DETERMINING IMPLICIT OPTION PREMIUMS FOR GOVERNMENT FARM PROGRAM PAYMENTS

By

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"And whatever you do, whether in word or deed, do it all in the name of the Lord Jesus, giving thanks to God the Father through him." Colossians 3:17

"From his fullness we have all received, grace upon grace." John 1:16

"Trust in the Lord with all your heart and lean not on your own understanding; in all your ways submit to him, and he will make your paths straight." Proverbs 3:5-6

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Abstract: In order to satisfy trade agreement obligations, U.S. farm policy has been increasingly moving away from market-distorting direct subsidies to decoupled payments. Decoupling payments from production of specific commodities were designed to be non-distorting to producers' production decisions. However, by altering producers' price and revenue distributions, farm programs may distort producers' production decisions. Recent U.S. government farm program payments are intended to provide a safety net protecting against adverse price and revenue events. As such, these programs act as put options for producers. The first step in assessing the potential for distortion is evaluating the implicit premiums of options provided by government programs. Option pricing models are developed for four recent U.S. farm programs, ACRE, DCP, ARC, and PLC, and are then used to estimate expected payments and implicit option premiums provided to producers under the programs.

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CHAPTER I

INTRODUCTION

Agricultural producers annually decide what crops to plant and how much land to allocate to each crop. Farmers' allocation decisions are influenced by a variety of different factors including climate, location of their farm, prices, and oftentimes government support. In the past, these support programs included direct payments, counter-cyclical payments, marketing loans, disaster payments, and revenue assurance programs.

The 1948 General Agreement on Tariffs and Trade (GATT) regulated international trade until 1994 when the World Trade Organization (WTO) Uruguay Round Agreements were signed. The Agreement on Agriculture from the Uruguay Round negotiations focused on starting a reform process in order to establish a fair and market-oriented agricultural trading system (WTO 1999). In the final Uruguay Round Agreements, the WTO set up commitments and rules to improve market access and decrease the amount of trade-distorting subsidies (WTO 1999). The trade negotiations categorized domestic support into two main areas: "Green Box" measures and "Amber Box" measures. Subsidies with no or minimal distortive effect on international trade are defined as Green Box measures, while subsidies with trade distorting effects are

classified as Amber Box measures. Decoupled payments in this sense were considered to be in the Green Box, since they are not intended to influence production decisions. Farmers receive a payment from the government, but the payments are intended to not influence agricultural production (WTO 2003).

Problem Statement

In order to satisfy trade agreement obligations, U.S. farm policy has increasingly moved away from market-distorting direct subsidies to decoupled payments. Decoupling payments from production of specific commodities were designed to be non-distorting to producers' production decisions. However, by altering producers' price and revenue distributions, these programs may be distorting.

So the relevant question is, "Are decoupled payments actually distorting to farm production decisions?" There is reason to suspect so. Economic theory suggests that decoupled payments may influence risk-averse decision makers through wealth effects. Adams et al. (2001) reported decoupled payments can lead producers to engage in risky behavior which can lead to changes in acreage allocation decisions. Bhaskar and Beghin (2009) identified five different channels through which decoupled payments can influence farm-level decisions, including production. The channels include reducing the risk that producers face, easing credit constraints, altering land values, affecting labor allocations, and influencing decisions through future payments. Their research reported that decoupled payments are not fully decoupled, but the impact of these subsidies on farm production decisions was likely relatively small.

So past research suggests that decoupled payments may affect production decisions. The extent that decoupled payments affect producer behavior is, in part,

influenced by the economic value of program payments. If Bhaskar and Beghin are correct that decoupled payments have slight influence on producer behavior, then the economic value of payments must be small relative to other economic factors determining producer planting decisions.

Recent U.S. farm subsidies have been intended to provide a safety net protecting against adverse price and revenue events. Producers are able to enroll in government programs that provide a payment to them when price or revenue falls below a point set in the program. By truncating price or revenue distributions, these programs act as put options for price or revenue. The first step in assessing the potential for distortion from decoupled payments is evaluating the implicit value of options provided by government programs. This research investigates the value of expected commodity program payments by calculating the implicit option premiums of commodity program payments. To date, there is limited research into valuing options provided by government program payments. Marcus and Modest (1986) investigated the valuation of put options provided by agricultural price support programs by investigating the *ex ante* costs to the government of agricultural price support programs. Their research shows that agricultural price support programs can be interpreted as providing put options to program beneficiaries. Implicit option premiums at the county-level for three states and three different commodities are empirically modeled for three recent U.S. commodity programs, and an expected payment is empirically modeled for one recent U.S. commodity program.

Objectives

The primary objective of this research is to measure the implicit premiums associated to the options provided to producers under three government program

payments and measure the expected payment provided to producers under one government program payment.

The specific objectives of this research are to:

1. Determine the option premiums and expected payments of program payments across counties within the states of Illinois, Ohio, and Oklahoma for corn, soybeans, and wheat; and
2. Determine the extent that option premiums and expected payments vary within each state, across states, and by crop.

Overview

This research will investigate the premiums associated with decoupled payments. Option premiums are estimated for major U.S. field crops for three different government programs-Average Crop Revenue Election (ACRE), Agriculture Risk Coverage (ARC), and Price Loss Coverage (PLC). Expected Payments are estimated for one program-Direct and Counter-Cyclical Payment (DCP). ACRE and DCP were established by The Food, Conservation, and Energy Act of 2008. These programs were in effect until the passage of The Agricultural Act of 2014. ARC and PLC were introduced in The Agricultural Act of 2014. The option premiums and expected payments for each of the program payments will be evaluated on a county level basis. By comparing the option premiums and expected payments across counties, states, and program payments, the impacts of the program payments are compared.

Data for this research were taken from Farm Service Agency (FSA) and United States Department of Agriculture-National Agricultural Statistics Service (USDA-NASS). The states of Oklahoma, Ohio, and Illinois were evaluated. Three states were

chosen to compare results from the Southern Plains and the eastern Corn Belt. Corn, soybeans, and wheat were included since these are the crops with the largest acreages in these states and regions. The data for the study spans the range of 2009-2015 and includes all counties for each of the states. Evaluating the data at the county level allows for comparison of option premiums of government payments both across states and within states.

Outline of thesis

The remaining research is presented as follows. Chapter 2 contains an overview of the government support programs evaluated in the research as well as relevant research related to valuing options and the impacts of support programs on production. Chapter 3 presents the methodology including the purpose for this research along with the data sources and empirical model for the research. Chapter 4 summarizes the results from the research. Finally, chapter 5 presents the conclusions.

CHAPTER II

LITERATURE REVIEW

U.S. Ag Policy and the WTO

Since the formation of the World Trade Organization (WTO) in 1995, U.S. agricultural policy makers have attempted to comply with regulations set forth by the organization. After passage of the Uruguay Round Trade negotiations in 1996, the United States implemented changes in farm policy. The 1996 Federal Agriculture Improvement and Reform (FAIR) Act shifted domestic agricultural policy programs to direct payments to comply with WTO Uruguay Round agreements. Goodwin and Mishra (2005; 2006) stated the passage of the 1996 FAIR Act served as a "transition toward a policy environment with diminishing government involvement in agricultural markets."

Since 1996, U.S. government has faced the challenge of trying to ensure subsidy payments adhere to regulations set forth by the WTO. The 1996 Farm Bill contained direct payments considered "green box" payments for upland cotton. In 2003, Brazil challenged that the U.S. was not adhering to all of the regulations in the agreement concerning upland cotton forcing the U.S. to change subsidy payments for the commodity. WTO concluded the upland cotton direct payments were not decoupled from production and therefore were not able to be considered "green box" payments any

longer. This caused the U.S. to reform payments for upland cotton. The WTO decision on upland cotton also led to Canada bringing up a complaint with the U.S. about U.S. subsidies for corn and other crops. These disputes forced Congress to acknowledge the importance of adhering to regulations set forth by the WTO (Kwan 2009).

While the subsequent farm bills following the 1996 farm bill have all made an effort to adhere to WTO regulations, researchers still had concerns with the 2014 farm bill. Glauber and Westhoff (2015) conducted research into implications of the bill and the WTO. Under the current Uruguay Round Trade Agreements, Glauber and Westhoff reported there is potential for the 2014 Farm Bill to exceed the payment limits for amber-box measures set forth by the WTO.

Since the passage of the Uruguay Round Trade Agreements in 1994, the United States implemented several changes to government payment programs. This research investigates four of those programs: Direct and Counter-Cyclical Payment (DCP) in 2002, Average Crop Revenue Election (ACRE) in 2008, and Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC) in 2014. Each program payment will be defined and explained and relevant research on farm program payments and the impact of them will be presented along with relevant research on valuing options.

The Food, Conservation, and Energy Act of 2008

The Food, Conservation, and Energy Act of 2008 included DCP and ACRE with these programs in effect until passage of the Agricultural Act of 2014. DCP contained two types of payments: direct payments and counter-cyclical payments. The Food Security and Rural Investment Act of 2002 established the DCP program, and The Food, Conservation, and Energy Act of 2008 extended the payments.

Direct payments (DP) were in effect before 2002, but the 2002 Farm Bill updated and extended the payments. Beginning in 2002, the following crops were eligible for direct payments: wheat, corn, grain sorghum, barley, oats, rice, upland cotton, soybeans, and other oilseeds. Producers enrolled in the program received annual payments that were based on a per-unit payment rate established in each new farm bill for each commodity that was then multiplied by the farm's payment quantity (established base acres times payment yield) for each commodity. A producer's total payment was found by adding all the payments for all eligible commodities (House Committee on Agriculture).

Counter-cyclical payments (CCP) came into existence in the 2002 Farm Security and Rural Investment Act. Counter-Cyclical payments provided a price-based safety net for producers. Under CCP, payments received by a producer were based on fixed area and yields, but the amount they received was based on market prices. Producers received payments if the effective price was less than the target price for a commodity. The effective price for a commodity was calculated using two values. The first value was the higher of the following: 1) the national average market price for a commodity received by a producer in the last year or 2) the national average loan rate for a commodity. The second value was the payment rate established to calculate direct payments for the commodity. The 2002 Farm Bill stated target prices for all of the commodities eligible for counter-cyclical payments. The total payment a producer received was calculated by multiplying the payment rate by the base acres by the yield (House Committee on Agriculture).

The 2008 Farm Bill established ACRE as an alternative option to counter cyclical payments. ACRE provided a revenue-based safety net rather than the price-based counter

cyclical payments. ACRE enrollment was an irrevocable decision, so once a producer elected to enroll in the program they could not change their election for the duration of the Farm Bill. The decision to enroll in the program came with three significant trade-offs for producers. Producers who chose to enroll in ACRE agreed to the following: "(1) forgo counter-cyclical payments, (2) a 20-percent deduction in their direct payments, and (3) a 30 percent reduction in the marketing assistance loan rates for all commodities produced on the farm are eligible for ACRE payments (USDA 2009)." ACRE payments also differed from counter-cyclical payments as they were based on the current plantings of the farm as opposed to established base acres. Payments tied directly to plantings created an issue with WTO boxes. Payments were issued when the following two conditions were met: 1) the Actual State Revenue falls below the State ACRE Guarantee and 2) the Actual Farm Revenue falls below the Farm ACRE Guarantee (USDA 2009). Producers received their ACRE payment and then were also eligible to receive direct payments at a rate 20 percent lower than the direct payment rate established in the farm bill.

The Agricultural Act of 2014

The Agricultural Act of 2014 brought about more changes to U.S. agricultural policy in an effort to better comply with WTO regulations. The 2014 Farm Bill eliminated CCP and ACRE programs and in turn put into place two new programs: Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC). Beginning in 2015, producers had the option to enroll their farms in ARC or PLC for 2014-2018.

PLC payments are not based on the current plantings of a farm, differing from ACRE and returning to previous programs that utilized decoupled base acres and yields.

Payments are based on base acres and yields. Producers had the option to retain existing base acres and yields or update base acres and yields. If a producer updated base acres and yields, the payment yields were equated to 90 percent of average yields for that commodity over 2008-2012. To qualify for a PLC payment, the effective price of a commodity must be less than the reference price for that specific commodity. Reference prices are set in the Farm Bill. The effective price of a commodity is determined by taking the larger of the national marketing-year-average price and the national average loan rate. A producer's payment is computed by multiplying 85 percent of a commodity's base acres by the payment rate for that commodity. The payment rate for a commodity is equal to the reference price minus the effective price (USDA 2015). PLC is similar to the DCP payment included in the 2002 and 2008 Farm Bills.

ARC offered two different programs: a county program (ARC-CO) and an individual program (ARC-IC). Producers had the option of county-level or farm-level revenue protection. At the farm number level, producers who chose ARC were required to choose either ARC-CO or ARC-IC. ARC payments are also computed using the same base acres as PLC. Under the county program (ARC-CO), producers receive a payment "when the actual county crop revenue of a covered commodity is less than the ARC-CO guarantee for the covered commodity (USDA 2015)." ARC-CO provides a producer with revenue loss coverage at the county level. Producers enrolled in ARC-IC receive a payment "when the current year revenue for all covered commodities planted on the ARC-IC farm falls below 86 percent of the farm benchmark revenue (USDA 2015)." The ARC-IC option provides producers with revenue loss coverage at the farm level.

Prior Research

The changes in U.S. agricultural policy since 1996 have been motivated by the need to comply with WTO regulations reducing trade-distorting subsidies. Government agricultural programs compliant with WTO regulations, or non-trade distorting, are described as decoupled payments.

Direct Payments and the DCP Program

Direct farm payments were first implemented under the 1996 Farm Bill (Federal Agriculture Improvement and Reform (FAIR) Act) with the goal of declining the payments each year until the act expired in 2002 (Goodwin and Mishra, 2006). The Direct and Counter-Cyclical Payment Program (DCP) was implemented in the 2002 Farm Bill to comply with WTO regulations. DCP ended the practice of basing subsidy payments on the amount of acres used in planting commodities, so it was thought to not distort trade since the payments for both direct and counter-cyclical payments were based on historical production, not current yields.

The effects of DCP payments on production decisions were subsequently analyzed. Anton and Mouel (2004) investigated this topic by looking into the risk-related effect of CCPs. For risk-averse producers, CCP payments provided risk-reducing incentives to producers, and thus production decisions were affected.

Goodwin and Mishra (2005) researched the influence of factors on acreage decisions by giving farmers a survey where they ranked the importance of ten different factors in determining acreage decisions. Their results suggested that direct payments could have an important effect on production. Additional research done by Goodwin and

Mishra (2006) looked at the effect of direct payments in the Corn Belt region of the United States. The study showed direct payments had a statistically significant effect on acreage decisions of corn, wheat, and soybeans, but the effect was very minimal. Goodwin and Mishra (2005; 2006) concluded direct payments may in fact affect acreage decision, but the effects they have on the acreage decisions are small.

Kwan (2009) also reported the payment schemes under the 1996 and 2002 farm bills (direct payments and CCP) had effects on crop production. Direct payments established a set price to pay producers for production of certain commodities, leading to decreased production of non-program commodities or program commodities with lower direct payment prices. Instead of aiding family farmers during hard times, the payments encouraged overproduction of program commodities, leading to low domestic prices and increased world supply (Kwan 2009). Direct payments and the DCP program were both found to be distortionary.

Methods of Government Payment Influence on Production

Researchers began to look into specific ways that farm program payments may affect production. Adams et al. found that decoupled payments can affect the desire of producers to engage in risky behavior which can lead to having an impact on acreage decisions as they engage in more risky production (2001). Westcott and Young (2003; 2004) also investigated the ways decoupled payments can affect production. One mechanism is wealth effects. Wealth effects of decoupled payments may cause a farmer to change their attitude toward risk. If a farmer receives decoupled payments they may be more willing to take on more risks. Decoupled payments may also provide a farmer with

more cash flow, which in turn leads them to face less credit constraints and reduced capital allowing them to invest more into their production.

Coble, Miller, and Hudson (2008) also investigated ways that decoupled payments can affect production. Because decoupled payments are not related to production, but instead related to base acreage of past production this could cause famers to adjust their acreage based upon the possibility of future policy options to update their base acreage instead of them responding fully to the marketplace. Coble, Miller, and Hudson (2008) conducted research on farmers in Mississippi that showed cotton farmers are likely to adjust acres to increase yields from their current crops in order to gain benefits from future farm bills.

U.S. Agricultural Policy from 2008-2014

Two concerns about current government agricultural programs led policy makers to establish the Average Crop Revenue Election Program (ACRE). First, prior to 2008, agricultural programs provided little support to producers when yields were low, and second, farmers could also receive CCP payments when revenue was above average, leading to increased government spending. ACRE was a revenue protection program with the goal of helping producers manage the risk of declining crop revenue in a short period of time (Zulauf et al. 2008). With the implementation of ACRE, producers could choose between DCP and ACRE. An analysis conducted by Zulauf et al. (2008) suggested that ACRE would most likely benefit producers in states with higher yield variability, crops with prices higher than the loan rates, states and crops with larger increases in yield over the past 25 years, and producers whose planted and base acres differed substantially.

In 2014, Congress passed the Agricultural Act of 2014 which included several changes to agricultural policy. Stabenow (2014) commented that the Agricultural Act of 2014 marked a "landmark shift in agricultural policy". The goals were to create a new farm safety net while reducing government outlays for farm program payments. This new farm bill eliminated past programs, including DCP and ACRE, replacing them with new programs with payments tied to market prices and yields. In an effort to reduce farm policy spending, Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC) were created.

Bradley et al. (2016) investigated the interactions between 2014 Farm Bill commodity programs and crop insurance choice. In the 2014 Farm Bill, Supplemental Coverage Option (SCO), a new insurance coverage option that is added onto a producers underlying traditional policy, was introduced. Bradley et al. (2016) investigated how ARC and PLC affected crop insurance level coverage choices by using data from 2008 to 2015 in the states of Oklahoma, Ohio, and Illinois, to examine the changes in crop insurance coverage due to the changes in government programs. Bradley et al. concluded the 2014 Farm Bill did have an impact on the level of insurance coverage selected by producers. After the 2014 Farm Bill was implemented, producers selected higher levels of coverage, and producers enrolled in ARC had a higher level of participation compared to producers enrolled in PLC (2016).

Research has shown that government program payments can influence producers' behavior. It has also been shown that there are several ways program payments can affect production decisions with one of those ways being wealth effects. Program payments can add to the wealth of a producer. If a producer is risk averse, then these changes in wealth

can affect risk aversion. When a producer has more wealth, this can lead them to engage in more risky behavior. If government programs essentially offer free put options on prices and revenues, then higher implicit prices of these options should lead to distorted behavior. So, then the first step in analyzing the potential for distortions is valuing free put options provided by commodity programs.

Valuing Options

Prior research has investigated valuing options with some researchers addressing government agricultural support programs. Before reviewing the literature related to options, a review of some key terminology is presented. Black and Scholes (1972) define an option contract as "a right to buy or to sell another asset at a given price within a specified period of time." Black and Scholes (1973) also describe an option as "a security giving the right to buy or sell an asset, subject to certain condition, within a specified period of time." There are two types of option contracts: call options and put options. A call option is the right to buy while a put option is the right to sell. The premium of the option is the price of the contract. This research will investigate valuing put option premiums of government payment programs.

Over the years, the government has introduced various types of agricultural support programs including direct payments, counter-cyclical payments, marketing loans, disaster payments, and revenue assurance programs. These various support programs have aimed to help stabilize and increase farmers' income. Even with governmental support, farmers still have financial troubles. Coupling this with federal budget deficits has led researchers to investigate government support programs (Gregorowicz and Moberly 1992). Many of these researchers have looked into option markets.

Gardner (1977) investigated commodity options for agriculture. In the research, Gardner makes the claim that an options market could help to facilitate the operation of some commodity programs. At the time of Gardner's research, the government used non-recourse loans to provide support to producers. Gardner showed that these non-recourse loans acted like a put option for producers. The loans were a free put option to producers with the exercise price being the loan level for the commodity. The research concluded that commodity options for farm products could be useful financial instruments (1977).

Marcus and Modest (1986) investigated government guarantees. They showed agricultural support programs along with other government insurance programs could be interpreted as providing a random number of put options. Gregorowicz and Moberly (1992) also looked into government price supports and private agricultural options. Their research compares put option contracts with current government support programs. Government support programs aim to offer risk transfer and price stabilization to producers. Gergorowicz and Moberly (1992) concluded put option contracts can offer similar effects to producers. By encouraging farmers to use these instruments, government involvement in agriculture could be reduced.

Kang and Brorsen (1995) used average-option pricing models to estimate premiums of the U.S. government deficiency payment program which they treat as a subsidized put option. They used a GARCH average-pricing option model and the Black average-pricing option model. In their research, they developed a framework to determine the expected payments from the deficiency payment program to help producers decide if they want to participate in the payment program. They concluded that the

GARCH average-pricing model produced results closest to the actual payments made by the deficiency payment program.

Summary

As the WTO continues to aim to regulate market-distorting subsidies, U.S. farm program payments continue to be a topic of interest. WTO disputes and prior research on the effects of direct payments caused Congress to recognize the importance of farm program payments leading them to change programs over the years. Through the years, Congress has eliminated programs while also implementing new programs. With policy ever changing and the lack of recent literature related to valuing options, there is motivation to investigate the option premiums associated with recent farm program payments. This research will develop a framework to calculate the implied option premiums provided by ACRE, ARC, and PLC. It will also calculate expected payments for DCP.

CHAPTER III

METHODOLOGY

Following the acceptance of a new farm bill into law, farmers are typically confronted with decisions regarding enrollment into commodity programs, a decision which may impact them for five years or more. The purpose of this research is to develop a framework for calculating implied option premiums associated with government subsidies for Average Crop Revenue Election (ACRE), Agriculture Risk Coverage (ARC), and Price Loss Coverage (PLC). A framework to calculate expected payments for Direct and Counter-Cyclical Payment (DCP) is also developed. The framework is used to assess the premiums on a county level across the states of Illinois, Ohio, and Oklahoma.

The commodities of interest in this study are corn, soybeans, and wheat. These commodities were chosen as they make up the majority of acres planted in each of the three states as shown in Table 1. Similar to Bradley (2016), the states of Illinois, Ohio, and Oklahoma are used in this research. For this research, option pricing models are developed for ACRE, ARC, PLC, and DCP. The option pricing models are then used to estimate implicit option premiums for ACRE for the years 2009-2013.These years are chosen due to ACRE being in effect during this time frame. For ARC and PLC, implicit option premiums are estimated for 2014 and 2015. Even though ARC and PLC are in

effect through 2018, we use these years because of data constraints. CCP option premiums and expected direct payments are also estimated for the years 2009-2013.

Option Pricing Models

PLC Option Premium

The expected payment for PLC was calculated as an option premium. To determine the per acre option premium of PLC, a price forecast was incorporated to find the option premium of the PLC payment for each state of nature in 2014 and 2015 for each commodity using equation 1. The subscript *i* denotes the commodity, subscript $s \in \{2014, 2015\}$ denotes years with PLC available, subscript $t \in \{1970,\ldots, 2008\}$ denotes historical observations, and *T* is the total number of observations in the distribution of forecasted prices.

Equation 1

$$Implicit\ PLC\ option\ premium_{is} = \sum_{t} [\max(0, ReferencePrice_{it} - Forecasted\ MYA\ Price_{its})]\ /T$$

Since the option premium equals zero when the forecasted price exceeds the reference price, the price distribution is truncated at the reference price (strike price). The implicit PLC option premiums for 2014 and 2015 were calculated by averaging across the *T* states of nature for each commodity in each year. The marketing-year-average (*MYA*) prices were forecasted using a regression model relating MYA price to harvest-contract futures price at planting time.

Chicago Board of Trade futures price data and marketing year average price data were used to simulate marketing-year-average price distributions for 2009-2015. The

marketing-year-average prices *(MYA Price)* were estimated as functions of harvest-contract-month futures prices as in equation 2. In equation 2, FP_{it} is the harvest-contract month futures price for commodity *i* and year *t* at planting time.

Equation 2

$$MYA\ Price_{it} = \hat{\beta}_0 + \sum_{j=1}^{39} \hat{\beta}_j\, FP_{it} + \varepsilon_{it}; t \in \{1970, \ldots, 2008\}$$

The residuals from equation 2 were then used to simulate a marketing-year-average price distribution for 2009-2015. Using harvest-contract-month futures prices and equation 2 estimated coefficients and residuals, distributions of MYA prices for 2009-2015 were simulated as in equation 3. For each year in the forecast, 39 residuals from equation 2 are used to generate 39 equally-likely prices, representing the distribution of forecasted prices.

Equation 3

$$Forecasted\ MYA\ Price_{its} = \hat{\beta}_0 + \sum_{j=1}^{7} \hat{\beta}_j\, FP_{is} + \varepsilon_{it}; s \in \{2009, \ldots, 2015\}$$

The per acre PLC option premium for each county in 2014 and 2015 was determined using equation 4. $CCPYield_{isc}$ is the CCP yield for commodity *i* in year *s* for county *c* which comes from the Farm Service Agency (FSA), and the *Implicit PLC Option Premium*$_{isc}$ is the option premium of PLC payments for commodity *i* in year *s* for county *c*.

Equation 4

$$PLC\ Option\ Premium_{isc} = CCPYield_{isc} \times Implicit\ PLC\ Option\ Premium_{is}$$

ARC Option Premium

In order to calculate the option premiums of ARC, a trend yield was estimated. Historical yields for commodity *i* in year *t* for county *c* were estimated as functions of year and a fixed effect for county as in equation 5. In equation 5, the *t* values are years and $County_j$ are dummy variables for the 267 counties across the three states.

