as compared to the county average?

a. _____ my farm's yields will be above the county average
b. _____ my farm's yields will be below the county average
c. _____ my farm yield will have about the same as the county average
d. _____ don't know

8. How much do you value the information you received from the meeting today?

a. _____ not valuable at all
b. _____ somewhat valuable
c. _____ valuable
d. _____ very valuable

9. List the most important thing(s) you learned during today's meeting:

_____

_____

10. Please share any other comments you have about the facility, materials, speakers, or anything else you would like us to know:

_____

_____

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