Equation 5

$$Historical\ County\ Yield_{itc} = \hat{\alpha}_0 + \hat{\alpha}_1 t + \sum_{j=1}^{267} \hat{\alpha}_{1+j}\, County_j + v_{itc}; t \in \{1970, \ldots, 2013\}$$

The estimated coefficients and regression residuals were then used to forecast yield distributions by county and crop for 2014 and 2015 as in equation 6.

Equation 6

$$Forecasted\ County\ Yield_{itsc} = \hat{\alpha}_0 + \hat{\alpha}_1 s + \hat{\alpha}_{1+c} + v_{itc}; s \in \{2014,2015\}$$

In order to calculate the value of the ARC option, forecasts of county-level revenue were computed by county, crop, and year using equation 7.

Equation 7

$$Forecasted\ County\ Revenue_{itsc} = Forecasted\ County\ Yield_{itsc} \times Forecasted\ MYA\ Price_{its}$$

Forecasted county yields were calculated by using the yield forecasts from equation 5. Forecasted county yields were then multiplied by MYA Price forecasts from equation 3. Assuming independence between county yields and national MYA price, this multiplication generated forecasted county revenues for 2014 and 2015. As ARC payments are made only if county revenue is 86% of benchmark revenue or lower, the

implicit option premium of ARC is computed as in equation 8. However, the annual ARC payment is capped at 10% of the benchmark county revenue.

Equation 8

$$ARC\ Implicit\ Option\ Premium_{itsc} = \sum_{t} \min(0.1 \times \text{Benchmark}_{\text{isc}}, \max[0, (Forecasted\ County\ Revenue_{itsc} - (0.86 \times Benchmark_{isc}))])/T$$

$Benchmark_{itc}$ is benchmark revenue which is the Olympic average yield times the Olympic average price over the previous five years (USDA, 2015). The *Olympic Average Yield* is the sum of the yield for commodity *i* from years *t-5* to *t-1* in county *c; min(Y)* in the minimum yield; and *max(Y)* is the maximum yield from years *t-5* to *t-1*.

Equation 9

$$Olympic\ Average\ Yield = \sum_{k=t-5}^{t-1} \frac{Y_{ikc} - \min(Y) - \max(Y)}{3}$$

The *Olympic Average Price* is the sum of the price for commodity *i* from years *t-5* to *t-1*; *min(P)* in the minimum price; and *max(P)* is the maximum price from years *t-5* to *t-1*.

Equation 10

$$Olympic\ Average\ Price = \sum_{k=t-5}^{t-1} \frac{P_{ik} - \min(P) - \max(P)}{3}$$

ACRE option premium

Payments under the ACRE program were also contingent on revenue outcomes. In order to receive an ACRE payment, two triggers must be met, the state trigger and farm trigger. For the state trigger to be met, the State ACRE Guarantee must exceed the

Actual State Revenue. For the farm trigger to be met, the Farm Guarantee must exceed the Actual Farm Revenue. The payments in this study are calculated assuming that the farm trigger is met. Previous literature (Harwood, 2009) also utilized this assumption.

In order to calculate the option premium of ACRE, state yield trends were calculated. Using trend models, state-level yields can be forecasted for 2008-2013, the years with ACRE. Historical yields for commodity *i* in year *t* for state *j* were estimated as in equation 11.

Equation 11

$$State\ Yield_{itj} = \hat{\gamma}_0 + \hat{\gamma}_1 t + \sum_{l=1}^{3} \hat{\gamma}_{1+l}\, State_j + u_{itj}; t \in \{1970, \dots, 2007\}$$

The residuals from the regression were used to simulate a forecasted yield distribution by state for 2008-2013 to obtain distributions of forecasted state yields by crop, state, and years as in equation 12.

Equation 12

$$Forecasted\ State\ Yield_{itsj} = \hat{\gamma}_0 + \hat{\gamma}_1 t + \hat{\gamma}_{1+j} + u_{itj}; t \in \{2008, \dots, 2013\}$$

The marketing-year-average price forecasts obtained using equation 3 and the state yield forecasts obtained using equation 12 were used to calculate the forecasted state revenue for the ACRE option premium as shown below in equation 13.

Equation 13

$$Forecasted\ State\ Revenue_{itsj} = Forecasted\ MYA\ Price_{its} \times Forecasted\ State\ Yield_{itsj}; s \in \{2009, .., 2013\}$$

The State ACRE Guarantee was calculated using a two-year national marketing year-average-price and an Olympic-average state yield.

Equation 14

$$State\ ACRE\ Revenue\ Guarantee_{isj} = TwoYear\ Average\ MYA\ Price_{is} \times Olympic\ Average\ State\ Yield_{isj}$$

The *Olympic Average State Yield* is the sum of the yield for commodity *i* from years *t-5* to *t-1* in state *j*; *min(Y)* in the minimum yield; and *max(Y)* is the maximum yield from years *t-5* to *t-1*.

Equation 15

$$Olympic\ Average\ State\ Yield_{isj} = \sum_{k=t-5}^{t-1} \frac{Y_{iks} - \min(Y) - \max(Y)}{3}$$

The per acre implicit option premium of ACRE was calculated as in equation 16.

Equation 16

$$\begin{aligned} &ACRE\ Implicit\ Option\ Premium_{itscj} \\ &= \Big\{\Big[Min\Big(\big(0.90 \times State\ ACRE\ Revenue\ Guarantee_{isj}\big) \\ &- \big(Forecasted\ State\ Revenue_{itsj}\big)\Big), \big(State\ ACRE\ Revenue\ Guarantee_{isj} \times 0.25\big)\Big] \\ &\times 83.3\%\ (85\%\ in\ 2012) \\ &\times \left(Benchmark\ County\ Yield_{isc} \Big/ Benchmark\ State\ Yield_{is}\right)\Big\} \end{aligned}$$

Benchmark County Yield is the sum of the yield for commodity *i* from years *t-5* to *t-1* in county *c*; *min(Y)* in the minimum yield; and *max(Y)* is the maximum yield from years *t-5* to *t-1*.

Equation 17

$$Benchmark\ County\ Yield_{isc} = \sum_{k=t-5}^{t-1} \frac{Y_{ik} - min(Y) - max(Y)}{3}$$

Benchmark State Yield is the sum of the yield for commodity *i* from years *t-5* to *t-1* in state *j*; *min(Y)* in the minimum yield; *max(Y)* is the maximum yield from years *t-5* to *t-1*.

Equation 18

$$Benchmark\ State\ Yield_{is} = \sum_{k=t-5}^{t-1} \frac{Y_{iks} - min(Y) - max(Y)}{3}$$

Expected Direct Payment

In order to calculate expected direct payments, a trend yield was estimated for 2009-2013. Equation 6 was changed to only include the years up to 2007. Historical yields for commodity *i* in year *t* for county *c* were estimated as functions of year and a fixed effect for county as in equation 19.

Equation 19

$$Historical\ County\ Yield_{itc} = \hat{\beta}_2 + \hat{\beta}_3 t + \hat{\beta}_4 County + v_{itc}; t \in \{1970, \dots, 2007\}$$

The estimated coefficients and regression residuals were then used to forecast yield distributions by county and crop for 2009-2013 as in equation 20.

Equation 20

$$Forecasted\ County\ Yield_{itsc} = \hat{\beta}_2 + \hat{\beta}_3 s + \hat{\beta}_4 c + v_{itc}; s \in \{2009, \dots, 2013\}$$

The expected direct payment per acre is calculated using equation 21. DPR_i is the direct payment rate for commodity *i* which is outlined in the Food, Conservation, and Energy Act of 2008 and Y_{isc} is the yield for commodity *i* in year *s* for county *c*.

Equation 21

$$DP_{itsc} = DPR_i \times Forecasted\ County\ Yield_{isc}; s \in \{2009, \ldots, 2013\}$$

CCP Option Premium

In order to calculate the implicit CCP option premium, the forecasted marketing year average prices from equation 2 were incorporated. For each state of nature, the maximum of zero and the CCP target price minus the forecasted marketing year average price was computed. Values were then averaged across all of the states of nature to calculate the implicit CCP option premium for each commodity for 2009-2013 as shown in equation 22.

Equation 22

$$Implicit\ CCP\ Option\ Premium_{is} = \sum_t [\max(0, CCP\ TargetPrice_i - Forecasted\ MYA\ Price_{its})]/T$$

For both and corn and wheat there was only one state of nature in which the CCP target price was higher than the marketing year average price making the average for each of the years approximately zero. So, the CCP option premiums were approximately zero (<$0.01).

Data

Price Forecast

Futures price data for corn, soybeans, and wheat were obtained from Quandl (2017) for the years 1970-2008. The futures prices used were a daily settlement price of harvest time futures contracts at planting time. Corn futures prices were from the March 15th (or nearest business day) settlement price of the December contract. Similarly,

soybeans futures prices were from the March 15th settlement price of the November contract. Finally, wheat futures prices were from the September 15th settlement price of the July contract. Marketing-year-average prices were obtained from USDA-NASS for the years 1970-2008.

Yield Forecasts

County-level yields for corn, soybeans, and wheat were taken from USDA-NASS (2017) for the years 1970-2013 to calculate the county-level yield forecasts for ARC and DCP. Historical state-level yields for corn, soybeans, and wheat were taken from USDA-NASS (2017) for the years 1970-2007 to calculate the state-level yield forecasts for ACRE.

PLC Option Premium

The reference prices for the PLC payments were collected from the Farm Service Agency (USDA-FSA 2014) as outlined in the Agricultural Act of 2014. The CCP yields also came from the FSA (USDA-FSA 2017).

ARC Option Premium

The yields and prices used to calculate the benchmark revenue were collected from USDA-NASS (2017). Yields were collected on a county basis while prices were the national marketing year prices for each commodity.

ACRE Option Premium

The national average marketing year prices and yield data for the Olympic average state yield, benchmark county yield, and benchmark state yield used in these calculations were obtained from USDA-NASS (2017).

DCP

The direct payment rate used in the DCP calculation was outlined in the Food, Conservation, and Energy Act of 2008 (House Committee on Agriculture). The county level yield data came from USDA-NASS (2017). The target prices were set in the 2008 Farm Bill (House Committee on Agriculture).

Commodities

Commodities in this research are divided into three categories: corn, soybeans, and wheat. Table 1 shows the percentage of planted acres for each commodity across the three states included in this study.

Table 1. 2009-2015 Annual Average as Percent of Crop Acres Planted by Crop and State*

State	Corn	Soybeans	Wheat	All Other
Illinois	53.36%	40.89%	2.97%	2.79%
Ohio	35.99%	45.97%	6.96%	11.09%
Oklahoma	3.49%	4.02%	52.37%	40.12%

*Source: USDA-NASS (2017)

Yield

County-level yield data were obtained from USDA-NASS. Yield data were used in various expected payment calculations. USDA does not report yield data for every county, so those counties without county level yield data available were recorded as zero. Table 3 presents the descriptive statistics of yield measured in bushels/acre for each commodity in Illinois, Ohio, and Oklahoma.

Table 2. Descriptive Statistics for County-Level Yield from 2009-2015 by Crop and State*

Commodity	State	Mean	Max	Min	Std. Dev.

Corn	Illinois	156.52	236.00	19.00	38.46
	Ohio	151.64	200.00	64.50	23.29
	Oklahoma	75.33	214.70	0.00	51.62
Soybeans	Illinois	48.30	73.10	0.00	9.81
	Ohio	47.22	62.20	25.10	5.44
	Oklahoma	20.98	61.20	0.00	14.06
Wheat	Illinois	63.48	97.10	30.80	9.67
	Ohio	62.31	90.30	23.60	10.74
	Oklahoma	27.53	69.00	0.00	12.35

*Source: USDA-NASS (2017)

CHAPTER IV

RESULTS

Several regression equations were used to calculate the implicit option premiums of the program payments. After the implicit option premiums were calculated, maps of the premiums were made for corn, soybeans, and wheat on a state by state basis for each program. For ACRE, an average of premiums from 2009-2013 was calculated on a county level and then mapped. For ARC and PLC, premiums were mapped on a county level for 2014 and 2015. The maps were created using ArcMap 10.2 (2017). ArcMap allows different choices to map data. The premiums were mapped using natural breaks. This method classifies the option premiums into natural groupings in the data. Breaks are made where there are relatively big differences in the data. Option premiums were broken into five natural groups. The econometric results from the regression equations used in calculating the option premiums are presented in this chapter. This chapter also looks at each program and discusses the differences in premiums across states and within states. Descriptive statistics for each of the program premiums are presented in tables. The maps for all of the option premiums are in the appendix.

Econometric Results

Equation 2 was used to estimate marketing-year-average prices as a function of

harvest-contract-month futures prices for corn, soybeans, and wheat. The coefficients and estimates were used to forecast marketing-year-average price distributions which were used in calculating the implicit ACRE, ARC, and PLC option premiums. The parameter estimates and standard errors for the intercept terms and futures prices are presented in table 3. All the futures price variables are significant at the one percent level.

Table 3: Regression Results for MYA Price Equations

Variable	Parameter Estimate	Standard Error
Corn Intercept	0.03378	.26959
Corn Futures Price	0.92847***	0.08762
Soybeans Intercept	0.61106	0.54215
Soybeans Future Price	0.91090***	0.07661
Wheat Intercept	0.25970	0.17311
Wheat Futures Price	0.87443***	0.04068

***significant at $p \leq 0.001$

Equation 5 was used in calculating a county-level trend yield that was used to calculate ARC option premiums. The parameter estimates and standards errors for the intercept and year variables from the corn, soybeans, and wheat regressions are presented in table 4. The parameter estimates and standard errors for each of the counties in Illinois, Ohio, and Oklahoma are presented in the appendix. The intercept and year variables for corn, soybeans, and wheat are significant at the one percent level.

Table 4: Regression Results for Historical County Yield Equations for ARC Option Premiums

Variable	Crop	Parameter Estimate	Standard Error
Intercept***	Corn	-3018.60	34.5854
Year***	Corn	1.5773	0.01729
Intercept***	Soybeans	-696.95	8.9194
Year***	Soybeans	0.3689	0.00446
Intercept***	Wheat	-996.81	13.7388
Year***	Wheat	0.5159	0.006869

***significant at $p \leq 0.001$

Equation 11 was used in the calculation of state yield trends. The state yield trends were then used in the calculation of implicit ACRE option premiums. The parameter estimates and standard errors for the intercept term, states, and year for corn, soybeans, and wheat are presented in tables 5 through 7.

Table 5: Regression Results for Corn State Yield Equation

Variable	Parameter Estimate	Standard Error
Intercept***	-3317.91	259.27
Illinois***	15.8421	3.5021
Ohio*	6.50	3.5021
Oklahoma	0.00	.
Year***	1.7237	0.1304

***significant at $p \leq 0.001$ *significant at $p \leq 0.10$

Table 6: Regression Results for Soybeans State Yield Equation

Variable	Parameter Estimate	Standard Error

Intercept***	-607.68	73.1178
Illinois***	16.5395	0.9876
Ohio***	14.4342	0.9876
Oklahoma	0.00	.
Year***	0.3167	0.03677

***significant at p≤0.001

Table 7: Regression Results for Wheat State Yield Equation

Variable	Parameter Estimate	Standard Error
Intercept***	-1034.75	113.52
Illinois***	19.4868	1.5334
Ohio***	23.6711	1.5334
Oklahoma	0.00	.
Year***	0.5351	0.05709

***significant at p≤0.001

Equation 19 was used in calculating county-level trend yields for expected direct payments. The parameter estimates and standard errors for the intercept term and year variable for corn, soybeans, and wheat are presented in table 8. The parameter estimates and standard errors for each county are presented in the appendix.

Table 8: Regression Results for Historical County Yield Equation for Expected Direct Payments

Variable	Crop	Parameter Estimate	Standard Error
Intercept***	Corn	-3181.54	38.9337
Year***	Corn	1.6591	0.01951
Intercept***	Soybeans	-672.63	10.6089

Year***	Soybeans	0.3566	0.005317
Intercept***	Wheat	-1039.28	15.9781
Year***	Wheat	0.5490	0.008007

***significant at p≤0.001

PLC

Table 9 shows the descriptive statistics for PLC implicit option premiums for 2014. Illinois had the highest average PLC option premium for corn and wheat. In 2014, the soybean PLC option premium was zero as the price forecast model had zero probability of a MYA price below the mandated reference price.

Table 9: Descriptive Statistics for County 2014 PLC Implicit Option Premiums ($/Acre)

Crop	State	Mean	Maximum	Minimum	Std. Dev	CV
Corn	Illinois	1.54	1.93	1.01	0.22	0.143
	Ohio	1.43	1.74	1.14	0.16	0.112
	Oklahoma	0.97	1.76	0.58	0.24	0.247
Soybeans	Illinois	0.00	0.00	0.00	0.00	
	Ohio	0.00	0.00	0.00	0.00	
	Oklahoma	0.00	0.00	0.00	0.00	
Wheat	Illinois	38.73	51.29	28.85	4.11	0.106
	Ohio	36.84	49.69	24.84	7.21	0.196
	Oklahoma	25.85	29.65	17.63	2.39	0.092

Table 10 shows the descriptive statistics for county PLC implicit option premiums for 2014. Illinois had the highest average PLC option premium for corn, soybeans, and wheat in 2015. The MYA price distribution and reference prices used in the calculation

of the premiums are the same across all three states, so the difference in the option premiums is yield driven leading to the state with higher yields to have higher premiums.

Table 10: Descriptive Statistics for County 2015 PLC Implicit Option Premiums ($/Acre)

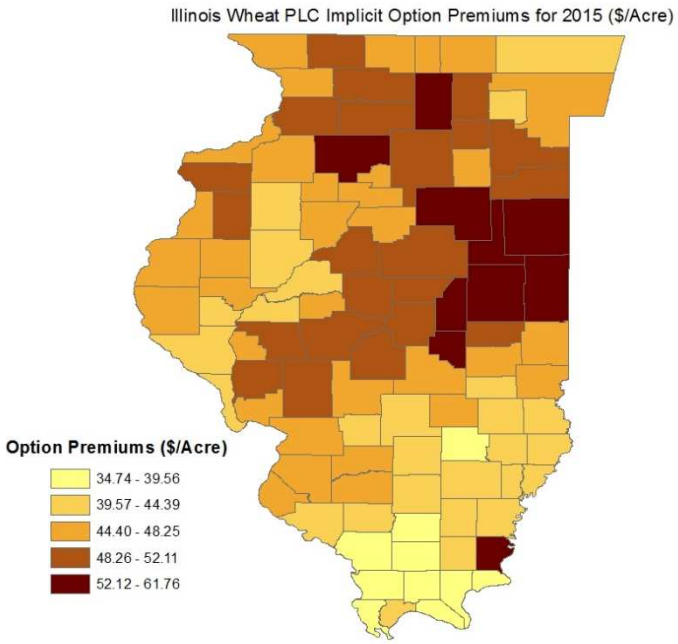
Crop	State	Mean	Maximum	Minimum	Std. Dev	CV
Corn	Illinois	25.25	31.74	16.60	3.66	0.145
	Ohio	23.53	28.58	18.71	2.61	0.111
	Oklahoma	15.87	28.79	9.46	3.98	0.251
Soybeans	Illinois	5.13	6.33	3.44	0.77	0.150
	Ohio	4.65	5.78	2.89	0.61	0.131
	Oklahoma	1.72	3.99	0.96	0.60	0.349
Wheat	Illinois	46.63	61.76	34.74	4.95	0.106
	Ohio	44.36	59.83	29.91	8.68	0.196
	Oklahoma	31.13	35.70	21.23	2.88	0.093

Illinois

Since the marketing-year-average price forecasting model is identical across states and counties, differences in implicit PLC option premiums are due exclusively to differences in CCP yields. CCP yields are available on a county level basis. So, counties with higher CCP yields will have payments when MYA price is below the reference (strike) price for a commodity. In each of the three states, the premiums for corn, soybeans, and wheat all increased in 2015. The increase in premiums is driven by the commodities all having lower futures prices in 2015 as compared to 2014. As the futures price decreases this led to more states of nature being below the reference (strike) price triggering higher premiums.

In 2014, the PLC implicit option premiums for Illinois corn were small with a range of $1.01 to $1.93 per acre. In 2015, the premiums increased to a range of $16.60 to $31.74 per acre. The same counties that had the lowest premiums in 2014 also had the lowest premiums in 2015. The same was true for the counties that had high premiums. Soybean PLC option premiums were zero in 2014, but in 2015 the premiums ranged from $3.44 to $6.33 per acre. The northeast and the southern part of the state had low premiums. The central part of the state along with the northwest corner had high premiums. Wheat implicit option premiums in 2014 were $28.85 to $51.29 per acre and increased to $34.74 to $61.76 per acre in 2015. Figure 1 displays the wheat PLC implicit option premiums for 2015. In both 2014 and 2015, the northwest corner and the east central region had the highest premiums because of higher forecasted yields. With the exception of one county, the southern portion of the state had premiums in the lower-end of the range due to lower yield forecasts.

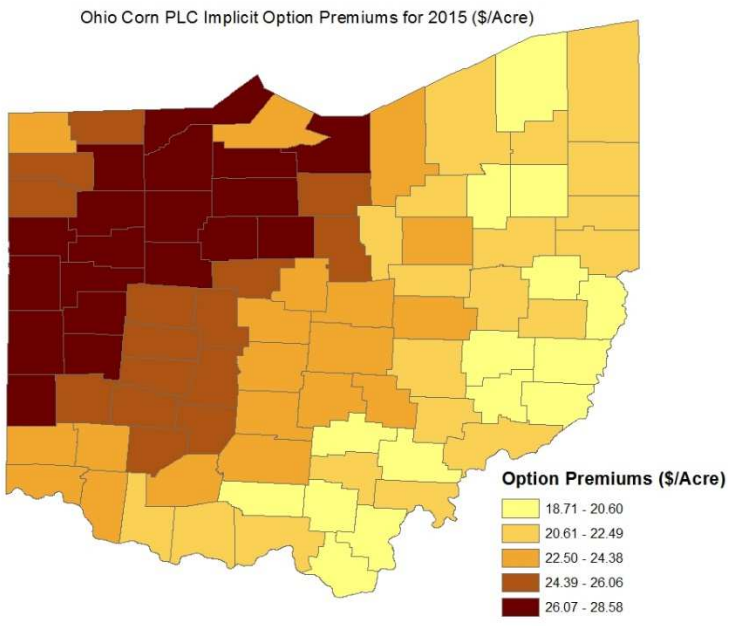
Figure 1: Illinois Wheat PLC Implicit Option Premiums for 2015 ($/Acre)



Ohio

Similar to Illinois, corn PLC implicit option premiums were small in Ohio, ranging from $1.14 to $1.74 per acre in 2014. In 2015, the premiums increased to a range of $18.71 to $28.58 per acre. In both 2014 and 2015, the northwest corner and west central part of the state had the highest premiums. The eastern and southern borders and the northeast area had lower premiums. Figure 2 displays the corn PLC implicit option premiums for 2015. There were no soybean premiums in 2014, and in 2015 the premiums ranged from $2.89 to $5.78 per acre. The central and eastern part of the state had higher premiums. Wheat had the highest option premiums out of all the commodities ranging from $24.84 to $49.69 per acre in 2014 and $29.91 to $59.83 per acre in 2015. In both 2014 and 2015, the western side of the state had higher premiums as compared to the eastern side and the southern border.

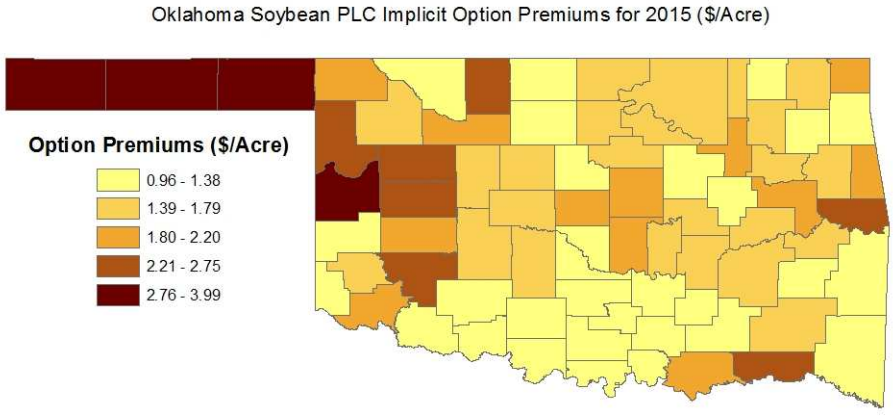
Figure 2: Ohio Corn PLC Implicit Option Premiums for 2015 ($/Acre)



Oklahoma

Just as Illinois and Ohio had low corn option premiums in 2014, Oklahoma also had low option premiums for corn in 2014, ranging from $0.58 to $1.76 per acre. Premiums increased in 2015 to a range of $9.46 to $28.79 per acre. Counties in the Panhandle along with two counties in the northwest part of the state had the highest premiums in 2014 and 2015. The majority of the remaining counties had premiums in the middle range. Soybean PLC implicit options were zero in 2014, as discussed previously. In 2015, soybean option premiums ranged from $0.96 to $3.99. Counties in the Panhandle had premiums in the upper end of the range and counties in the south central part of the state had the lowest premiums. Figure 3 displays the soybean PLC implicit option premiums for 2015. Wheat option premiums ranged from $17.63 to $29.65 per acre in 2014 and from $21.23 to $35.70 per acre in 2015. In 2014 and 2015 only two counties had the lowest level of premiums. The eastern border, northern border, and a portion of counties in the central part of the state had high premiums with the remaining counties having premiums in the middle range. Oklahoma had the lowest average PLC option premiums for 2014 and 2015 across all of the commodities due to lower historical yields compared to Ohio and Illinois.

Figure 3: Oklahoma Soybean PLC Implicit Option Premiums for 2015 ($/Acre)



ARC

Table 11 shows the descriptive statistics for ARC implicit option premiums for 2014. In 2014, Ohio had the highest average ARC option premium for corn and soybeans while Illinois had the highest average ARC option premium for wheat because the states had the highest benchmark guarantees in each of those respective commodities. ARC calculations include a forecasted county revenue which includes the forecasted county yield and forecasted marketing-year-average price distribution. The differences in premiums within states can be attributed to county yield trends. Those counties with a higher trend yield had higher ARC option premiums. In 2015, corn premiums decreased while soybean and wheat premiums increased across all of the states. The increase in soybean and wheat premiums can be attributed to lower futures prices. The increase could also be due to changes in the benchmark revenue. While the corn futures price also decreased, the benchmark guarantee for corn also increased across all of the states. The drop in futures price was offset by the increase in the benchmark guarantee leading to lower corn premiums in 2015 across all of the states.

Table 11: Descriptive Statistics for 2014 County ARC Implicit Option Premiums ($/Acre)

Crop	State	Mean	Maximum	Minimum	Std. Dev	CV
Corn	Illinois	61.46	88.41	12.84	11.55	0.188
	Ohio	69.92	88.62	46.77	9.00	0.129
	Oklahoma	10.34	84.18	0.00	18.15	1.755
Soybeans	Illinois	15.39	33.68	5.03	6.36	0.413
	Ohio	21.92	37.14	5.06	6.10	0.278
	Oklahoma	2.61	17.55	0.00	3.95	1.513

Crop	State	Mean	Maximum	Minimum	Std. Dev	CV
Wheat	Illinois	20.56	39.90	7.32	6.16	0.300
	Ohio	20.23	31.82	7.18	4.31	0.213
	Oklahoma	4.49	15.58	0.83	3.16	0.704

Table 12 shows the descriptive statistics for ARC implicit option premiums for 2015. Like 2014, Ohio had the highest average ARC option premium for corn and soybeans while Illinois had the highest average ARC option premium for wheat in 2015 which is again due to those states having the highest benchmark guarantees in those respective commodities.

Table 12: Descriptive Statistics for 2015 County ARC Implicit Option Premiums ($/Acre)

Crop	State	Mean	Maximum	Minimum	Std. Dev	CV
Corn	Illinois	31.27	58.87	12.47	10.29	0.329
	Ohio	38.69	61.52	18.21	10.35	0.268
	Oklahoma	9.10	57.67	0.01	11.99	1.318
Soybeans	Illinois	46.99	67.61	24.58	11.71	0.249
	Ohio	47.42	62.08	15.23	6.96	0.147
	Oklahoma	7.21	42.31	0.00	10.36	1.437
Wheat	Illinois	24.03	41.41	9.72	5.75	0.239
	Ohio	23.61	41.40	2.44	6.60	0.280
	Oklahoma	6.28	27.51	1.13	5.32	0.847

Illinois

County-level ARC implicit option premiums from 2014 for corn ranged from $12.84 to $88.41 per acre. For corn in 2015, ARC implicit option premiums decreased slightly to a range of $12.47 to $58.87 per acre. In both 2014 and 2015, the northwest corner had the highest premiums. Soybean option premiums ranged from $5.03 to $33.68 per acre in 2014 with the northern half of the state having premiums in the high end while the southern half had lower premiums in the range of $5.03 to $17.41 per acre. In 2015, the soybean option premiums increased to $24.58 to $67.61 per acre. Similar to 2014, the northern part of the state had higher premiums than those counties in the southern half of the state. Wheat option premiums ranged from $7.32 to $39.90 per acre in 2014 and increased slightly to $9.72 to $41.41 per acre in 2015. For both years, counties on the northwest border and in the northeast corner had the highest premiums while the east central part of the state had low end premiums.

Ohio

For 2014, county-level corn ARC implicit option premiums ranged from $46.77 to $88.62 per acre. The central part of the state had the highest premiums. In 2015, the option premiums decreased to $18.21 to $61.52 per acre. Similar to 2014, the central part of the state had the highest premiums. The 2014 ARC soybean implicit option premiums were $5.06 to $37.14 per acre. Counties along the western border of the state had the lowest premiums while counties in the northeast corner and in the central portion of the state had the highest premiums. In 2015, soybean option premiums had increased to a range of $15.23 to $62.08 per acre. Two-thirds of the state had county-level premiums starting at $43.57 per acre which is more than the maximum premium from 2014. Wheat ARC option premiums from 2014 were $7.18 to $31.82 per acre. A line of counties along

the northwest border, counties in the northeast corner, and counties in the southwest corner had premiums in the top of the upper range. In 2015, the lower end of premiums decreased to $2.44 per acre while the maximum premium increased to $41.40 per acre. Once again, counties along the northwest border had premiums in the upper range. There was also an area of counties in the south-central part of the state that had premiums in the upper range.

Oklahoma

Oklahoma corn ARC implicit option premiums for 2014 ranged from $0.00 to $84.18 per acre. Premiums were low across the state with only 12 counties having premiums in the top end. The remainder of the state had premiums of $11.96 per acre or less. The majority of Oklahoma counties had premiums between $0.00 and $0.85 per acre with 11 counties having premiums of $0.00. In 2015, the range of premiums was $0.01 to $57.67 per acre. There were seven counties that had premiums than $25.32 per acre or greater. The majority of counties had premiums between $0.01 and $3.21 per acre. For soybeans, the 2014 ARC implicit option premiums ranged from $0.00 to $17.55 per acre. Counties in the Panhandle and the southeast corner had the lowest premiums. The southwest corner had the highest premiums. The northeast corner and north central area contained counties having premiums in the middle of the range with the exception of two counties having the highest level of premiums. In 2015, the maximum premium increased to $42.31 per acre. Similar to 2014, the Panhandle and southeast corner contained counties that had the lowest premiums. The southwest corner had the highest premiums. Wheat ARC option premiums ranged from $0.83 to $15.58 per acre in 2014 and increased to $1.13 to $27.51 per acre in 2015. In 2014, the northeast and southeast

corners of the state had the highest premiums. In 2015, the northeast corner once again had high implicit option premiums along with a portion of counties in the central part of the state. In 2014 and 2015, counties in the southwest corner had the lowest premiums. Of the three states considered, Oklahoma had the lowest option premiums in 2014 and 2015 for corn, soybeans, and wheat due to having lower guarantees resulting from lower yields.

ACRE

Table 13 reports the descriptive statistics for the average ACRE implicit option premiums from 2009-2013. Across each of the commodities, Illinois had the highest county-average option premiums because yield forecasts for Illinois were greater than Ohio and Oklahoma. ACRE premium calculations include a state yield trend, marketing-year-average price distribution, and benchmark county yields, so the differences in premiums within a state can be attributed to county-level yields. Counties having higher premiums within a state had higher county yields. The premium difference between states can be attributed to higher state yields since the marketing-year-average price distribution is the same across all of the states.

Table 13: Descriptive Statistics for 2009-2013 County-Average ACRE Implicit Option Premiums ($/Acre)

Crop	State	Mean	Maximum	Minimum	Std. Dev	CV
Corn	Illinois	60.54	71.21	42.04	6.84	0.113
	Ohio	41.71	49.36	32.27	3.79	0.091
	Oklahoma	3.89	8.55	0.14	1.36	0.347
Soybeans	Illinois	8.44	10.14	6.61	0.96	0.114
	Ohio	5.89	6.78	4.94	0.46	0.078

Crop	State	Mean	Maximum	Minimum	Std. Dev	CV
	Oklahoma	1.28	1.94	0.00	0.34	0.266
Wheat	Illinois	30.22	37.06	24.24	3.22	0.107
	Ohio	29.74	36.17	22.95	3.33	0.112
	Oklahoma	3.71	5.59	0.58	0.66	0.178

Illinois

In Illinois, the average implicit option premiums for corn ranged from $42.02 to $71.21 per acre. Counties in Northwest Illinois had the highest premiums while counties in the Northeast corner had the lowest premiums. For soybeans, the option premiums were much smaller with the average implicit option premiums ranging from $6.61 to $10.14 per acre. Counties in the northeast corner and southern part of the state except for one county in southwest Illinois had the smallest premiums while the northeast and central areas of the state had premiums in the upper range. The wheat implicit option premiums fell in the middle of corn and soybeans with a range of $24.24 to $37.06 per acre. The western side of Illinois had higher premiums than the eastern side of the state. Illinois wheat option premiums were slightly higher than Ohio, but much larger than Oklahoma due to the higher state yield in Illinois.

Ohio

In Ohio, the average option premiums for corn ranged from $32.27 to $49.36 per acre. The counties in the southern part of Ohio along with the eastern half of the state had lower premiums as compared with those counties in the western part of the state. For soybeans, the average premiums were smaller than corn with a range of $4.94 to $6.78 per acre. Counties along the western border and those in the central area of the state had

higher premiums than those counties along the south and east borders and the northeast corner. Wheat option premiums fell in the middle with a range of $22.95 to $36.17 per acre. The western half of the state had higher premiums than the eastern half of the state.

Oklahoma

Average option premiums for corn in Oklahoma ranged from $0.14 to $8.55 per acre. The Panhandle had the highest premiums while the southwest portion of the state had lower premiums. Soybean option premiums were very low as they ranged from $0.00 to $1.94 per acre. The southwest corner of the state along with the central portion of the state had implicit option premiums towards the higher end of the premium levels. The average wheat option premiums for wheat ranged from $0.58 to $5.59 per acre. Most of the counties in Oklahoma fell into the middle range of premiums and had premiums ranging from $3.43 to $4.72 per acre. Oklahoma had the lowest ACRE premiums for each of the commodities since the yield trend models showed that the state yields in Illinois and Ohio are higher than Oklahoma yields for all of the commodities.

DCP

Table 14 reports the descriptive statistics for the county-average expected direct payments from 2009-2013. Across each of the commodities, Illinois had the highest average expected payment. Expected direct payments include a forecasted county yield trend and a direct payment rate. The direct payment rate is the same across all of the states, so differences in expected premiums are yield driven. Those counties and states with higher yields have higher expected direct payments.

Table 14. Descriptive Statistics for 2009-2013 County-Average Expected Direct Payments

Crop	State	Mean	Maximum	Minimum	Std. Dev	CV
Corn	Illinois	43.56	50.81	33.84	4.56	0.105
	Ohio	41.26	46.05	35.84	2.70	0.065
	Oklahoma	31.03	49.88	21.32	4.68	0.151
Soybeans	Illinois	19.99	23.45	15.30	2.29	0.115
	Ohio	18.97	20.98	15.68	1.15	0.061
	Oklahoma	12.99	16.79	0.00	2.22	0.171
Wheat	Illinois	32.58	38.13	26.70	2.69	0.083
	Ohio	31.31	37.09	25.59	3.37	0.108
	Oklahoma	21.55	24.08	17.58	1.28	0.059

Illinois

In Illinois, the average expected direct payment for corn ranged from $33.84 to $50.81 per acre. The southern part of the state and the northeast corner had low payments while the central part of the state had the highest payments. Soybean average expected direct payments ranged from $15.30 to $23.45 per acre. The southern part of the state and the northeast corner had low payments while the central and northwest parts of the state had higher payments. Wheat expected direct payments ranged from $26.70 to $38.13 per acre. Most of the southern part of the state had low payments while the east central and north central parts had high payments.

Ohio

Ohio expected direct payments for corn ranged from $35.84 to $46.05 per acre. The western part of the state had high payments, and the southeast border and eastern part

of the state had low payments. Soybean expected direct payments were lower than corn payments with a range of $15.68 to $20.98 per acre. The western part of the state had the highest payments. Wheat expected direct payments ranged from $25.59 to $37.09 per acre. Similar to corn and soybeans, the counties in the western part of the state had higher payments. The southern border and the eastern part of the state had lower payments.

Oklahoma

Corn expected direct payments in Oklahoma ranged from $21.32 to $49.88 per acre. The Panhandle had the highest payments. The majority of the state had payments in the range of $24.20 to $33.04. Soybean expected direct payments were lower than corn with a range of $0.00 to $16.79 per acre. Once again the Panhandle had the highest payments. Wheat expected direct payments ranged from $17.58 to $24.08 per acre. The majority of the counties in Oklahoma had payments in the range of $20.57 to $24.08 per acre.

CHAPTER V

CONCLUSIONS

To satisfy trade agreement obligations, U.S. farm policy has been increasingly moving towards decoupled payments as they are thought to not distort producers' production decisions. However, past research has suggested decoupled payments may influence production decisions. If decoupled payments provide a free put option to producers by providing a safety net to protect against adverse price and revenue events, one step towards identifying if these payments have an effect on production decisions is to calculate the option premiums of government program payments. This research developed a framework for calculating option premiums for three government program payments- Average Crop Revenue Election (ACRE), Agriculture Risk Coverage (ARC), and Price Loss Coverage (PLC). An expected payment was also calculated for Direct and Counter-Cyclical Payment (DCP).

This research developed a framework to estimate the actuarially-fair value of free put options provided to producers through government programs. If a producer bought an option provided by a government program, the actuarially-fair value is the amount they would pay for the option in market where no participant earned positive economic profits. In other words, the premium is equal to the expected payment (Copeland and Weston 1988). The framework presented in this research is useful to policy makers as farm policy continues to change and evolve. As discussion about which government programs to keep and which to change takes place, it is useful for policy makers to be able to assess the

actuarially-fair values that current government program payments provide to producers. Having a framework for valuing options provided by government programs enables policy makers to assess the ex-ante value of these programs. Armed with this information, policy makers are better equipped to assess the effectiveness and benefits of alternative farm policies and compare cost effectiveness between alternatives. Additionally, a framework for estimating option premiums of government program payments could help extension economists advise producers on program enrollment. Option pricing models were developed for ACRE, ARC, and PLC and were then used to estimate implicit option premiums for ACRE for the years 2009 to 2013 and for ARC and PLC for the years 2014 and 2015. Expected payments were also calculated for DCP for the years 2009 to 2013. Several forecast models were estimated and used to determine implicit option premiums associated with commodity programs. A forecast of marketing-year-average prices was used in the calculation of PLC, ARC, and ACRE premiums. A state-trend yield forecast was used in the calculation of ACRE premiums. A forecast of county yield trends was used in the calculation of expected DCP payments and ARC premiums while PLC used CCP yields in its premium calculations. Individual producer option premiums may differ from the premiums found in each county for PLC since the county CCP yields are not the same as an individual producers yield.

Once the implicit option premiums were calculated, the premiums were mapped in ArcMap 10.2 (2017). County-level averages of DCP expected payments and ACRE implicit option premiums were calculated and mapped. County-level implicit option premiums also were calculated for 2014 and 2015 for ARC and PLC and mapped. In the previous chapter results for each of the maps were discussed. Here, DCP expected

payments and ACRE option premiums are compared, and ARC and PLC option premiums are compared. The chapter concludes with possible future research related to this study.

DCP and ACRE

Illinois

Under DCP, the average expected payment across the state for corn was $43.56 per acre. Under ACRE, the average corn option premium was $60.54 per acre which is almost $20.00 more per acre than DCP. The average soybean DCP expected payment was $19.99 per acre which was more than the $8.44 per acre premium under ACRE. Finally, the average wheat DCP expected payment was $32.58 which is slightly higher than the $30.22 per acre provided by the ACRE premium. In conclusion, the average expected payments under DCP were greater than the average ACRE option premiums for soybeans and wheat.

Ohio

In Ohio, the average DCP expected payment for corn was $41.26 per acre, for soybeans was $18.97 per acre, and for wheat was $31.31 per acre. The average ACRE option premium for corn was $41.71 per acre, for soybeans was $5.89 per acre, and for wheat was $29.74 per acre. Like Illinois, the average DCP expected payments for soybeans and wheat were higher than the average ACRE option premiums for those crops.

Oklahoma

In Oklahoma, the average DCP expected payment for corn was $31.03 per acre, for soybeans was $12.00 per acre, and for wheat was $21.55 per acre. The average ACRE

option premium for corn was $3.89 per acre, for soybeans was $1.28 per acre, and for wheat was $3.71 per acre. For each of the commodities, the average DCP expected payments are much higher than the ACRE option premiums.

ARC and PLC

Illinois

In 2014, the average ARC option premiums for Illinois were $61.46 per acre for corn, $15.39 per acre for soybeans, and $20.56 per acre for wheat. The average PLC option premiums for PLC were $1.54 per acre for corn, $0.00 per acre for soybeans, and $38.73 per acre for wheat. The 2015 average ARC option premiums for corn were $31.27 per acre, for soybeans were $46.99 per acre, and for wheat were $24.03 per acre. The 2015 average PLC option premiums for corn were $32.41 per acre, for soybeans were $5.13 per acre, and for wheat were $46.63 per acre. In 2014, the average ARC option premiums as compared to PLC option premiums were substantially higher for corn and soybeans and were lower than PLC wheat option premiums. In 2015, ARC soybean option premiums were substantially higher than PLC soybean option premiums. Corn ARC and PLC option premiums were close in 2015 while wheat ARC option premiums were smaller than wheat PLC option premiums.

Ohio

The average ARC option premium in 2014 for corn was $69.92 per acre, for soybeans was $21.92 per acre, and for wheat was $20.23 per acre. The average PLC option premium in 2014 for corn was $1.43 per acre, for soybeans was $0.00 per acre, and for wheat was $36.84 per acre. The average ARC option premium in 2015 for corn was $38.69 per acre, for soybeans was $47.42 per acre, and for wheat was $23.61 per

acre. The average PLC option premium in 2015 for corn was $23.53 per acre, for soybeans was $4.65 per acre, and for wheat was $44.36 per acre. The average ARC option premiums for soybeans were higher than the average PLC option premiums in both 2014 and 2015. Similar to Illinois, the average corn ARC option premium was substantially higher than the average corn PLC option premium in 2014 and the average wheat option premiums for ARC were lower than PLC in 2014. In 2015, the average ARC option premium for corn and soybeans was higher than the average PLC option premiums for corn and soybeans. Wheat ARC option premiums in 2015 were lower than wheat PLC option premiums.

Oklahoma

In 2014, the average ARC option premiums for Oklahoma were $10.34 per acre for corn, $2.61 per acre for soybeans, and $4.49 per acre for wheat. The average PLC option premiums for PLC were $0.97 per acre for corn, $0.00 per acre for soybeans, and $25.85 per acre for wheat. The 2015 average ARC option premiums for corn were $9.10 per acre, for soybeans were $7.21 per acre, and for wheat were $6.28 per acre. The 2015 average PLC option premiums for corn were $15.87 per acre, for soybeans were $1.72 per acre, and for wheat were $31.13 per acre. Like Ohio and Illinois, the average ARC corn premium was slightly higher than the average PLC corn option premium in 2014. The average PLC wheat option premium was higher in 2014 and 2015 than the average ARC wheat option premium, while the average PLC soybean option premium was lower in 2014 and 2015 than the average ARC soybean option premium.

Future Research

Bradley (2016) investigated interactions between 2014 Farm Bill commodity programs and crop insurance choice and reported that the commodity programs did have an effect on the level of insurance coverage selected. Similar to Bradley, future research could investigate the impact that 2014 Farm Bill commodity programs have on producers' decisions. By utilizing the implicit option premium framework developed in this study, research could determine if and how these option premiums affect producers' acreage decisions. Future research could also investigate if the level of these program payments causes producers to engage in more risky production behaviors and if they utilize less risk reducing strategies.

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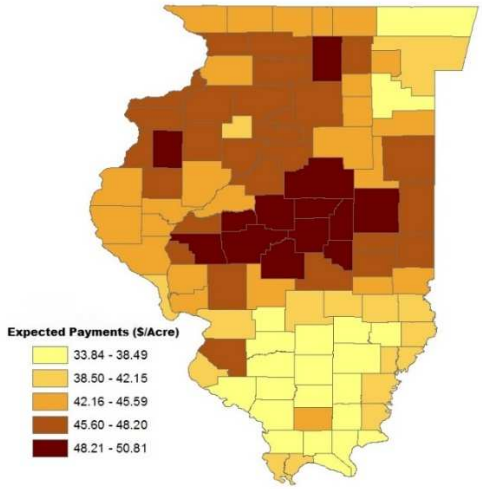
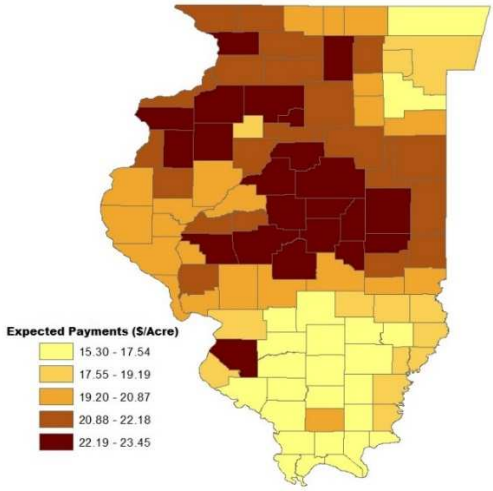
APPENDICES

Appendix A. Maps of County-Average Expected Direct Payments for 2009-2013

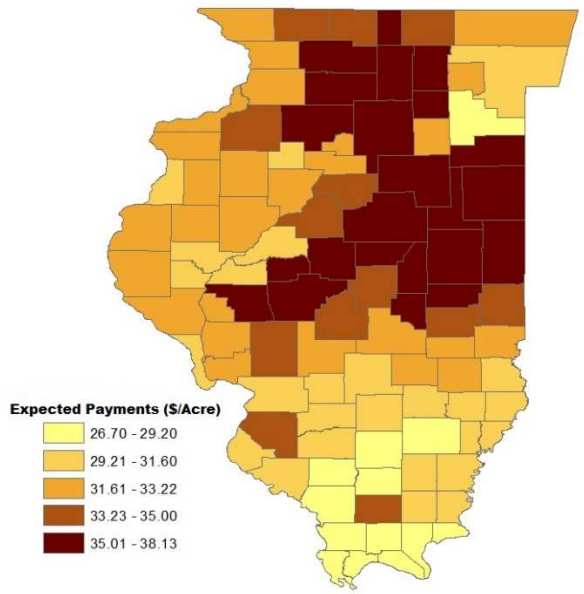
Average Illinois Corn Expected Direct Payments for 2009-2013 ($/Acre)



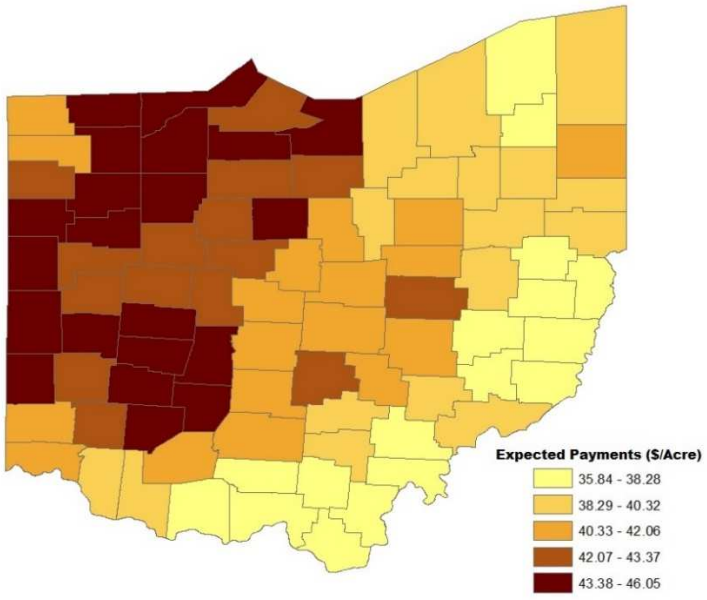
Average Illinois Soybean Expected Direct Payments for 2009-2013 ($/Acre)



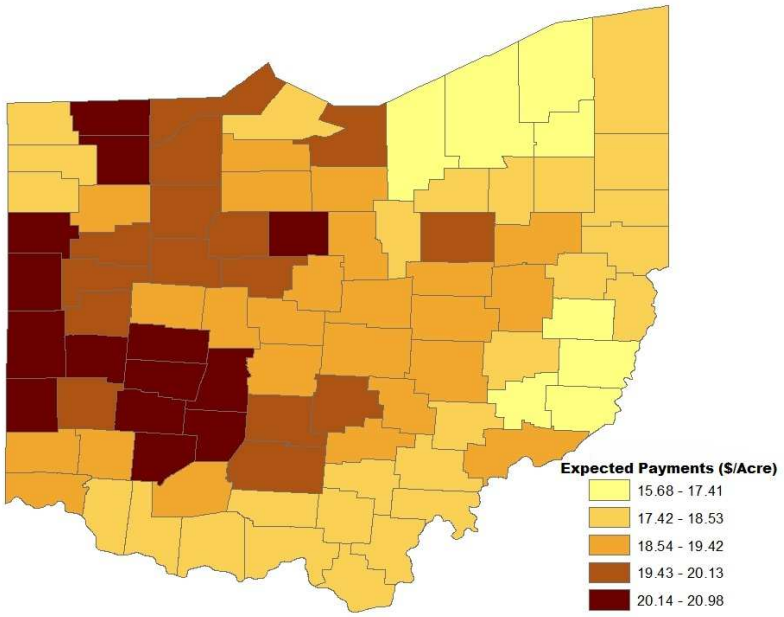
Average Illinois Wheat Expected Direct Payments for 2009-2013 ($/Acre)



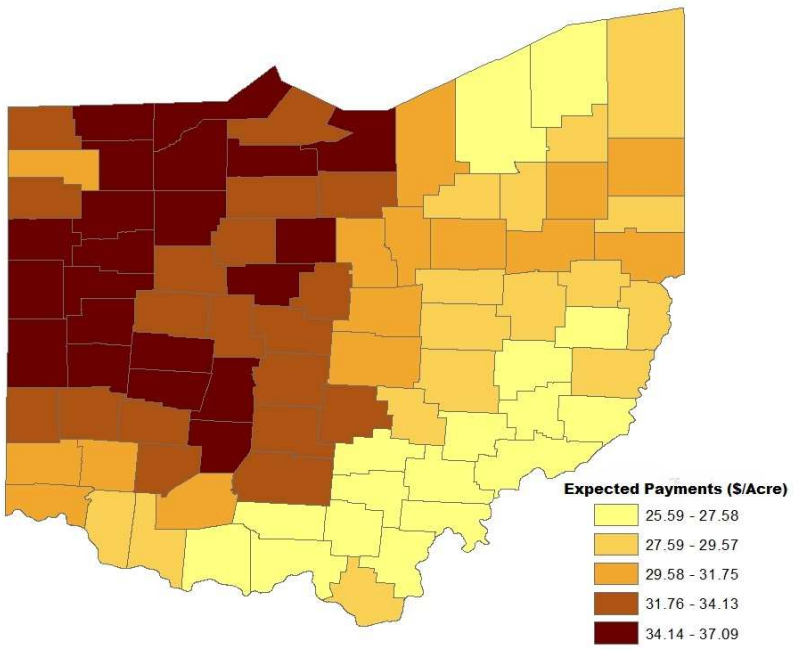
Average Ohio Corn Expected Direct Payments for 2009-2013 ($/Acre)



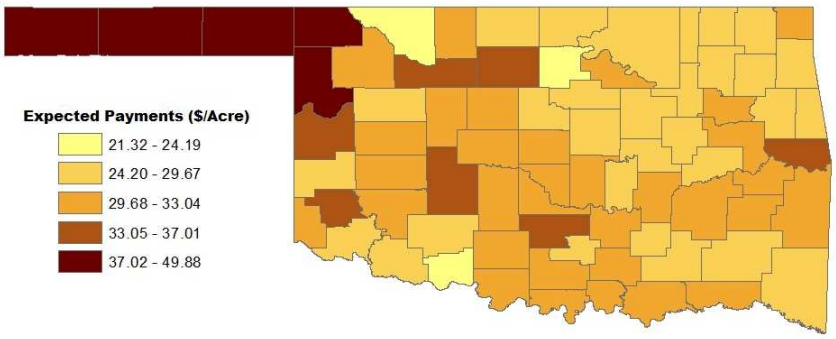
Average Ohio Soybean Expected Direct Payments for 2009-2013 ($/Acre)



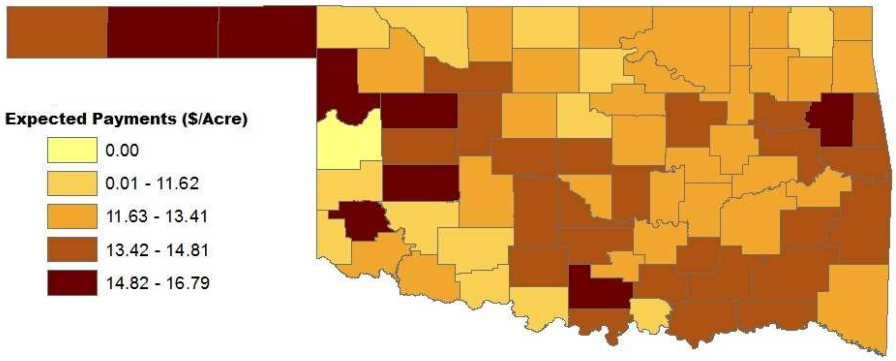
Average Ohio Wheat Expected Direct Payments for 2009-2013 ($/Acre)



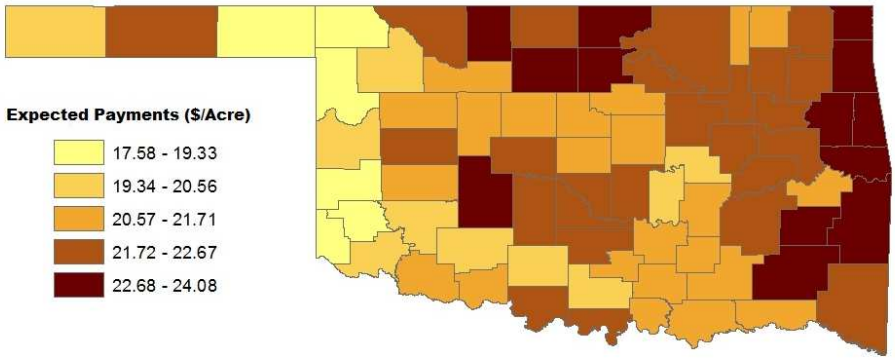
Average Oklahoma Corn Expected Direct Payments for 2009-2013 ($/Acre)



Average Oklahoma Soybean Expected Direct Payments for 2009-2013 ($/Acre)

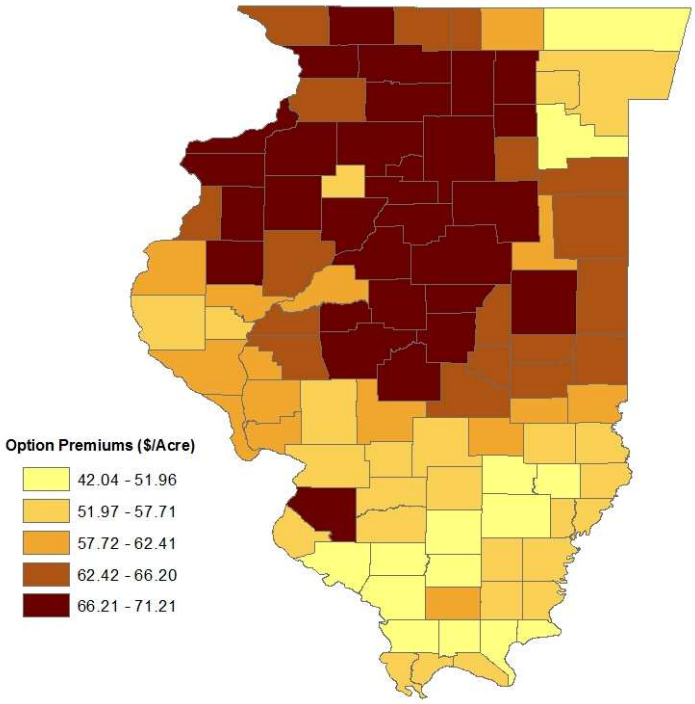


Average Oklahoma Wheat Expected Direct Payments for 2009-2013 ($/Acre)

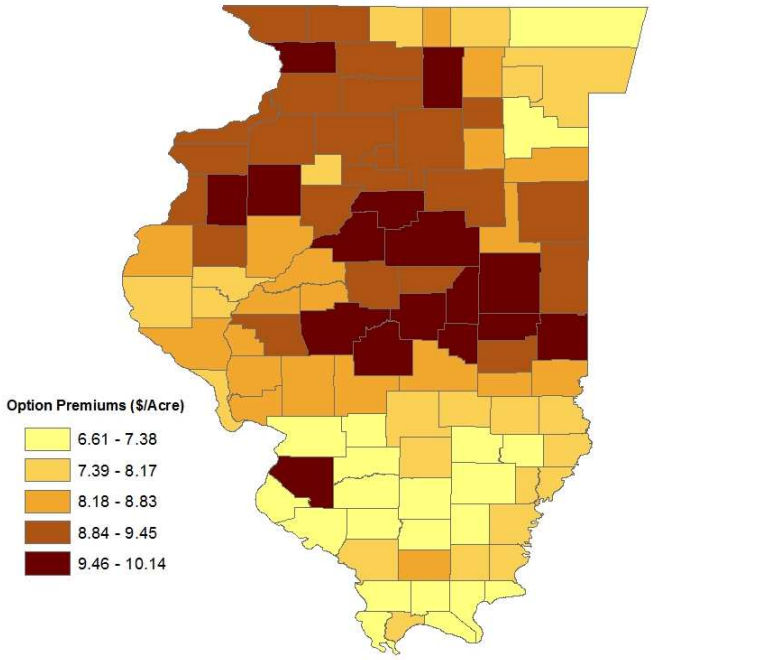


Appendix B. Maps of Average ACRE Implicit Option Premiums for 2009-2013 ($/Acre)

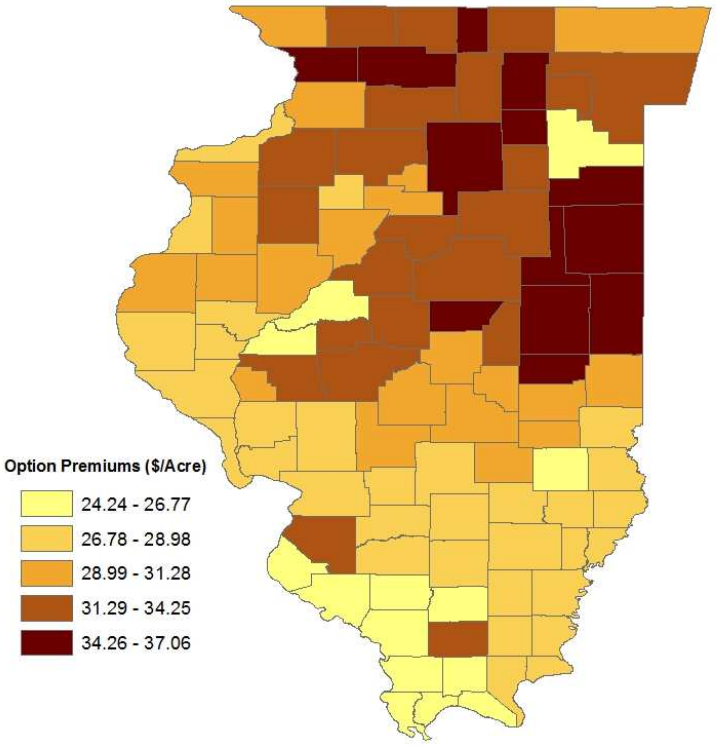
Average Illinois Corn ACRE Implicit Option Premiums for 2009-2013 ($/Acre)



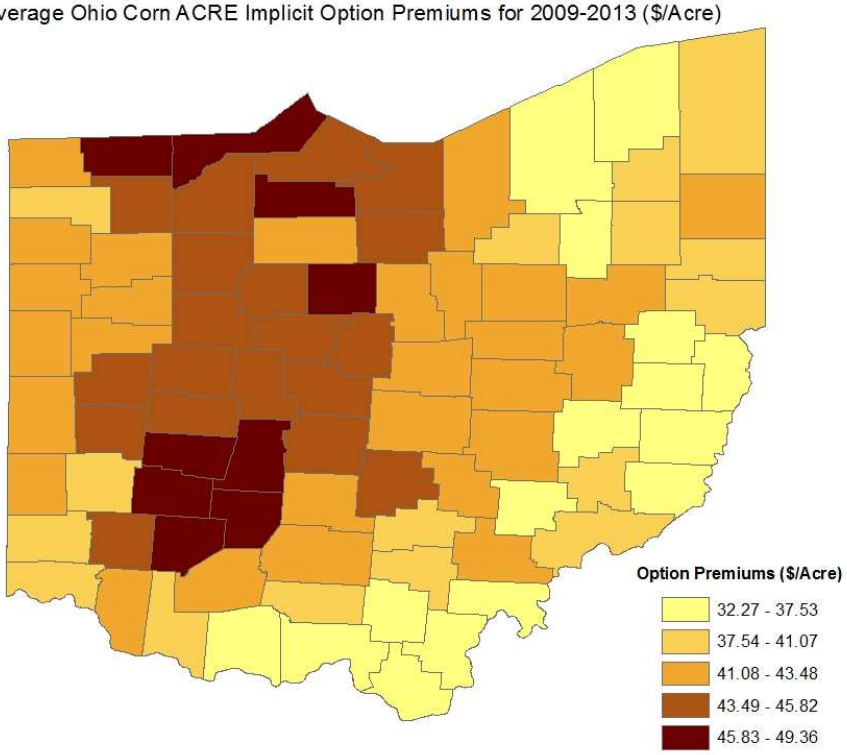
Average Illinois Soybean ACRE Implicit Option Premiums for 2009-2013 ($/Acre)



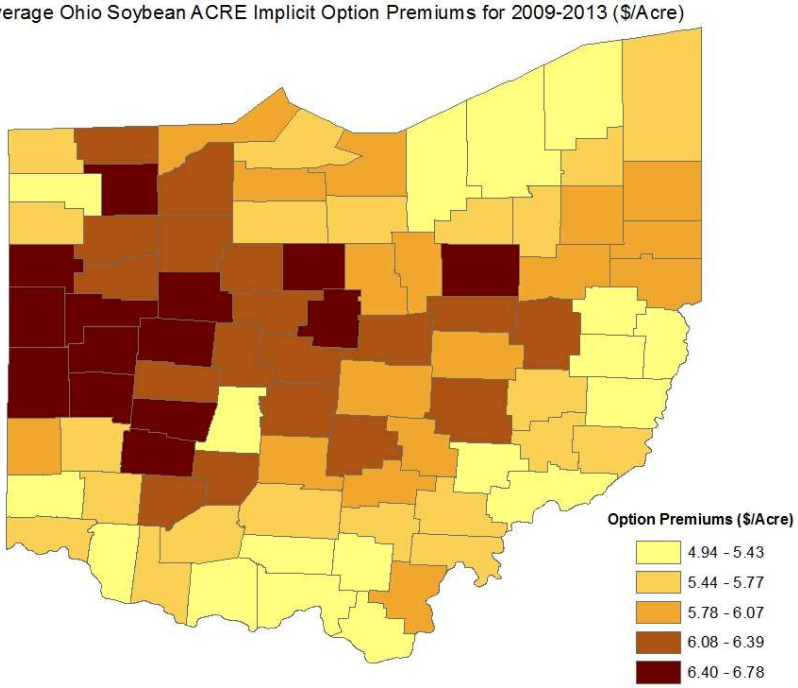
Average Illinois Wheat ACRE Implicit Option Premiums for 2009-2013 ($/Acre)



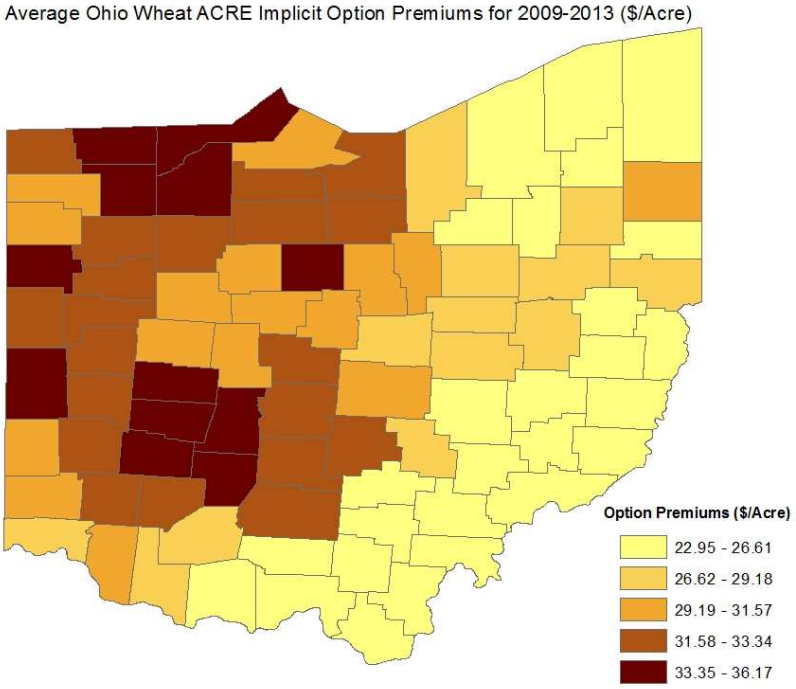
Average Ohio Corn ACRE Implicit Option Premiums for 2009-2013 ($/Acre)



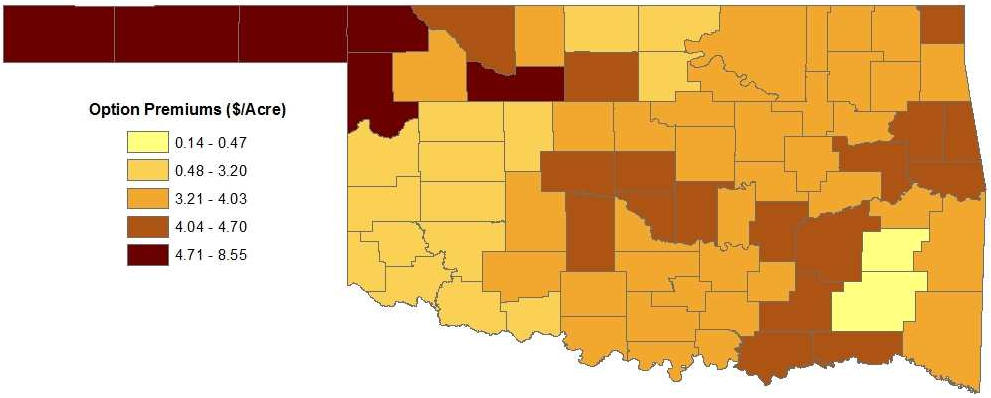
Average Ohio Soybean ACRE Implicit Option Premiums for 2009-2013 ($/Acre)



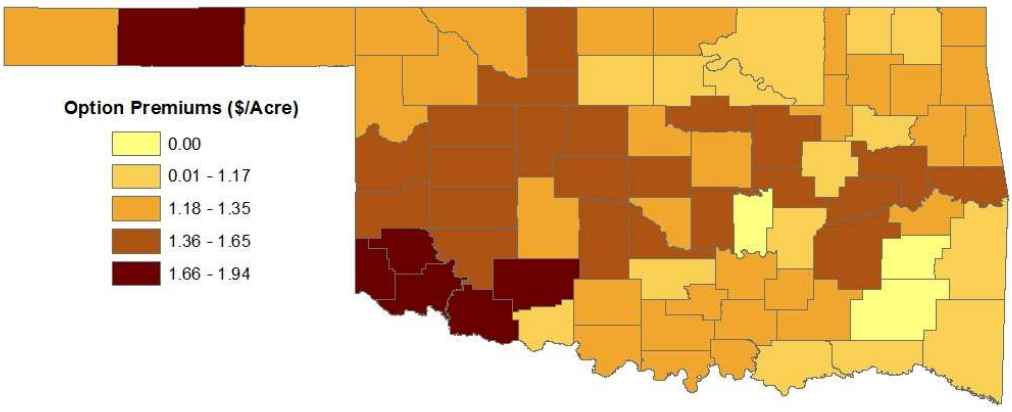
Average Ohio Wheat ACRE Implicit Option Premiums for 2009-2013 ($/Acre)



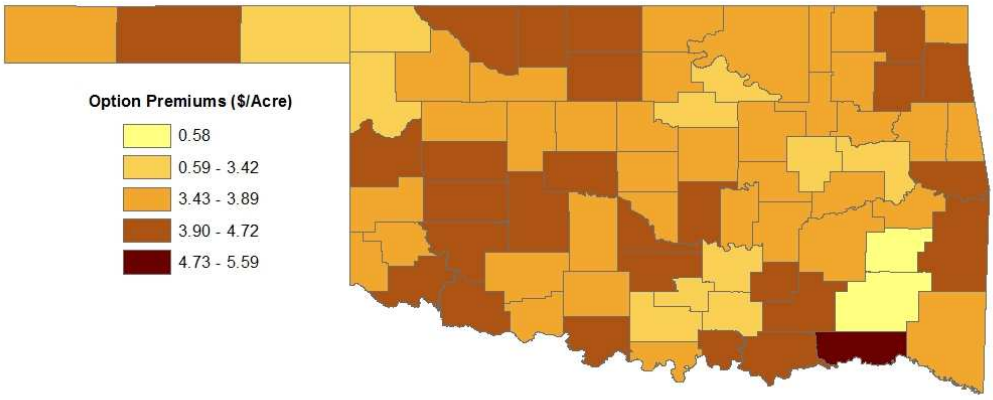
Average Oklahoma Corn ACRE Implicit Option Premiums for 2009-2013 ($/Acre)



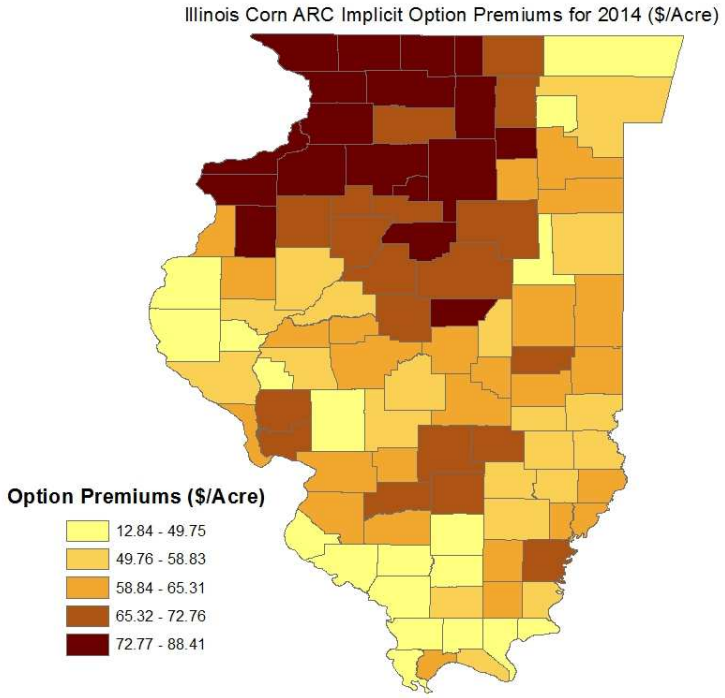
Average Oklahoma Soybean ACRE Implicit Option Premiums ($/Acre)

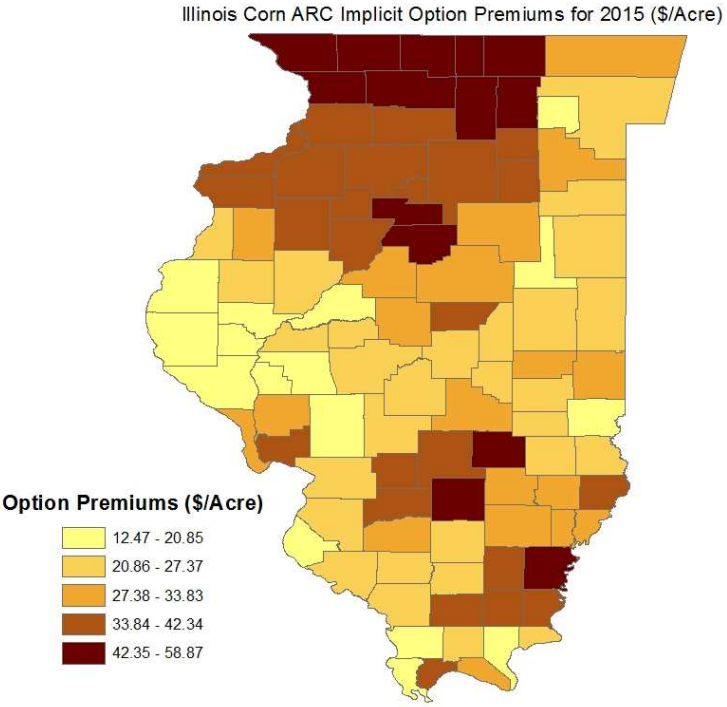


Average Oklahoma Wheat ACRE Implicit Option Premiums for 2009-2013 ($/Acre)

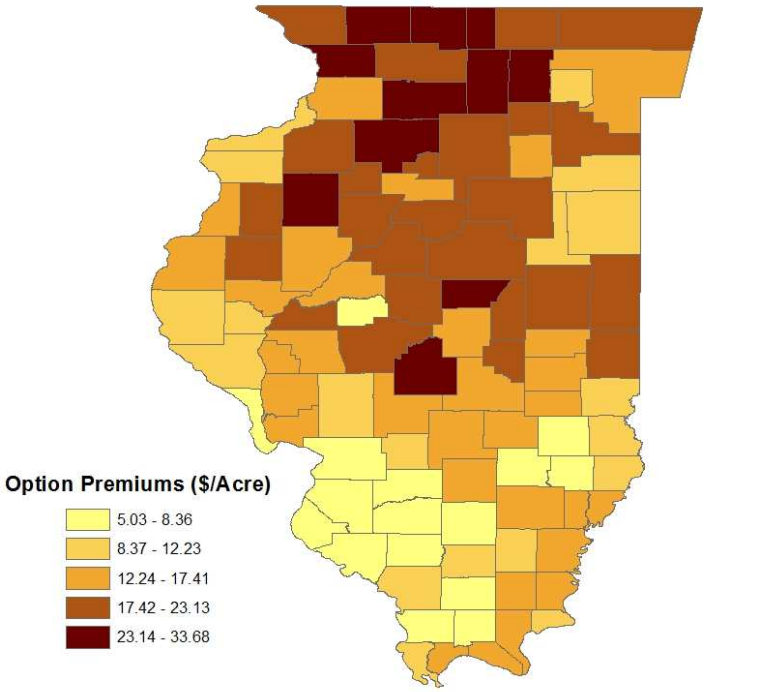


Appendix C. Maps of ARC Implicit Option Premiums for 2014 and 2015 ($/Acre)

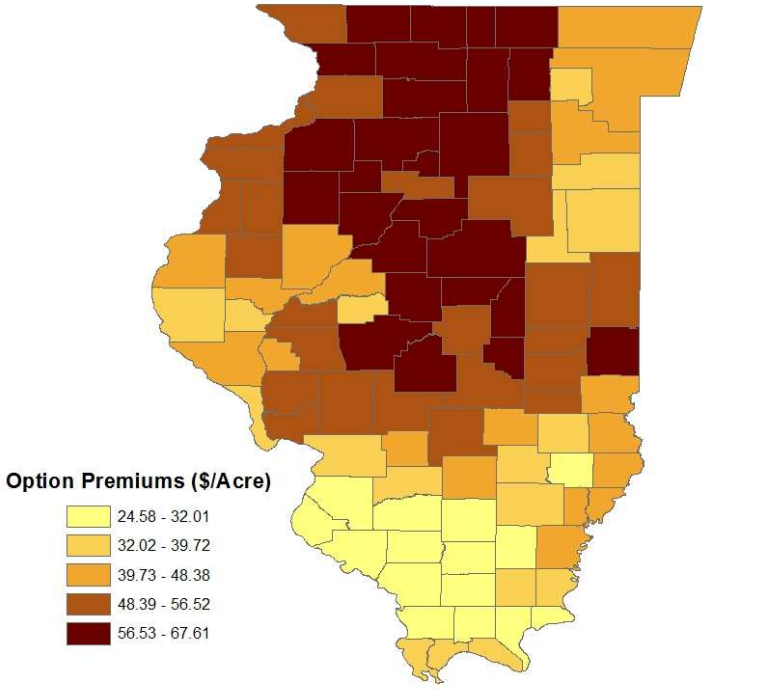




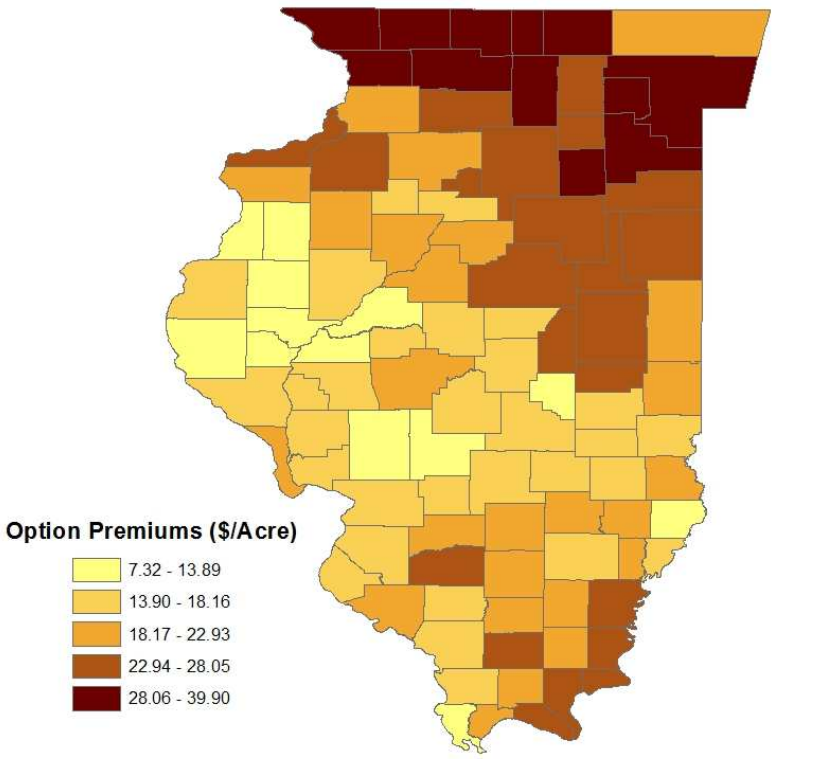
Illinois Soybean ARC Implicit Option Premiums for 2014 ($/Acre)



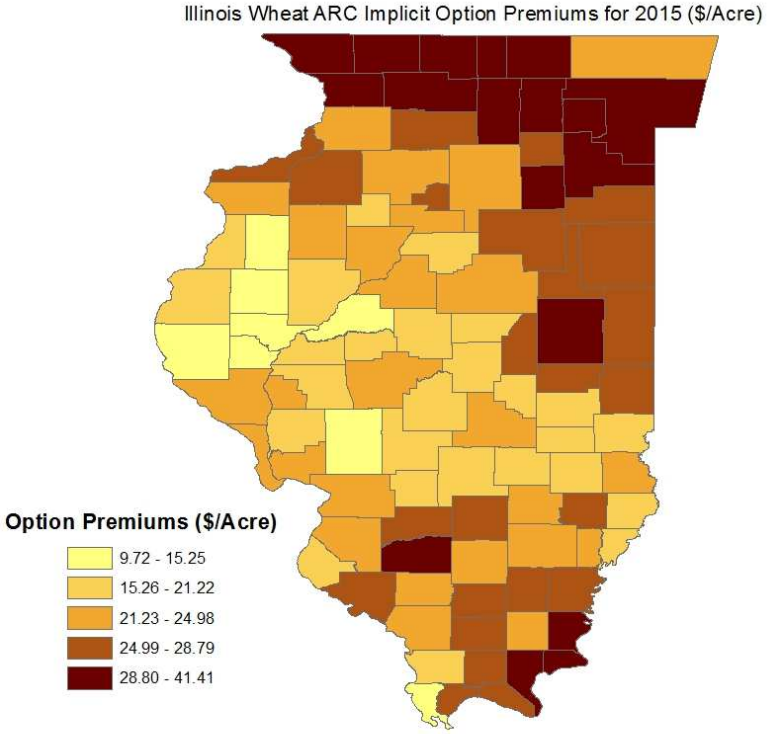
Illinois Soybean ARC Implicit Option Premiums for 2015 ($/Acre)



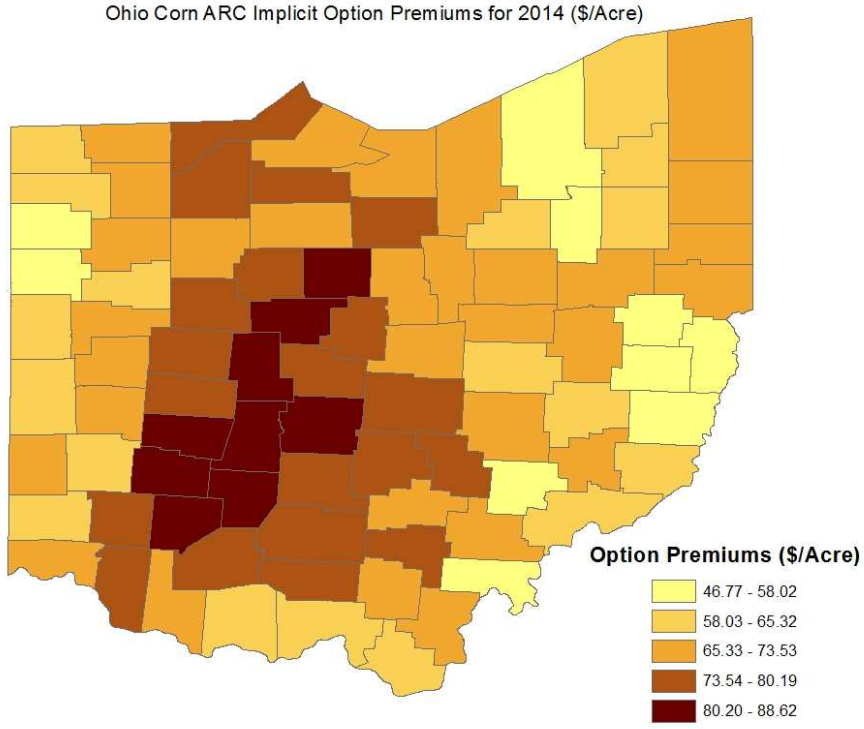
Illinois Wheat ARC Implicit Option Premiums for 2014 ($/Acre)



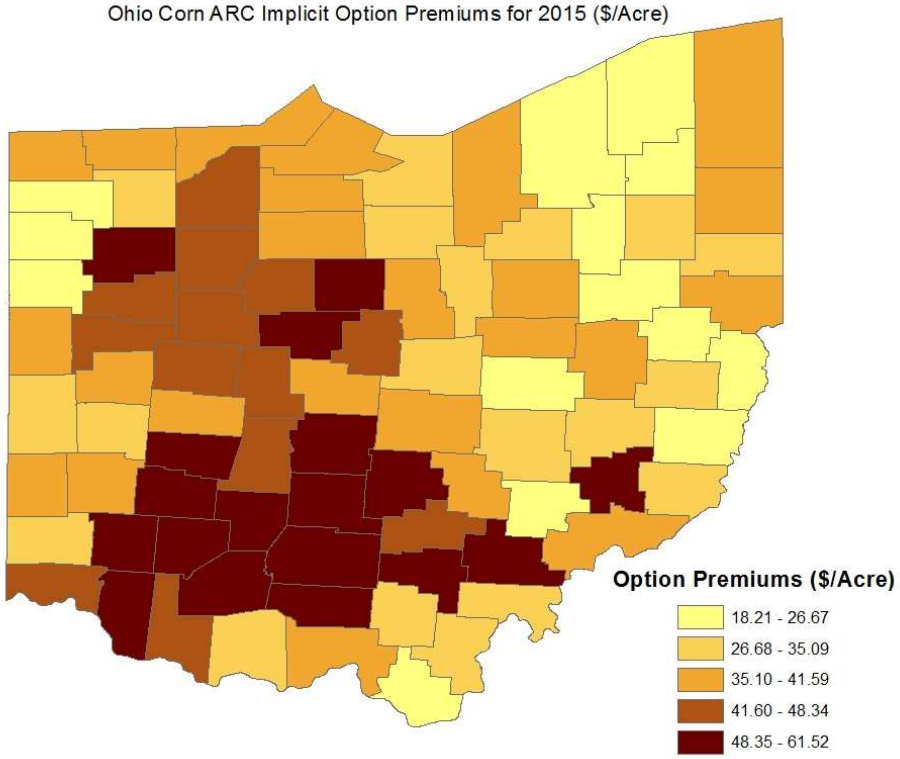
Illinois Wheat ARC Implicit Option Premiums for 2015 ($/Acre)



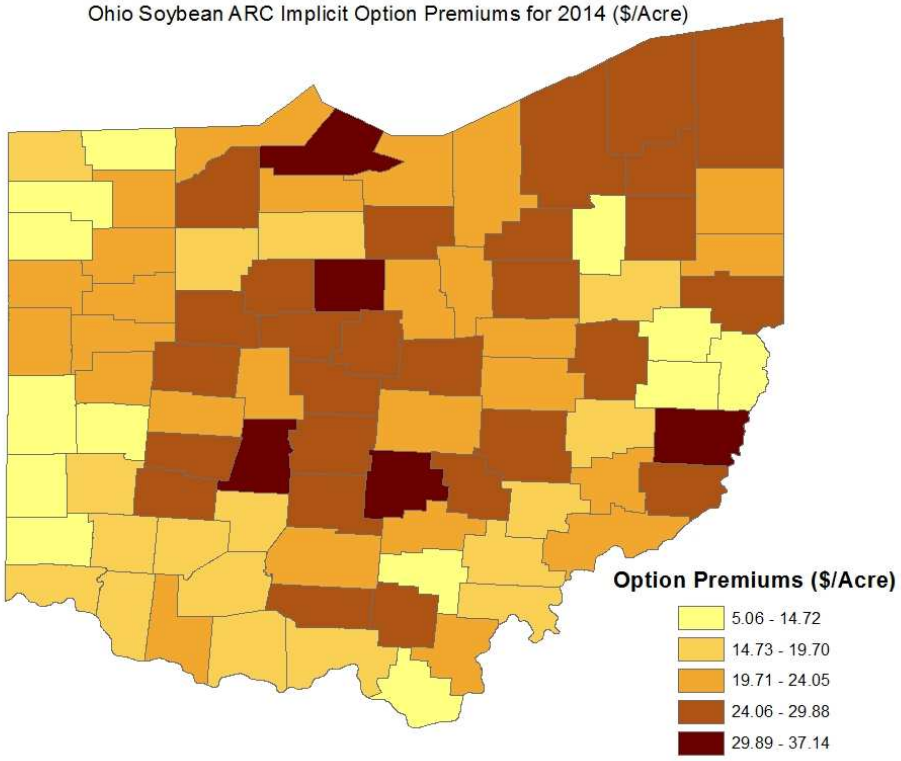
Ohio Corn ARC Implicit Option Premiums for 2014 ($/Acre)



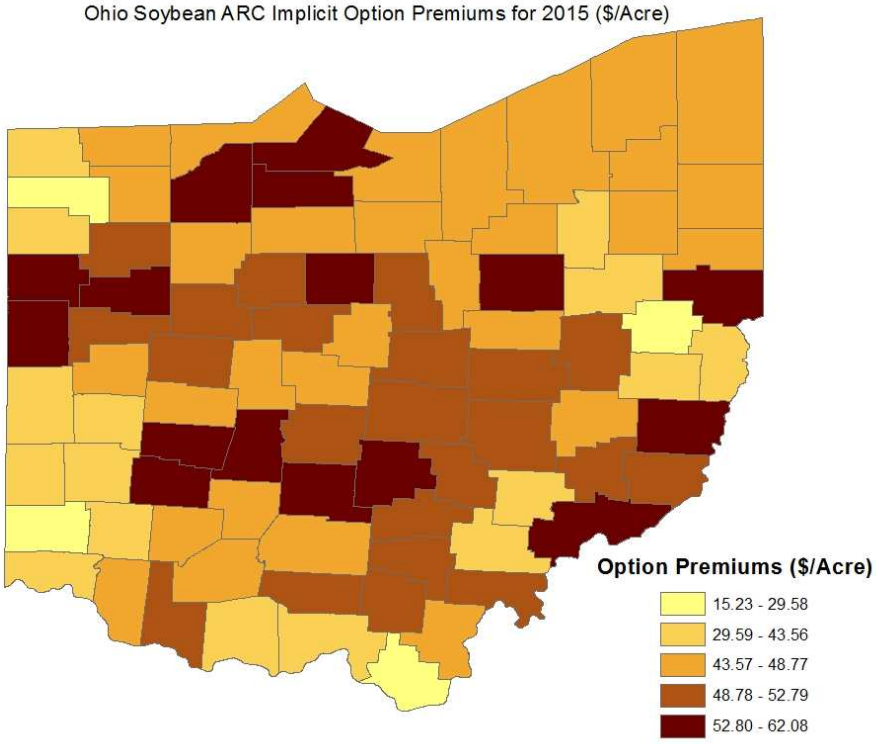
Ohio Corn ARC Implicit Option Premiums for 2015 ($/Acre)



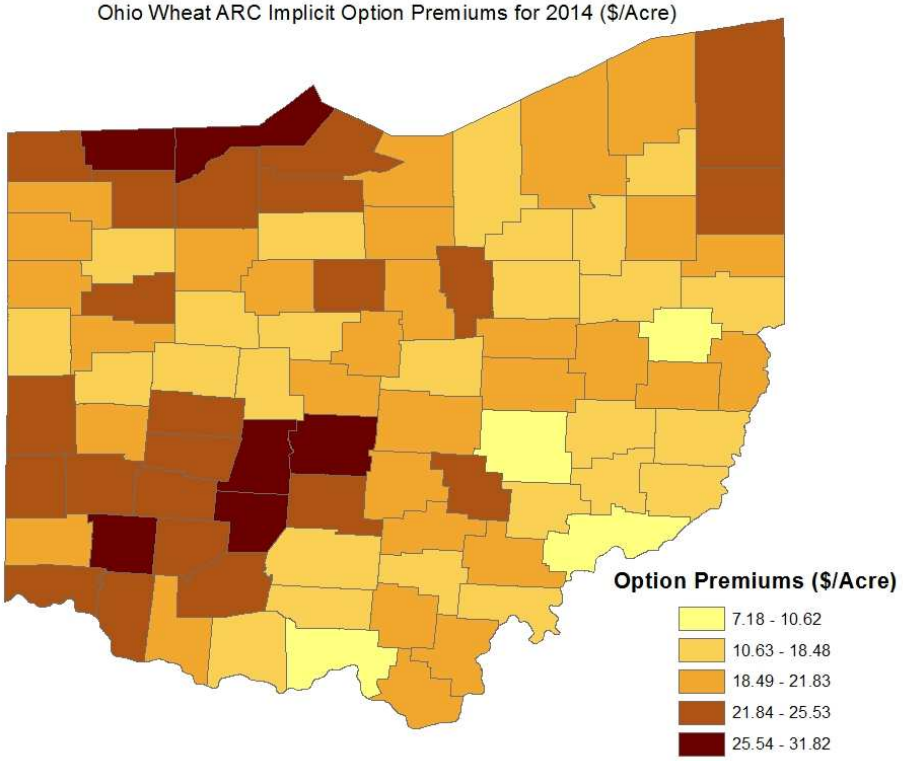
Ohio Soybean ARC Implicit Option Premiums for 2014 ($/Acre)



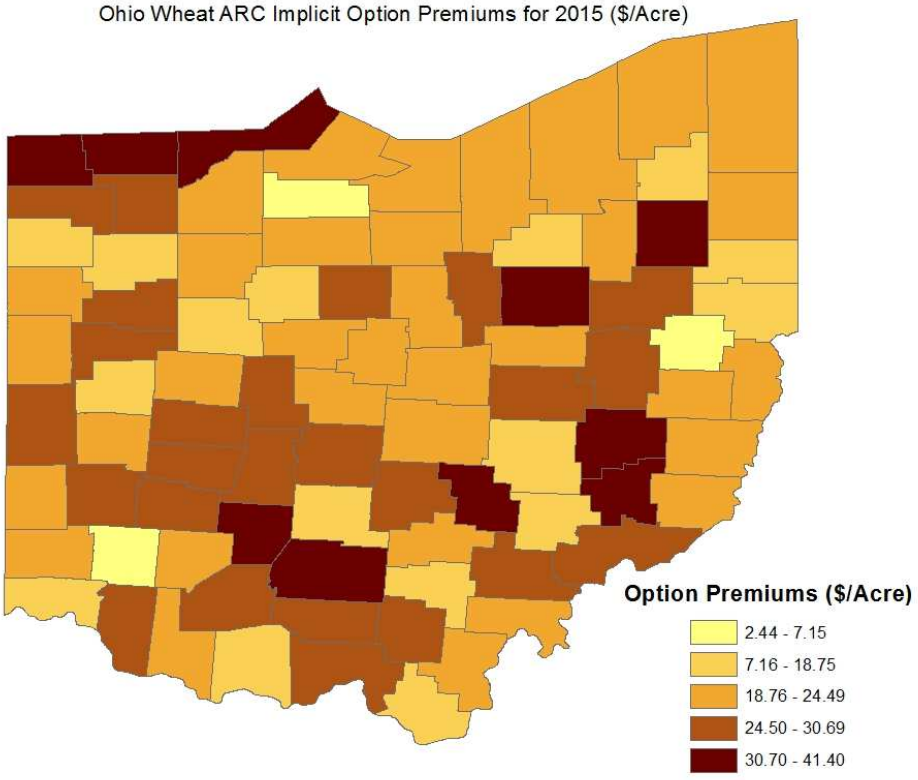
Ohio Soybean ARC Implicit Option Premiums for 2015 ($/Acre)



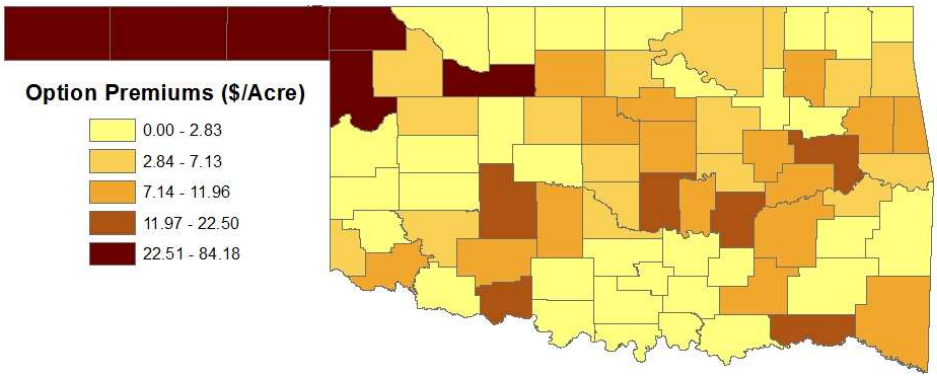
Ohio Wheat ARC Implicit Option Premiums for 2014 ($/Acre)



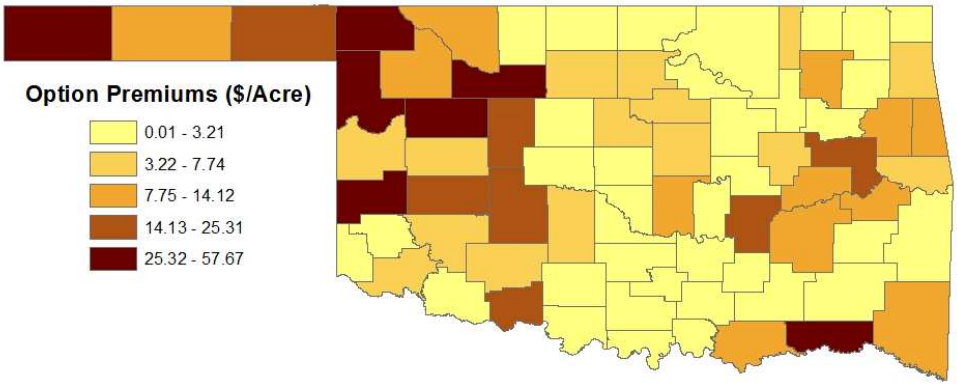
Ohio Wheat ARC Implicit Option Premiums for 2015 ($/Acre)



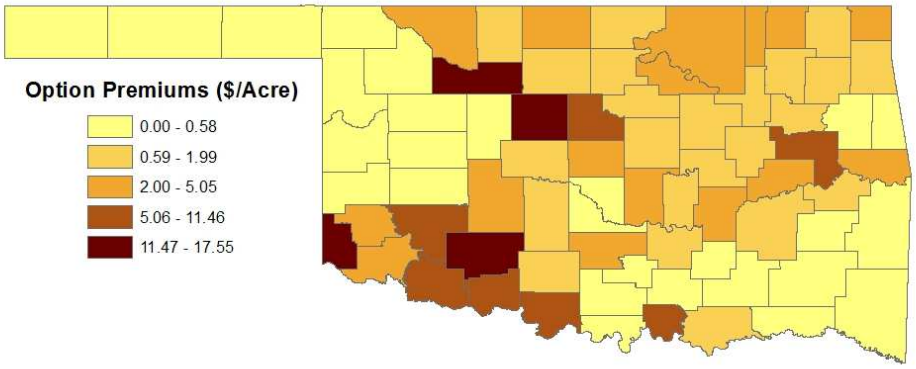
Oklahoma Corn ARC Implicit Option Premiums for 2014 ($/Acre)



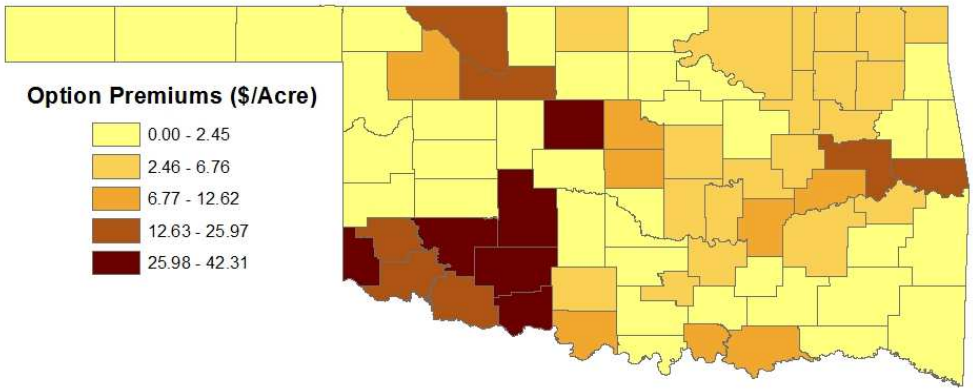
Oklahoma Corn ARC Implicit Option Premiums for 2015 ($/Acre)



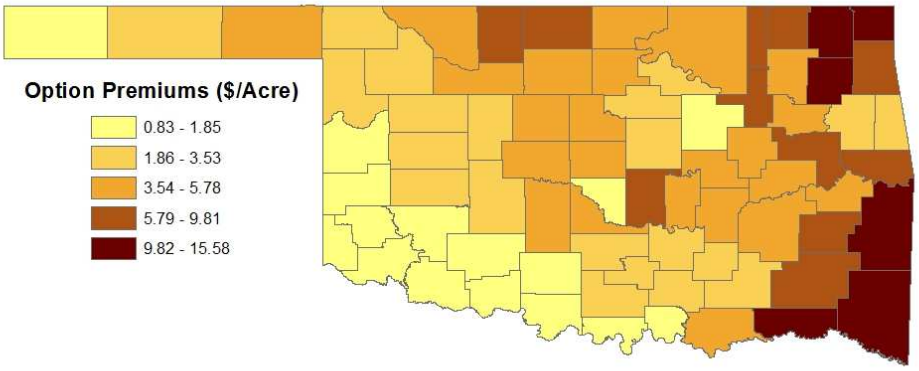
Oklahoma Soybean ARC Implicit Option Premiums for 2014 ($/Acre)



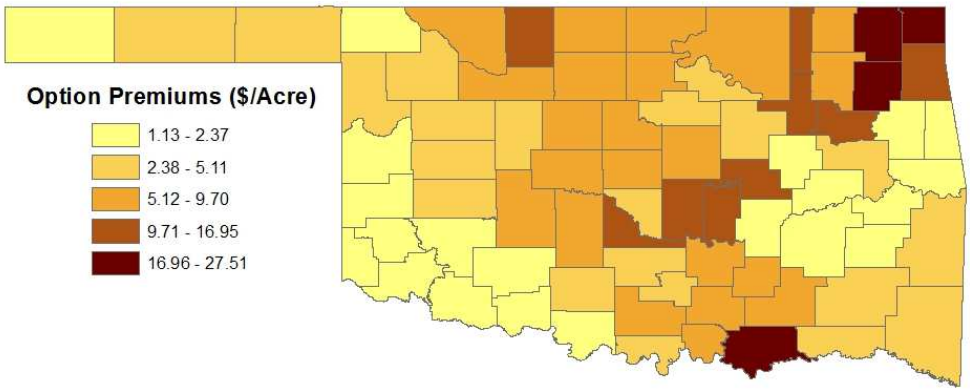
Oklahoma Soybean ARC Implicit Option Premiums for 2015 ($/Acre)



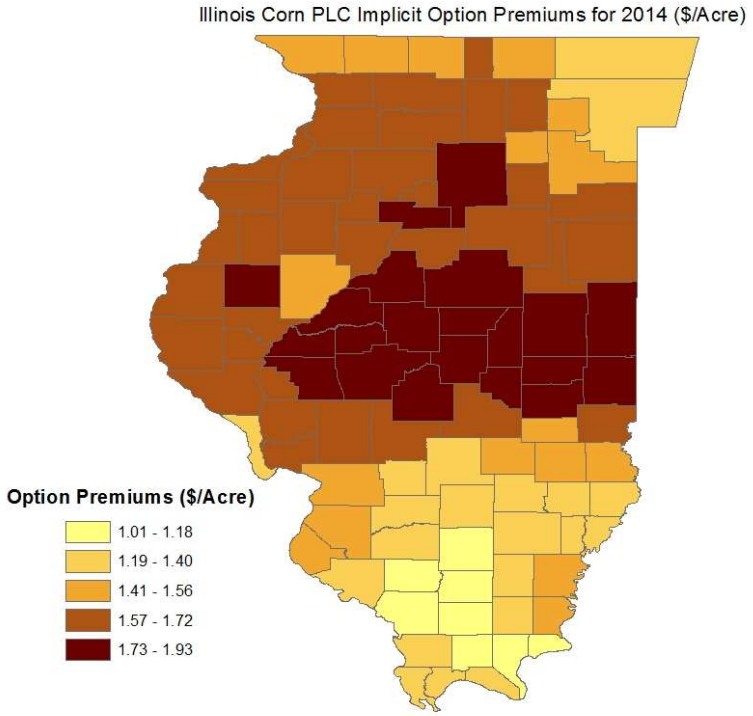
Oklahoma Wheat ARC Implicit Option Premiums for 2014 ($/Acre)

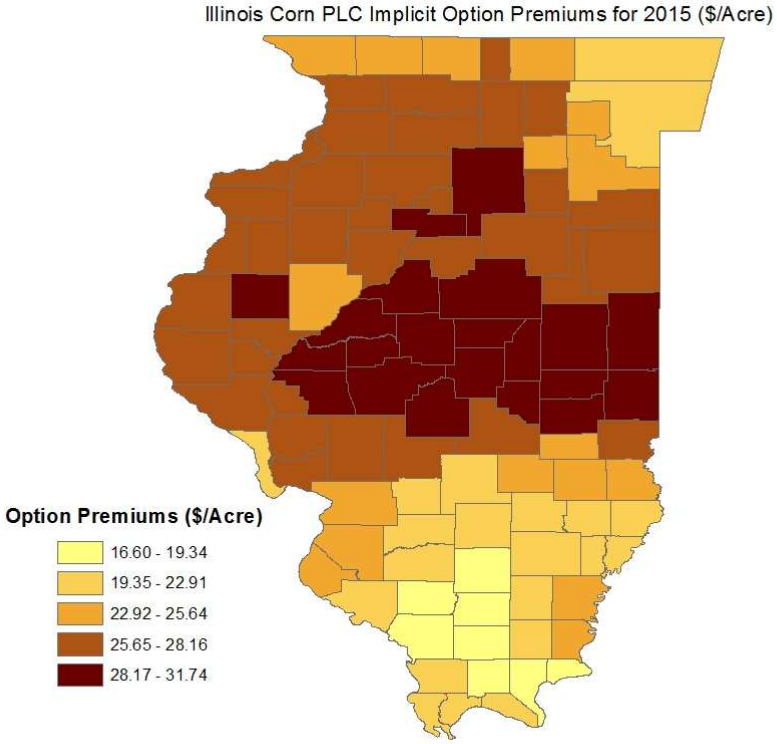


Oklahoma Wheat ARC Implicit Option Premiums for 2015 ($/Acre)

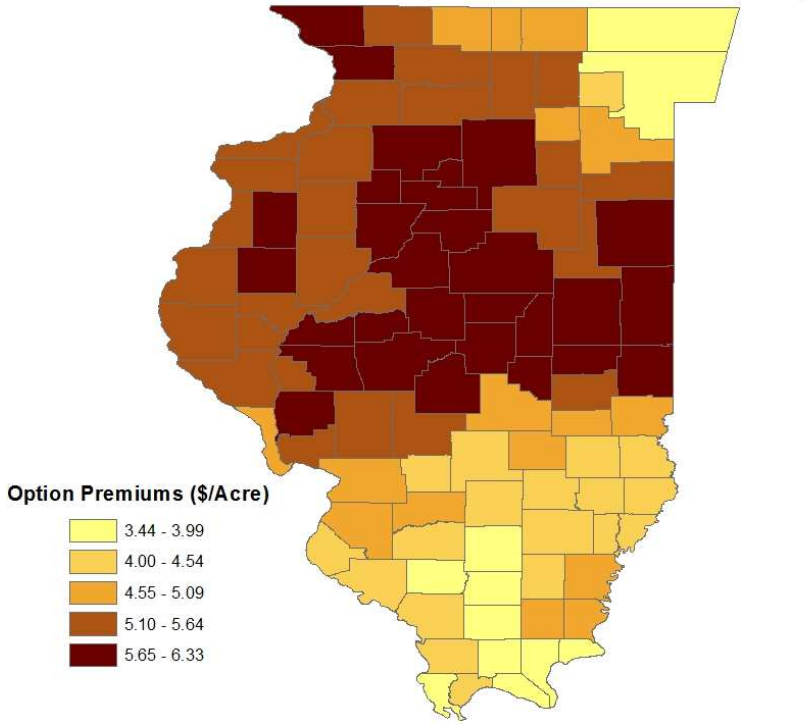


Appendix D. Maps of PLC Implicit Option Premiums for 2014 and 2015 ($/Acre)

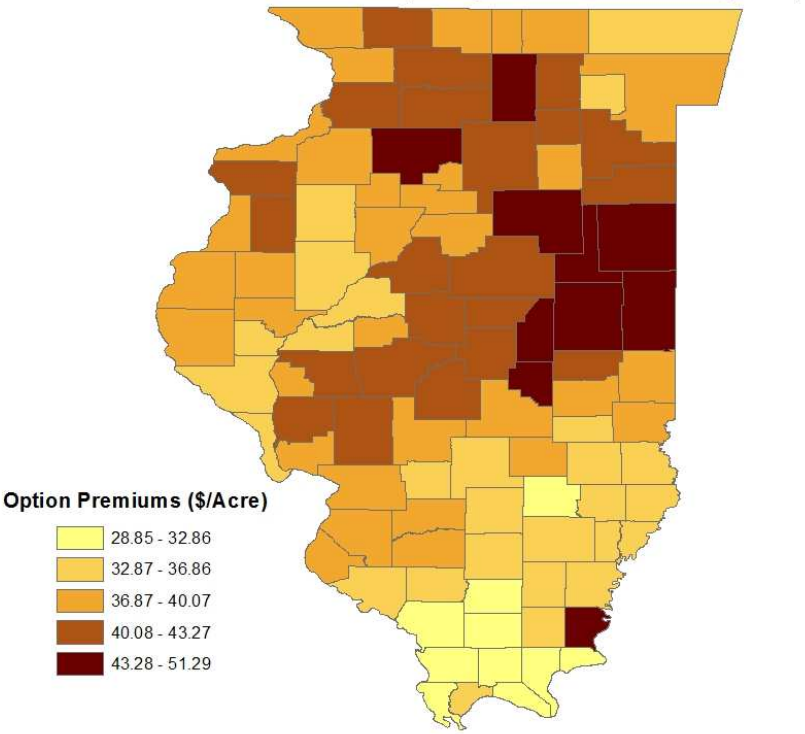


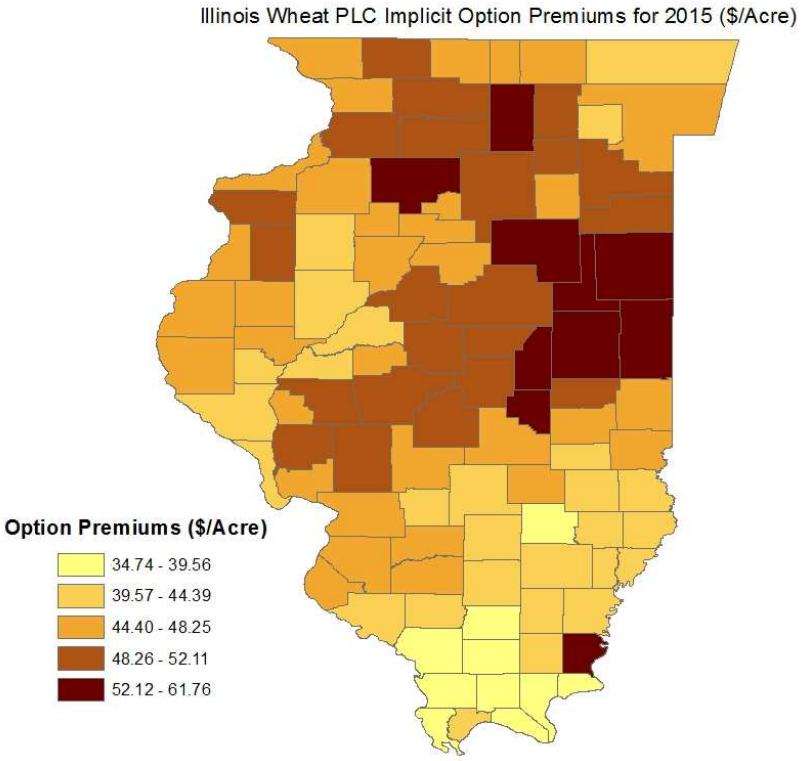


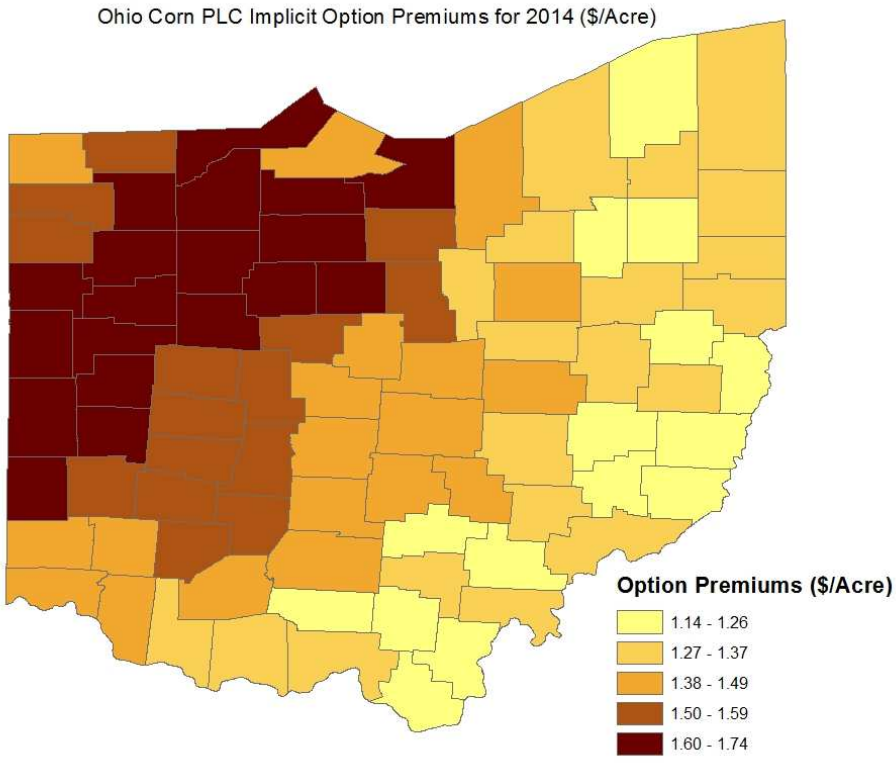
Illinois Soybean PLC Implicit Option Premiums for 2015 ($/Acre)



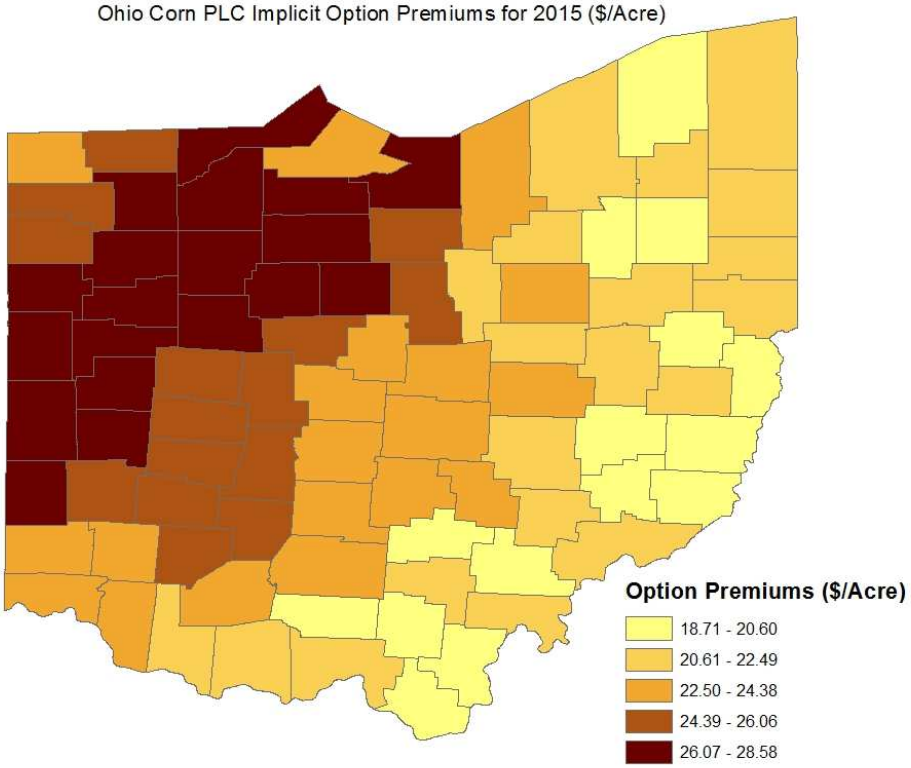
Illinois Wheat PLC Implicit Option Premiums for 2014 ($/Acre)



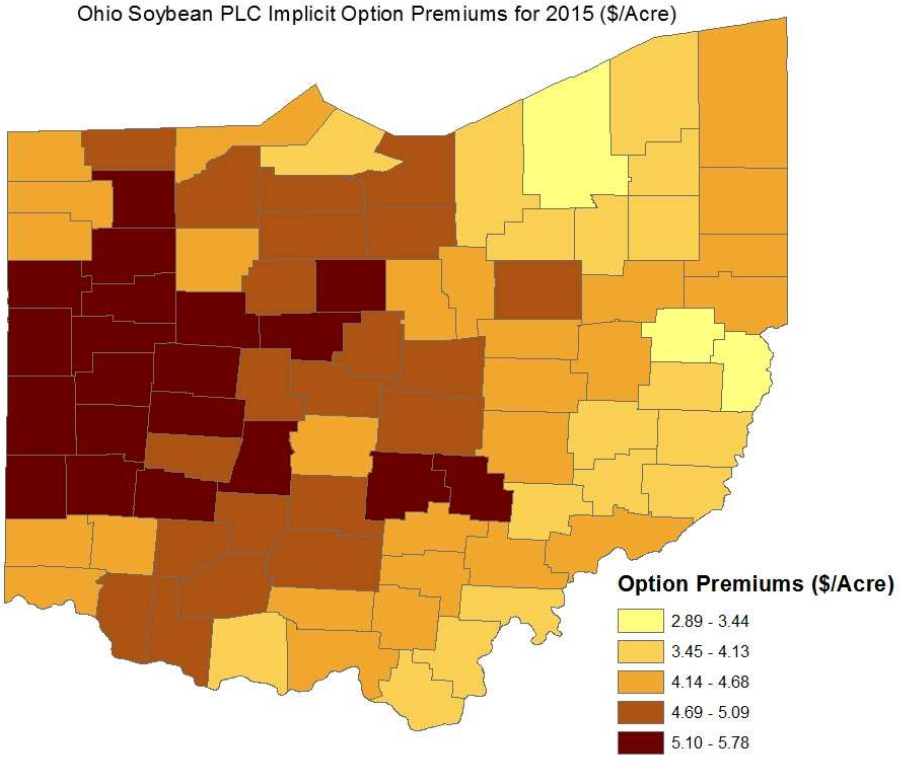

Illinois Wheat PLC Implicit Option Premiums for 2015 ($/Acre)
Option Premiums ($/Acre)
34.74 - 39.56
39.57 - 44.39
44.40 - 48.25
48.26 - 52.11
52.12 - 61.76


Ohio Corn PLC Implicit Option Premiums for 2014 ($/Acre)
Option Premiums ($/Acre)
1.14 - 1.26
1.27 - 1.37
1.38 - 1.49
1.50 - 1.59
1.60 - 1.74

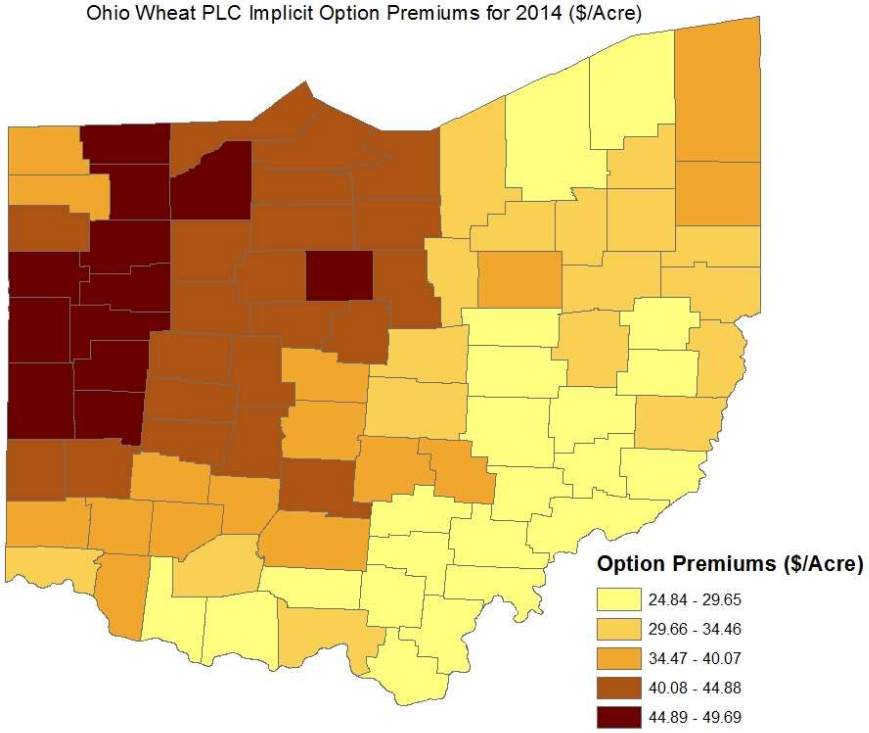
Ohio Corn PLC Implicit Option Premiums for 2015 ($/Acre)



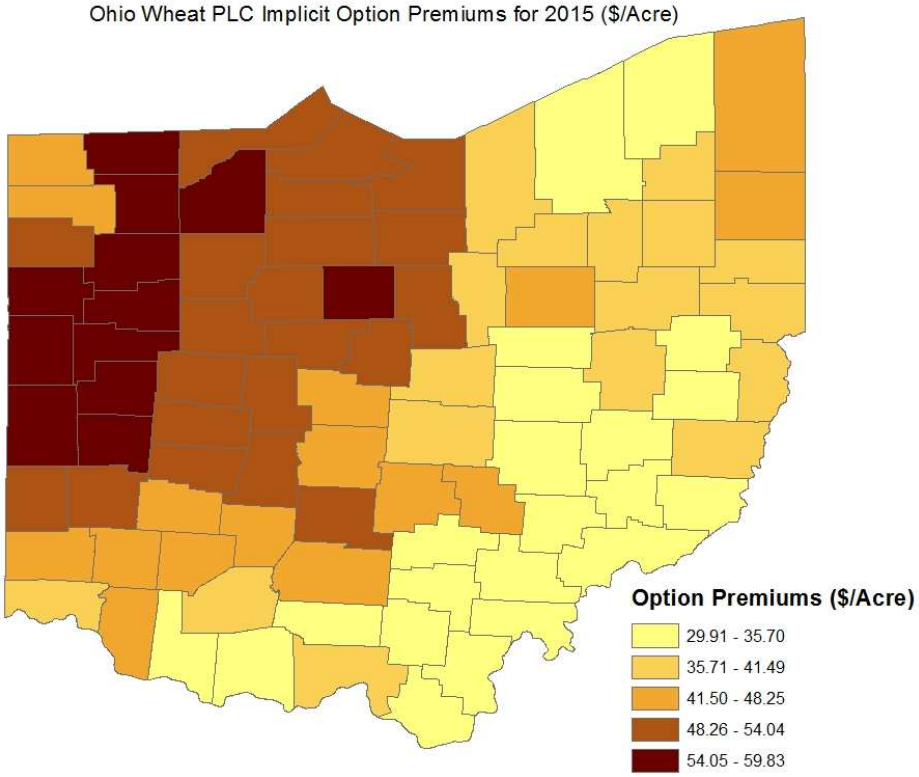
Ohio Soybean PLC Implicit Option Premiums for 2015 ($/Acre)



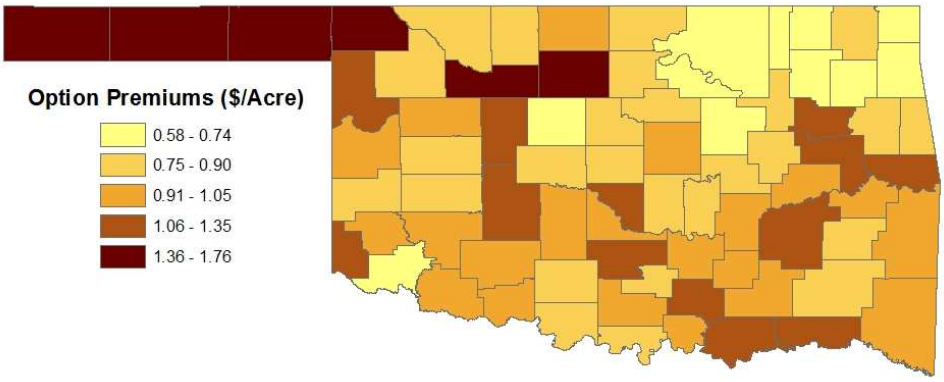
Ohio Wheat PLC Implicit Option Premiums for 2014 ($/Acre)



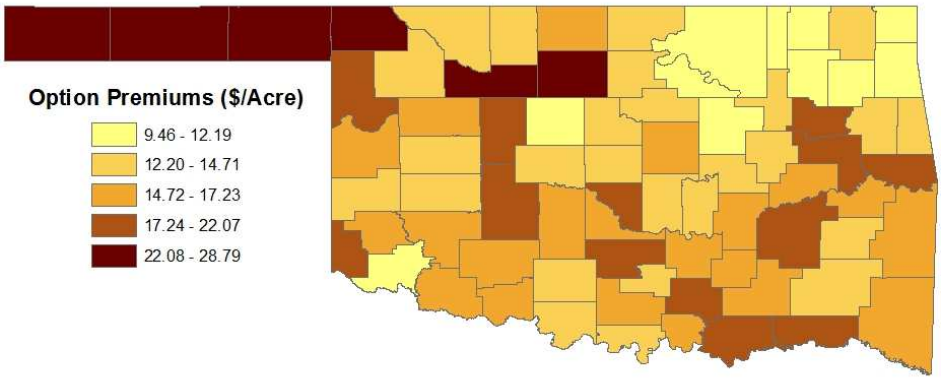
Ohio Wheat PLC Implicit Option Premiums for 2015 ($/Acre)



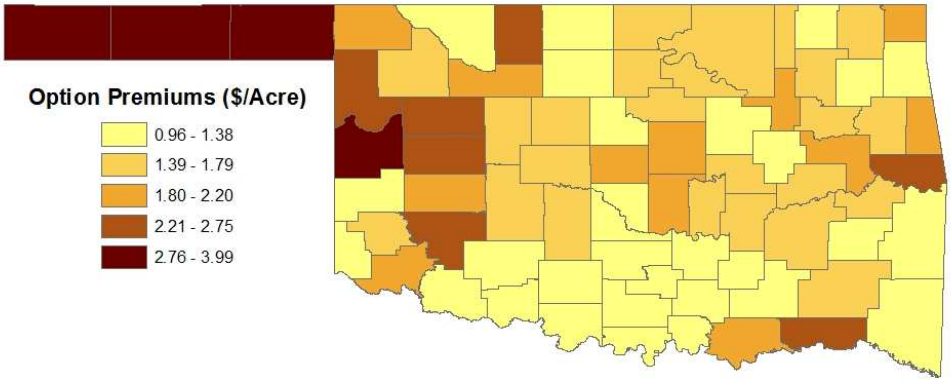
Oklahoma Corn PLC Implicit Option Premiums for 2014 ($/Acre)



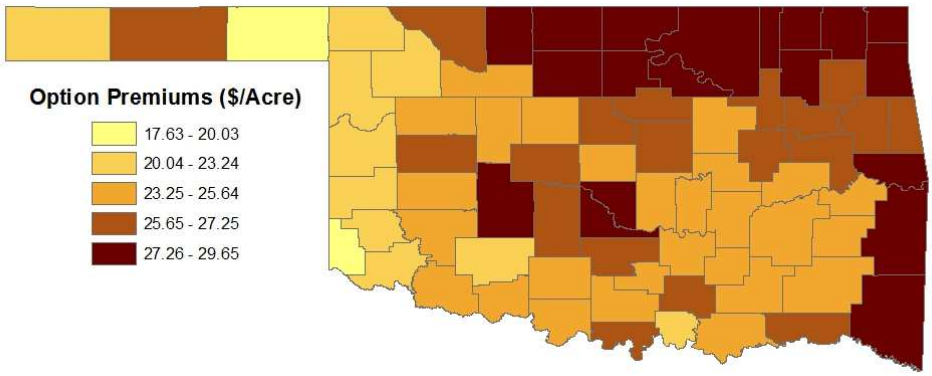
Oklahoma Corn PLC Implicit Option Premiums for 2015 ($/Acre)



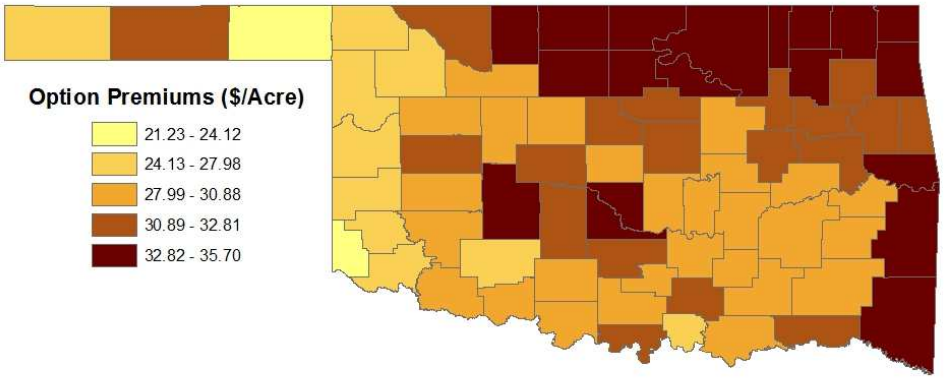
Oklahoma Soybean PLC Implicit Option Premiums for 2015 ($/Acre)



Oklahoma Wheat PLC Implicit Option Premiums for 2014 ($/Acre)



Oklahoma Wheat PLC Implicit Option Premiums for 2015 ($/Acre)



Appendix E. Descriptive Statistics for County Yield Regression Equations through 2007

Corn Regression Equation Descriptive Statistics

Effect	CountyState	Estimate	Standard	Pr > |t|
Intercept		-3181.54	38.9337	<.0001
CountyState	ADAIROKLAHOMA	-53.6161	11.7898	<.0001
CountyState	ADAMSILLINOIS	0.5605	4.5096	0.9011
CountyState	ADAMSOHIO	-21.6895	4.5096	<.0001
CountyState	ALEXANDERILLINOIS	-12.4395	4.5096	0.0058
CountyState	ALFALFAOKLAHOMA	-43.5258	6.9908	<.0001
CountyState	ALLENOHIO	2.9079	4.5096	0.5191
CountyState	ASHLANDOHIO	-12.1026	4.5096	0.0073
CountyState	ASHTABULAOHIO	-16.3868	4.5096	0.0003
CountyState	ATHENSOHIO	-21.2526	4.5096	<.0001
CountyState	ATOKAOKLAHOMA	-56.1058	6.9899	<.0001
CountyState	AUGLAIZEOHIO	-1.0553	4.5096	0.8150
CountyState	BEAVEROKLAHOMA	7.4135	4.6403	0.1102
CountyState	BECKHAMOKLAHOMA	-52.0816	10.3335	<.0001
CountyState	BELMONTOHIO	-24.0344	4.6404	<.0001
CountyState	BLAINEOKLAHOMA	-44.2685	7.2890	<.0001
CountyState	BONDILLINOIS	-17.8079	4.5096	<.0001
CountyState	BOONEILLINOIS	6.0868	4.5096	0.1771
CountyState	BROWNILLINOIS	-1.8079	4.5096	0.6885
CountyState	BROWNOHIO	-11.5368	4.5096	0.0105
CountyState	BRYANOKLAHOMA	-43.1777	4.5718	<.0001
CountyState	BUREAUILLINOIS	14.5605	4.5096	0.0012
CountyState	BUTLEROHIO	-8.1289	4.5096	0.0715
CountyState	CADDOOKLAHOMA	-30.7118	4.8012	<.0001
CountyState	CALHOUNILLINOIS	-4.4395	4.5096	0.3249
CountyState	CANADIANOKLAHOMA	-38.0115	4.6774	<.0001
CountyState	CARROLLILLINOIS	13.4553	4.5096	0.0029
CountyState	CARROLLOHIO	-22.5842	4.5096	<.0001
CountyState	CARTEROKLAHOMA	-41.7315	6.7301	<.0001
CountyState	CASSILLINOIS	15.8763	4.5096	0.0004
CountyState	CHAMPAIGNILLINOIS	19.2711	4.5096	<.0001
CountyState	CHAMPAIGNOHIO	2.4947	4.5096	0.5801
CountyState	CHEROKEEOKLAHOMA	-50.2281	11.7923	<.0001
CountyState	CHOCTAWOKLAHOMA	-40.7687	4.5399	<.0001
CountyState	CHRISTIANILLINOIS	25.0079	4.5096	<.0001
CountyState	CIMARRONOKLAHOMA	13.8579	4.5096	0.0021
CountyState	CLARKILLINOIS	3.9553	4.5096	0.3805
CountyState	CLARKOHIO	5.7632	4.5096	0.2013
CountyState	CLAYILLINOIS	-23.3868	4.5096	<.0001
CountyState	CLERMONTOHIO	-11.4316	4.5096	0.0113
CountyState	CLEVELANDOKLAHOMA	-41.4067	4.5718	<.0001
CountyState	CLINTONILLINOIS	-17.4395	4.5096	0.0001
CountyState	CLINTONOHIO	6.6789	4.5096	0.1386
CountyState	COALOKLAHOMA	-60.5630	19.9166	0.0024

Effect	CountyState	Estimate	Standard	Pr > |t|	Effect	CountyState	Estimate	Standard	Pr > |t|
CountyState	COLESILLINOIS	17.2447	4.5096	0.0001	CountyState	EFFINGHAMILLINOIS	-8.6500	4.5096	0.0551
CountyState	COLUMBIANAOHIO	-11.9526	4.5096	0.0081	CountyState	ELLISOKLAHOMA	-8.5609	5.1930	0.0993
CountyState	COMANCHEOKLAHOMA	-57.1531	6.7328	<.0001	CountyState	ERIEOHIO	4.3789	4.5096	0.3316
CountyState	COOKILLINOIS	-10.0447	4.5096	0.0259	CountyState	FAIRFIELDOHIO	-2.3316	4.5096	0.6051
CountyState	COSHOCTONOHIO	-0.8000	4.5096	0.8592	CountyState	FAYETTEILLINOIS	-14.9921	4.5096	0.0009
CountyState	COTTONOKLAHOMA	-78.7825	8.6389	<.0001	CountyState	FAYETTEOHIO	2.0658	4.5096	0.6469
CountyState	CRAIGOKLAHOMA	-51.0193	4.5399	<.0001	CountyState	FORDILLINOIS	7.1395	4.5096	0.1134
CountyState	CRAWFORDILLINOIS	-5.9132	4.5096	0.1898	CountyState	FRANKLINILLINOIS	-30.3342	4.5096	<.0001
CountyState	CRAWFORDOHIO	4.7447	4.5096	0.2928	CountyState	FRANKLINOHIO	-7.6553	4.5096	0.0896
CountyState	CREEKOKLAHOMA	-56.1130	9.3560	<.0001	CountyState	FULTONILLINOIS	4.7974	4.5096	0.2874
CountyState	CUMBERLANDILLINOIS	2.2974	4.5096	0.6105	CountyState	FULTONOHIO	7.7632	4.5096	0.0852
CountyState	CUSTEROKLAHOMA	-45.8939	4.8010	<.0001	CountyState	GALLATINILLINOIS	-4.3868	4.5096	0.3307
CountyState	CUYAHOGAOHIO	-15.8471	6.5138	0.0150	CountyState	GALLIAOHIO	-19.5271	4.5718	<.0001
CountyState	DARKEOHIO	3.3026	4.5096	0.4640	CountyState	GARFIELDOKLAHOMA	-33.4873	6.7302	<.0001
CountyState	DE KALBILLINOIS	17.9816	4.5096	<.0001	CountyState	GARVINOKLAHOMA	-32.3178	4.5399	<.0001
CountyState	DE WITTILLINOIS	20.3237	4.5096	<.0001	CountyState	GEAUGAOHIO	-18.5842	4.5096	<.0001
CountyState	DEFIANCEOHIO	-5.3579	4.5096	0.2348	CountyState	GRADYOKLAHOMA	-40.0692	4.7164	<.0001
CountyState	DELAWAREOHIO	-5.3553	4.5096	0.2351	CountyState	GRANTOKLAHOMA	-48.9334	5.0626	<.0001
CountyState	DELAWAREOKLAHOMA	-58.1847	7.6480	<.0001	CountyState	GREENEILLINOIS	4.7711	4.5096	0.2901
CountyState	DEWEYOKLAHOMA	-56.7728	6.1459	<.0001	CountyState	GREENEOHIO	5.0579	4.5096	0.2621
CountyState	DOUGLASILLINOIS	15.7711	4.5096	0.0005	CountyState	GREEROKLAHOMA	-29.7563	10.3345	0.0040
CountyState	DU PAGEILLINOIS	-1.7026	4.5096	0.7058	CountyState	GRUNDYILLINOIS	7.2974	4.5096	0.1057
CountyState	EDGARILLINOIS	15.4816	4.5096	0.0006	CountyState	GUERNSEYOHIO	-20.1026	4.5096	<.0001
CountyState	EDWARDSILLINOIS	-15.5447	4.5096	0.0006	CountyState	HAMILTONILLINOIS	-21.8079	4.5096	<.0001

Effect	CountyState	Estimate	Standard	Pr > |t|	Effect	CountyState	Estimate	Standard	Pr > |t|
CountyState	HAMILTONOHIO	-8.8684	4.5096	0.0493	CountyState	JEFFERSONOKLAHOMA	-41.9038	19.9169	0.0354
CountyState	HANCOCKILLINOIS	6.3763	4.5096	0.1574	CountyState	JERSEYILLINOIS	3.0605	4.5096	0.4974
CountyState	HANCOCKOHIO	2.1500	4.5096	0.6335	CountyState	JO DAVIESSILLINOIS	4.7711	4.5096	0.2901
CountyState	HARDINILLINOIS	-29.7289	4.5096	<.0001	CountyState	JOHNSONILLINOIS	-28.9132	4.5096	<.0001
CountyState	HARDINOHIO	-0.7895	4.5096	0.8610	CountyState	JOHNSTONOKLAHOMA	-37.8692	5.2674	<.0001
CountyState	HARMONOKLAHOMA	-46.4288	6.9869	<.0001	CountyState	KANEILLINOIS	13.0868	4.5096	0.0037
CountyState	HARPEROKLAHOMA	-5.1667	5.4302	0.3414	CountyState	KANKAKEEILLINOIS	3.9289	4.5096	0.3836
CountyState	HARRISONOHIO	-24.6474	4.5096	<.0001	CountyState	KAYOKLAHOMA	-50.7258	4.9486	<.0001
CountyState	HASKELLOKLAHOMA	-45.0354	4.9481	<.0001	CountyState	KENDALLILLINOIS	6.2711	4.5096	0.1644
CountyState	HENDERSONILLINOIS	15.5079	4.5096	0.0006	CountyState	KINGFISHEROKLAHOMA	-44.9838	6.5100	<.0001
CountyState	HENRYILLINOIS	10.5605	4.5096	0.0192	CountyState	KIOWAOKLAHOMA	-39.8940	7.6464	<.0001
CountyState	HENRYOHIO	9.5684	4.5096	0.0339	CountyState	KNOXILLINOIS	13.7447	4.5096	0.0023
CountyState	HIGHLANDOHIO	-6.2474	4.5096	0.1660	CountyState	KNOXOHIO	-5.9316	4.5096	0.1884
CountyState	HOCKINGOHIO	-12.4947	4.5096	0.0056	CountyState	LA SALLEILLINOIS	11.6132	4.5096	0.0100
CountyState	HOLMESOHIO	-9.1000	4.5096	0.0436	CountyState	LAKEILLINOIS	-19.2289	4.5096	<.0001
CountyState	HUGHESOKLAHOMA	-46.4741	4.6403	<.0001	CountyState	LAKEOHIO	-20.7221	6.5138	0.0015
CountyState	HURONOHIO	-0.9447	4.5096	0.8341	CountyState	LATIMEROKLAHOMA	-45.4358	11.7897	0.0001
CountyState	IROQUOISILLINOIS	9.1921	4.5096	0.0415	CountyState	LAWRENCEILLINOIS	-13.0447	4.5096	0.0038
CountyState	JACKSONILLINOIS	-22.0184	4.5096	<.0001	CountyState	LAWRENCEOHIO	-21.3966	4.5718	<.0001
CountyState	JACKSONOHIO	-20.4211	4.5096	<.0001	CountyState	LEEILLINOIS	12.7974	4.5096	0.0046
CountyState	JACKSONOKLAHOMA	-51.4369	9.3513	<.0001	CountyState	LEFLOREOKLAHOMA	-47.7024	5.7371	<.0001
CountyState	JASPERILLINOIS	-6.4132	4.5096	0.1550	CountyState	LICKINGOHIO	-6.3342	4.5096	0.1602
CountyState	JEFFERSONILLINOIS	-30.2816	4.5096	<.0001	CountyState	LINCOLNOKLAHOMA	-53.7215	5.4302	<.0001
CountyState	JEFFERSONOHIO	-22.5079	4.6404	<.0001	CountyState	LIVINGSTONILLINOIS	7.6395	4.5096	0.0903

Effect	CountyState	Estimate	Standard	Pr > |t|	Effect	CountyState	Estimate	Standard	Pr > |t|
CountyState	LOGANILLINOIS	21.9026	4.5096	<.0001	CountyState	MCLEANILLINOIS	18.8763	4.5096	<.0001
CountyState	LOGANOHIO	-3.1974	4.5096	0.4783	CountyState	MEDINAOHIO	-14.9921	4.5096	0.0009
CountyState	LOGANOKLAHOMA	-55.1861	8.0854	<.0001	CountyState	MEIGSOHIO	-23.2816	4.5096	<.0001
CountyState	LORAINOHIO	-12.6158	4.5096	0.0052	CountyState	MENARDILLINOIS	20.2184	4.5096	<.0001
CountyState	LOVEOKLAHOMA	-48.3796	5.8602	<.0001	CountyState	MERCERILLINOIS	12.4553	4.5096	0.0058
CountyState	LUCASOHIO	8.9553	4.5096	0.0471	CountyState	MERCEROHIO	2.4842	4.5096	0.5817
CountyState	MACONILLINOIS	26.5605	4.5096	<.0001	CountyState	MIAMIOHIO	4.0921	4.5096	0.3642
CountyState	MACOUPINILLINOIS	9.9289	4.5096	0.0277	CountyState	MONROEILLINOIS	-12.8605	4.5096	0.0044
CountyState	MADISONILLINOIS	-5.6500	4.5096	0.2103	CountyState	MONROEOHIO	-23.5704	4.6053	<.0001
CountyState	MADISONOHIO	2.8158	4.5096	0.5324	CountyState	MONTGOMERYILLINOIS	7.9026	4.5096	0.0797
CountyState	MAHONINGOHIO	-14.7263	4.5096	0.0011	CountyState	MONTGOMERYOHIO	-2.8526	4.5096	0.5270
CountyState	MAJOROKLAHOMA	-22.7450	4.8475	<.0001	CountyState	MORGANILLINOIS	22.2711	4.5096	<.0001
CountyState	MARIONILLINOIS	-23.3868	4.5096	<.0001	CountyState	MORGANOHIO	-17.5474	4.5096	0.0001
CountyState	MARIONOHIO	-1.8868	4.5096	0.6757	CountyState	MORROWOHIO	-7.5132	4.5096	0.0957
CountyState	MARSHALLILLINOIS	11.3763	4.5096	0.0117	CountyState	MOULTRIEILLINOIS	25.4026	4.5096	<.0001
CountyState	MARSHALLOKLAHOMA	-44.0891	4.8957	<.0001	CountyState	MURRAYOKLAHOMA	-54.6183	6.9862	<.0001
CountyState	MASONILLINOIS	4.8500	4.5096	0.2822	CountyState	MUSKINGUMOHIO	-7.4711	4.5096	0.0976
CountyState	MASSACILLINOIS	-20.3868	4.5096	<.0001	CountyState	MUSKOGEEOKLAHOMA	-36.9237	4.5096	<.0001
CountyState	MAYESOKLAHOMA	-54.6789	4.5096	<.0001	CountyState	NOBLEOHIO	-26.8961	4.6053	<.0001
CountyState	MCCLAINOKLAHOMA	-40.5143	4.6052	<.0001	CountyState	NOBLEOKLAHOMA	-72.0965	7.6519	<.0001
CountyState	MCCURTAINOKLAHOMA	-53.4834	4.8474	<.0001	CountyState	NOWATAOKLAHOMA	-53.9839	4.6773	<.0001
CountyState	MCDONOUGHILLINOIS	16.5868	4.5096	0.0002	CountyState	OGLEILLINOIS	11.8237	4.5096	0.0088
CountyState	MCHENRYILLINOIS	1.0079	4.5096	0.8232	CountyState	OKFUSKEEOKLAHOMA	-53.2113	5.4304	<.0001
CountyState	MCINTOSHOKLAHOMA	-51.7663	4.8960	<.0001	CountyState	OKLAHOMAOKLAHOMA	-38.9686	4.6773	<.0001

Effect	CountyState	Estimate	Standard	Pr > |t|	Effect	CountyState	Estimate	Standard	Pr > |t|
CountyState	OKMULGEEOKLAHOMA	-49.8211	4.5096	<.0001	CountyState	RANDOLPHILLINOIS	-25.5447	4.5096	<.0001
CountyState	OSAGEOKLAHOMA	-51.7196	5.2668	<.0001	CountyState	RICHLANDILLINOIS	-21.6763	4.5096	<.0001
CountyState	OTTAWAOHIO	-3.0711	4.5096	0.4959	CountyState	RICHLANDOHIO	-7.0474	4.5096	0.1181
CountyState	OTTAWAOKLAHOMA	-48.3013	4.6403	<.0001	CountyState	ROCK ISLANDILLINOIS	9.4553	4.5096	0.0360
CountyState	PAULDINGOHIO	-1.1842	4.5096	0.7929	CountyState	ROGER MILLSOKLAHOMA	-27.1692	11.7897	0.0212
CountyState	PAWNEEOKLAHOMA	-47.0096	6.3177	<.0001	CountyState	ROGERSOKLAHOMA	-51.5892	5.7356	<.0001
CountyState	PAYNEOKLAHOMA	-57.9560	6.1475	<.0001	CountyState	ROSSOHIO	-6.6789	4.5096	0.1386
CountyState	PEORIAILLINOIS	9.8237	4.5096	0.0294	CountyState	SALINEILLINOIS	-20.3079	4.5096	<.0001
CountyState	PERRYILLINOIS	-34.0447	4.5096	<.0001	CountyState	SANDUSKYOHIO	4.8868	4.5096	0.2785
CountyState	PERRYOHIO	-6.5816	4.5096	0.1445	CountyState	SANGAMONILLINOIS	25.4026	4.5096	<.0001
CountyState	PIATTILLINOIS	26.4026	4.5096	<.0001	CountyState	SCHUYLERILLINOIS	1.9289	4.5096	0.6688
CountyState	PICKAWAYOHIO	-4.6947	4.5096	0.2979	CountyState	SCIOTOOHIO	-18.1947	4.5096	<.0001
CountyState	PIKEILLINOIS	3.0079	4.5096	0.5048	CountyState	SCOTTILLINOIS	10.9026	4.5096	0.0156
CountyState	PIKEOHIO	-20.0974	4.5096	<.0001	CountyState	SEMINOLEOKLAHOMA	-55.6843	9.3515	<.0001
CountyState	PITTSBURGOKLAHOMA	-47.8601	5.7356	<.0001	CountyState	SENECAOHIO	-0.2211	4.5096	0.9609
CountyState	PONTOTOCOKLAHOMA	-43.2348	6.3180	<.0001	CountyState	SEQUOYAHOKLAHOMA	-25.1236	4.7578	<.0001
CountyState	POPEILLINOIS	-32.6237	4.5096	<.0001	CountyState	SHELBYILLINOIS	9.3500	4.5096	0.0382
CountyState	PORTAGEOHIO	-17.0079	4.5096	0.0002	CountyState	SHELBYOHIO	-0.07105	4.5096	0.9874
CountyState	POTTAWATOMIEOKLAHOM	-41.4732	4.8012	<.0001	CountyState	ST CLAIRILLINOIS	-7.4395	4.5096	0.0990
CountyState	PREBLEOHIO	3.1342	4.5096	0.4871	CountyState	STARKILLINOIS	15.6658	4.5096	0.0005
CountyState	PULASKIILLINOIS	-15.1237	4.5096	0.0008	CountyState	STARKOHIO	-11.9632	4.5096	0.0080
CountyState	PUSHMATAHAOKLAHOMA	-53.2334	14.2648	0.0002	CountyState	STEPHENSOKLAHOMA	-40.3842	7.6469	<.0001
CountyState	PUTNAMILLINOIS	12.1921	4.5096	0.0069	CountyState	STEPHENSONILLINOIS	6.7974	4.5096	0.1318
CountyState	PUTNAMOHIO	2.5421	4.5096	0.5730	CountyState	SUMMITOHIO	-17.5026	4.5096	0.0001

Effect	CountyState	Estimate	Standard	Pr > |t|
CountyState	TAZEWELLILLINOIS	17.0605	4.5096	0.0002
CountyState	TEXASOKLAHOMA	23.2316	4.5096	<.0001
CountyState	TILLMANOKLAHOMA	-60.8690	5.4311	<.0001
CountyState	TRUMBULLOHIO	-10.0421	4.5096	0.0260
CountyState	TULSAOKLAHOMA	-49.5274	8.0871	<.0001
CountyState	TUSCARAWASOHIO	-10.9105	4.5096	0.0156
CountyState	UNIONILLINOIS	-18.1763	4.5096	<.0001
CountyState	UNIONOHIO	-3.0474	4.5096	0.4992
CountyState	VAN WERTOHIO	6.7816	4.5096	0.1327
CountyState	VERMILIONILLINOIS	12.7711	4.5096	0.0046
CountyState	VINTONOHIO	-17.3605	4.5096	0.0001
CountyState	WABASHILLINOIS	-9.8605	4.5096	0.0288
CountyState	WAGONEROKLAHOMA	-46.0429	4.8010	<.0001
CountyState	WARRENILLINOIS	19.1658	4.5096	<.0001
CountyState	WARRENOHIO	-2.4711	4.5096	0.5837
CountyState	WASHINGTONILLINOIS	-21.4658	4.5096	<.0001
CountyState	WASHINGTONOHIO	-13.7263	4.5096	0.0023
CountyState	WASHINGTONOKLAHOMA	-56.5792	5.2661	<.0001
CountyState	WASHITAOKLAHOMA	-45.4815	5.8581	<.0001
CountyState	WAYNEILLINOIS	-22.8605	4.5096	<.0001
CountyState	WAYNEOHIO	-6.5421	4.5096	0.1469
CountyState	WHITEILLINOIS	-13.3079	4.5096	0.0032
CountyState	WHITESIDEILLINOIS	7.9026	4.5096	0.0797
CountyState	WILLIAMSOHIO	-6.2605	4.5096	0.1651
CountyState	WILLIAMSONILLINOIS	-30.0711	4.5096	<.0001
CountyState	WILLILLINOIS	-2.5447	4.5096	0.5726
CountyState	WINNEBAGOILLINOIS	1.7447	4.5096	0.6988
CountyState	WOODFORDILLINOIS	15.5868	4.5096	0.0006
CountyState	WOODOHIO	3.1816	4.5096	0.4805
CountyState	WOODSOKLAHOMA	-68.5176	19.9149	0.0006
CountyState	WOODWARDOKLAHOMA	-40.3411	8.6381	<.0001
CountyState	WYANDOTOHIO	0	.	.
Year		1.6591	0.01951	<.0001

Soybean Regression Equation Descriptive Statistics

Effect	CountyState	Estimate	Std. Error	Pr > |t|
Intercept		-672.63	10.6089	<.0001
CountyState	ADAIROKLAHOMA	-10.8410	1.9818	<.0001
CountyState	ADAMSILLINOIS	0.3632	1.2259	0.7671
CountyState	ADAMSOHIO	-4.6579	1.2259	0.0001
CountyState	ALEXANDERILLINOIS	-5.8211	1.2259	<.0001
CountyState	ALFALFAOKLAHOMA	-16.0573	1.7702	<.0001
CountyState	ALLENOHIO	0.9947	1.2259	0.4172
CountyState	ASHLANDOHIO	-2.7368	1.2259	0.0256
CountyState	ASHTABULAOHIO	-4.4658	1.2259	0.0003
CountyState	ATHENSOHIO	-2.4368	1.3450	0.0701
CountyState	ATOKAOKLAHOMA	-12.6275	1.8309	<.0001
CountyState	AUGLAIZEOHIO	0.9316	1.2259	0.4473
CountyState	BEAVEROKLAHOMA	-9.7170	1.9819	<.0001
CountyState	BECKHAMOKLAHOMA	-26.1740	5.4139	<.0001
CountyState	BELMONTOHIO	-8.8471	5.4142	0.1023
CountyState	BLAINEOKLAHOMA	-12.0508	1.8310	<.0001
CountyState	BONDILLINOIS	-5.6500	1.2259	<.0001
CountyState	BOONEILLINOIS	1.7842	1.2259	0.1456
CountyState	BROWNILLINOIS	-0.00526	1.2259	0.9966
CountyState	BROWNOHIO	-3.7526	1.2259	0.0022
CountyState	BRYANOKLAHOMA	-13.1816	1.2259	<.0001
CountyState	BUREAUILLINOIS	6.6921	1.2259	<.0001
CountyState	BUTLEROHIO	-0.9263	1.2259	0.4499
CountyState	CADDOOKLAHOMA	-14.4110	1.3310	<.0001
CountyState	CALHOUNILLINOIS	-0.00526	1.2259	0.9966
CountyState	CANADIANOKLAHOMA	-13.3335	1.2428	<.0001
CountyState	CARROLLILLINOIS	7.3763	1.2259	<.0001
CountyState	CARROLLOHIO	-4.3041	1.2715	0.0007
CountyState	CARTEROKLAHOMA	-8.5307	2.3478	0.0003
CountyState	CASSILLINOIS	3.5342	1.2259	0.0040
CountyState	CHAMPAIGNILLINOIS	6.8368	1.2259	<.0001
CountyState	CHAMPAIGNOHIO	2.0947	1.2259	0.0875
CountyState	CHEROKEEOKLAHOMA	-8.6320	2.8099	0.0021
CountyState	CHOCTAWOKLAHOMA	-12.5516	1.2342	<.0001
CountyState	CHRISTIANILLINOIS	6.1000	1.2259	<.0001
CountyState	CIMARRONOKLAHOMA	-11.1368	2.0787	<.0001
CountyState	CLARKILLINOIS	1.3105	1.2259	0.2851
CountyState	CLARKOHIO	2.8026	1.2259	0.0223
CountyState	CLAYILLINOIS	-7.1763	1.2259	<.0001
CountyState	CLERMONTOHIO	-4.1500	1.2259	0.0007
CountyState	CLEVELANDOKLAHOMA	-14.5492	1.3177	<.0001
CountyState	CLINTONILLINOIS	-4.6237	1.2259	0.0002
CountyState	CLINTONOHIO	2.6342	1.2259	0.0317
CountyState	COALOKLAHOMA	-13.6756	2.0792	<.0001
CountyState	COLESILLINOIS	5.0474	1.2259	<.0001
CountyState	COLUMBIANAOHIO	-2.8219	1.2342	0.0223
CountyState	COMANCHEOKLAHOMA	-23.6407	3.2052	<.0001

Effect	CountyState	Estimate	Std. Error	Pr > |t|	Effect	CountyState	Estimate	Std. Error	Pr > |t|
CountyState	COOKILLINOIS	-3.4789	1.2259	0.0046	CountyState	FAIRFIELDOHIO	0.4263	1.2259	0.7280
CountyState	COSHOCTONOHIO	-1.0605	1.2259	0.3870	CountyState	FAYETTEILLINOIS	-5.7289	1.2259	<.0001
CountyState	COTTONOKLAHOMA	-21.2117	2.3484	<.0001	CountyState	FAYETTEOHIO	2.3737	1.2259	0.0529
CountyState	CRAIGOKLAHOMA	-18.2605	1.2259	<.0001	CountyState	FORDILLINOIS	3.8895	1.2259	0.0015
CountyState	CRAWFORDILLINOIS	-1.9789	1.2259	0.1065	CountyState	FRANKLINILLINOIS	-8.0447	1.2259	<.0001
CountyState	CRAWFORDOHIO	2.0500	1.2259	0.0945	CountyState	FRANKLINOHIO	-1.0079	1.2259	0.4110
CountyState	CREEKOKLAHOMA	-12.9861	1.3052	<.0001	CountyState	FULTONILLINOIS	2.9421	1.2259	0.0164
CountyState	CUMBERLANDILLINOIS	0.4421	1.2259	0.7184	CountyState	FULTONOHIO	2.0500	1.2259	0.0945
CountyState	CUSTEROKLAHOMA	-11.5429	1.3933	<.0001	CountyState	GALLATINILLINOIS	-2.8211	1.2259	0.0214
CountyState	CUYAHOGAOHIO	-6.1966	1.8310	0.0007	CountyState	GALLIAOHIO	-2.4836	1.3601	0.0679
CountyState	DARKEOHIO	2.7868	1.2259	0.0230	CountyState	GARFIELDOKLAHOMA	-17.8685	1.3934	<.0001
CountyState	DE KALBILLINOIS	6.3895	1.2259	<.0001	CountyState	GARVINOKLAHOMA	-11.2342	1.2259	<.0001
CountyState	DE WITTILLINOIS	7.2711	1.2259	<.0001	CountyState	GEAUGAOHIO	-5.3132	1.3761	0.0001
CountyState	DEFIANCEOHIO	-4.3816	1.2259	0.0004	CountyState	GRADYOKLAHOMA	-12.3314	1.2342	<.0001
CountyState	DELAWAREOHIO	-0.5237	1.2259	0.6693	CountyState	GRANTOKLAHOMA	-19.1855	1.5294	<.0001
CountyState	DELAWAREOKLAHOMA	-16.4421	1.2429	<.0001	CountyState	GREENEILLINOIS	3.2316	1.2259	0.0084
CountyState	DEWEYOKLAHOMA	-6.3357	2.5426	0.0127	CountyState	GREENEOHIO	3.1974	1.2259	0.0091
CountyState	DOUGLASILLINOIS	6.5868	1.2259	<.0001	CountyState	GREEROKLAHOMA	-10.2585	3.8767	0.0082
CountyState	DU PAGEILLINOIS	-0.8868	1.2259	0.4695	CountyState	GRUNDYILLINOIS	2.4158	1.2259	0.0488
CountyState	EDGARILLINOIS	5.2316	1.2259	<.0001	CountyState	GUERNSEYOHIO	-3.9869	1.5291	0.0091
CountyState	EDWARDSILLINOIS	-2.6632	1.2259	0.0299	CountyState	HAMILTONILLINOIS	-6.7553	1.2259	<.0001
CountyState	EFFINGHAMILLINOIS	-2.5711	1.2259	0.0360	CountyState	HAMILTONOHIO	-1.3500	1.2259	0.2708
CountyState	ELLISOKLAHOMA	-8.7841	3.2051	0.0061	CountyState	HANCOCKILLINOIS	2.6132	1.2259	0.0331
CountyState	ERIEOHIO	0.4000	1.2259	0.7442	CountyState	HANCOCKOHIO	0.4079	1.2259	0.7394

Effect	CountyState	Estimate	Std. Error	Pr > |t|	Effect	CountyState	Estimate	Std. Error	Pr > |t|
CountyState	HARDINILLINOIS	-7.8079	1.2259	<.0001	CountyState	JOHNSONILLINOIS	-7.1105	1.2259	<.0001
CountyState	HARDINOHIO	0.2158	1.2259	0.8603	CountyState	JOHNSTONOKLAHOMA	-12.6456	1.8309	<.0001
CountyState	HARMONOKLAHOMA	-22.6609	5.4138	<.0001	CountyState	KANEILLINOIS	4.0605	1.2259	0.0009
CountyState	HARPEROKLAHOMA	-19.2508	3.2051	<.0001	CountyState	KANKAKEEILLINOIS	1.9158	1.2259	0.1182
CountyState	HARRISONOHIO	-6.3253	1.7175	0.0002	CountyState	KAYOKLAHOMA	-15.3395	1.2259	<.0001
CountyState	HASKELLOKLAHOMA	-14.3635	1.2429	<.0001	CountyState	KENDALLILLINOIS	2.6263	1.2259	0.0322
CountyState	HENDERSONILLINOIS	5.6921	1.2259	<.0001	CountyState	KINGFISHEROKLAHOMA	-14.0238	1.5926	<.0001
CountyState	HENRYILLINOIS	6.8237	1.2259	<.0001	CountyState	KIOWAOKLAHOMA	-18.4385	2.0788	<.0001
CountyState	HENRYOHIO	2.3342	1.2259	0.0569	CountyState	KNOXILLINOIS	7.7579	1.2259	<.0001
CountyState	HIGHLANDOHIO	-1.2605	1.2259	0.3039	CountyState	KNOXOHIO	-1.1421	1.2259	0.3516
CountyState	HOCKINGOHIO	-1.6193	1.2715	0.2029	CountyState	LA SALLEILLINOIS	5.1000	1.2259	<.0001
CountyState	HOLMESOHIO	-0.9752	1.2519	0.4360	CountyState	LAKEILLINOIS	-6.2553	1.2259	<.0001
CountyState	HUGHESOKLAHOMA	-16.4658	1.2259	<.0001	CountyState	LAKEOHIO	-7.4472	1.9005	<.0001
CountyState	HURONOHIO	-1.9105	1.2259	0.1192	CountyState	LATIMEROKLAHOMA	-12.3131	2.0792	<.0001
CountyState	IROQUOISILLINOIS	3.9684	1.2259	0.0012	CountyState	LAWRENCEILLINOIS	-3.6895	1.2259	0.0026
CountyState	JACKSONILLINOIS	-5.0184	1.2259	<.0001	CountyState	LAWRENCEOHIO	-2.3678	1.4762	0.1088
CountyState	JACKSONOHIO	-2.9243	1.2715	0.0215	CountyState	LEEILLINOIS	4.9684	1.2259	<.0001
CountyState	JACKSONOKLAHOMA	-14.3394	1.5290	<.0001	CountyState	LEFLOREOKLAHOMA	-13.1211	1.2259	<.0001
CountyState	JASPERILLINOIS	-1.5316	1.2259	0.2116	CountyState	LICKINGOHIO	-0.6184	1.2259	0.6140
CountyState	JEFFERSONILLINOIS	-8.4526	1.2259	<.0001	CountyState	LINCOLNOKLAHOMA	-15.4630	1.4530	<.0001
CountyState	JEFFERSONOHIO	-2.5820	2.1989	0.2403	CountyState	LIVINGSTONILLINOIS	4.0342	1.2259	0.0010
CountyState	JEFFERSONOKLAHOMA	-19.0826	3.8770	<.0001	CountyState	LOGANILLINOIS	7.1789	1.2259	<.0001
CountyState	JERSEYILLINOIS	1.2711	1.2259	0.2999	CountyState	LOGANOHIO	-0.3526	1.2259	0.7736
CountyState	JO DAVIESSILLINOIS	4.2974	1.2259	0.0005	CountyState	LOGANOKLAHOMA	-19.1315	1.8296	<.0001

Effect	CountyState	Estimate	Std. Error	Pr > |t|	Effect	CountyState	Estimate	Std. Error	Pr > |t|
CountyState	LORAINOHIO	-5.0395	1.2259	<.0001	CountyState	MENARDILLINOIS	5.5079	1.2259	<.0001
CountyState	LOVEOKLAHOMA	-11.9557	1.9810	<.0001	CountyState	MERCERILLINOIS	6.7447	1.2259	<.0001
CountyState	LUCASOHIO	0.3921	1.2259	0.7491	CountyState	MERCEROHIO	2.0974	1.2259	0.0871
CountyState	MACONILLINOIS	6.7974	1.2259	<.0001	CountyState	MIAMIOHIO	3.0895	1.2259	0.0118
CountyState	MACOUPINILLINOIS	1.9026	1.2259	0.1207	CountyState	MONROEILLINOIS	-2.8868	1.2259	0.0186
CountyState	MADISONILLINOIS	-2.0842	1.2259	0.0891	CountyState	MONROEOHIO	-6.9560	1.8998	0.0003
CountyState	MADISONOHIO	2.3605	1.2259	0.0542	CountyState	MONTGOMERYILLINOIS	0.5474	1.2259	0.6553
CountyState	MAHONINGOHIO	-2.5342	1.2259	0.0387	CountyState	MONTGOMERYOHIO	0.8500	1.2259	0.4881
CountyState	MAJOROKLAHOMA	-11.3340	1.7698	<.0001	CountyState	MORGANILLINOIS	6.9158	1.2259	<.0001
CountyState	MARIONILLINOIS	-6.6368	1.2259	<.0001	CountyState	MORGANOHIO	-2.7460	1.5593	0.0783
CountyState	MARIONOHIO	0.03684	1.2259	0.9760	CountyState	MORROWOHIO	-1.1605	1.2259	0.3438
CountyState	MARSHALLILLINOIS	5.4026	1.2259	<.0001	CountyState	MOULTRIEILLINOIS	6.2579	1.2259	<.0001
CountyState	MARSHALLOKLAHOMA	-18.6139	2.8090	<.0001	CountyState	MURRAYOKLAHOMA	-14.7649	1.8992	<.0001
CountyState	MASONILLINOIS	1.0605	1.2259	0.3870	CountyState	MUSKINGUMOHIO	-0.9297	1.2615	0.4611
CountyState	MASSACILLINOIS	-7.1237	1.2259	<.0001	CountyState	MUSKOGEEOKLAHOMA	-13.3789	1.2259	<.0001
CountyState	MAYESOKLAHOMA	-17.1414	1.2342	<.0001	CountyState	NOBLEOHIO	-4.9189	2.3490	0.0363
CountyState	MCCLAINOKLAHOMA	-12.5895	1.2259	<.0001	CountyState	NOBLEOKLAHOMA	-18.0726	1.4118	<.0001
CountyState	MCCURTAINOKLAHOMA	-14.6974	1.2259	<.0001	CountyState	NOWATAOKLAHOMA	-17.5000	1.2259	<.0001
CountyState	MCDONOUGHILLINOIS	5.9158	1.2259	<.0001	CountyState	OGLEILLINOIS	5.5605	1.2259	<.0001
CountyState	MCHENRYILLINOIS	-0.00526	1.2259	0.9966	CountyState	OKFUSKEEOKLAHOMA	-14.6291	1.2428	<.0001
CountyState	MCINTOSHOKLAHOMA	-16.6551	1.2615	<.0001	CountyState	OKLAHOMAOKLAHOMA	-13.5786	1.4534	<.0001
CountyState	MCLEANILLINOIS	7.4816	1.2259	<.0001	CountyState	OKMULGEEOKLAHOMA	-17.6632	1.2259	<.0001
CountyState	MEDINAOHIO	-3.9763	1.2259	0.0012	CountyState	OSAGEOKLAHOMA	-14.1553	1.2259	<.0001
CountyState	MEIGSOHIO	-2.7398	1.3933	0.0493	CountyState	OTTAWAOHIO	-2.8816	1.2259	0.0188

Effect	CountyState	Estimate	Std. Error	Pr > |t|	Effect	CountyState	Estimate	Std. Error	Pr > |t|
CountyState	OTTAWAOKLAHOMA	-15.5132	1.2259	<.0001	CountyState	ROCK ISLANDILLINOIS	5.2842	1.2259	<.0001
CountyState	PAULDINGOHIO	-2.8526	1.2259	0.0200	CountyState	ROGERSOKLAHOMA	-14.5861	1.2342	<.0001
CountyState	PAWNEEOKLAHOMA	-15.7971	1.2520	<.0001	CountyState	ROSSOHIO	0.5842	1.2259	0.6337
CountyState	PAYNEOKLAHOMA	-15.8266	1.5290	<.0001	CountyState	SALINEILLINOIS	-5.2158	1.2259	<.0001
CountyState	PEORIAILLINOIS	5.1658	1.2259	<.0001	CountyState	SANDUSKYOHIO	-0.4763	1.2259	0.6976
CountyState	PERRYILLINOIS	-7.5184	1.2259	<.0001	CountyState	SANGAMONILLINOIS	7.6263	1.2259	<.0001
CountyState	PERRYOHIO	-1.4078	1.2342	0.2541	CountyState	SCHUYLERILLINOIS	0.6658	1.2259	0.5871
CountyState	PIATTILLINOIS	7.9684	1.2259	<.0001	CountyState	SCIOTOOHIO	-2.4632	1.2259	0.0445
CountyState	PICKAWAYOHIO	0.3342	1.2259	0.7852	CountyState	SCOTTILLINOIS	2.7447	1.2259	0.0252
CountyState	PIKEILLINOIS	1.0211	1.2259	0.4049	CountyState	SEMINOLEOKLAHOMA	-15.2814	1.4532	<.0001
CountyState	PIKEOHIO	-2.7053	1.2259	0.0274	CountyState	SENECAOHIO	-1.3421	1.2259	0.2737
CountyState	PITTSBURGOKLAHOMA	-15.2258	1.3052	<.0001	CountyState	SEQUOYAHOKLAHOMA	-11.4816	1.2259	<.0001
CountyState	PONTOTOCOKLAHOMA	-15.6007	1.7170	<.0001	CountyState	SHELBYILLINOIS	1.2842	1.2259	0.2949
CountyState	POPEILLINOIS	-9.7289	1.2259	<.0001	CountyState	SHELBYOHIO	1.2526	1.2259	0.3069
CountyState	PORTAGEOHIO	-3.8158	1.2259	0.0019	CountyState	ST CLAIRILLINOIS	-1.5184	1.2259	0.2155
CountyState	POTTAWATOMIEOKLAHO	-13.3263	1.2259	<.0001	CountyState	STARKILLINOIS	7.9816	1.2259	<.0001
CountyState	PREBLEOHIO	2.8763	1.2259	0.0190	CountyState	STARKOHIO	-0.9605	1.2259	0.4334
CountyState	PULASKIILLINOIS	-5.2816	1.2259	<.0001	CountyState	STEPHENSOKLAHOMA	-13.0763	2.3479	<.0001
CountyState	PUSHMATAHAOKLAHOMA	-10.8839	2.1988	<.0001	CountyState	STEPHENSONILLINOIS	4.7447	1.2259	0.0001
CountyState	PUTNAMILLINOIS	6.2053	1.2259	<.0001	CountyState	SUMMITOHIO	-4.0495	1.2821	0.0016
CountyState	PUTNAMOHIO	-0.6658	1.2259	0.5871	CountyState	TAZEWELLILLINOIS	7.3895	1.2259	<.0001
CountyState	RANDOLPHILLINOIS	-5.2553	1.2259	<.0001	CountyState	TEXASOKLAHOMA	-6.7944	1.3310	<.0001
CountyState	RICHLANDILLINOIS	-4.9658	1.2259	<.0001	CountyState	TILLMANOKLAHOMA	-16.2582	1.6707	<.0001
CountyState	RICHLANDOHIO	-1.9526	1.2259	0.1112	CountyState	TRUMBULLOHIO	-2.5579	1.2259	0.0370

Effect	CountyState	Estimate	Std. Error	Pr > |t|
CountyState	TULSAOKLAHOMA	-14.5000	1.2259	<.0001
CountyState	TUSCARAWASOHIO	-1.0500	1.2259	0.3918
CountyState	UNIONILLINOIS	-4.9658	1.2259	<.0001
CountyState	UNIONOHIO	-0.8632	1.2259	0.4814
CountyState	VAN WERTOHIO	2.6263	1.2259	0.0322
CountyState	VERMILIONILLINOIS	4.3237	1.2259	0.0004
CountyState	VINTONOHIO	-3.4602	1.8310	0.0588
CountyState	WABASHILLINOIS	-1.7816	1.2259	0.1462
CountyState	WAGONEROKLAHOMA	-12.0026	1.2259	<.0001
CountyState	WARRENILLINOIS	8.8105	1.2259	<.0001
CountyState	WARRENOHIO	-0.9079	1.2259	0.4590
CountyState	WASHINGTONILLINOIS	-6.4263	1.2259	<.0001
CountyState	WASHINGTONOHIO	-1.7907	1.3176	0.1742
CountyState	WASHINGTONOKLAHOMA	-15.8132	1.2259	<.0001
CountyState	WASHITAOKLAHOMA	-7.5555	1.6709	<.0001
CountyState	WAYNEILLINOIS	-6.8474	1.2259	<.0001
CountyState	WAYNEOHIO	0.2711	1.2259	0.8250
CountyState	WHITEILLINOIS	-4.1763	1.2259	0.0007
CountyState	WHITESIDEILLINOIS	5.6132	1.2259	<.0001
CountyState	WILLIAMSOHIO	-2.8763	1.2259	0.0190
CountyState	WILLIAMSONILLINOIS	-8.5053	1.2259	<.0001
CountyState	WILLILLINOIS	-0.05789	1.2259	0.9623
CountyState	WINNEBAGOILLINOIS	1.1658	1.2259	0.3417
CountyState	WOODFORDILLINOIS	7.4684	1.2259	<.0001
CountyState	WOODOHIO	0.5737	1.2259	0.6398
CountyState	WOODSOKLAHOMA	-21.7869	2.5422	<.0001
CountyState	WOODWARDOKLAHOMA	-15.8416	3.2048	<.0001
CountyState	WYANDOTOHIO	0	.	.
Year		0.3566	0.005317	<.0001

Wheat Regression Equation Descriptive Statistics

Effect	CountyState	Estimate	Std Error	Pr > |t|
Intercept		-1039.28	15.9781	<.0001
CountyState	ADAIROKLAHOMA	-20.7314	1.9882	<.0001
CountyState	ADAMSILLINOIS	-3.7447	1.9010	0.0489
CountyState	ADAMSOHIO	-14.0053	1.9010	<.0001
CountyState	ALEXANDERILLINOIS	-10.4289	1.9010	<.0001
CountyState	ALFALFAOKLAHOMA	-20.2605	1.9010	<.0001
CountyState	ALLENOHIO	3.0842	1.9010	0.1048
CountyState	ASHLANDOHIO	-7.1711	1.9010	0.0002
CountyState	ASHTABULAOHIO	-9.2234	1.9138	<.0001
CountyState	ATHENSOHIO	-15.5393	2.7453	<.0001
CountyState	ATOKAOKLAHOMA	-23.8051	1.9882	<.0001
CountyState	AUGLAIZEOHIO	3.1553	1.9010	0.0970
CountyState	BEAVEROKLAHOMA	-29.4105	1.9010	<.0001
CountyState	BECKHAMOKLAHOMA	-27.5789	1.9010	<.0001
CountyState	BELMONTOHIO	-10.2952	2.7458	0.0002
CountyState	BLAINEOKLAHOMA	-23.7132	1.9010	<.0001
CountyState	BONDILLINOIS	-5.1921	1.9010	0.0063
CountyState	BOONEILLINOIS	4.6500	1.9010	0.0145
CountyState	BROWNILLINOIS	-3.9816	1.9010	0.0362
CountyState	BROWNOHIO	-10.5132	1.9010	<.0001
CountyState	BRYANOKLAHOMA	-24.3684	1.9010	<.0001
CountyState	BUREAUILLINOIS	3.5974	1.9010	0.0585
CountyState	BUTLEROHIO	-4.4921	1.9010	0.0181
CountyState	CADDOOKLAHOMA	-20.0132	1.9010	<.0001
CountyState	CALHOUNILLINOIS	-5.4026	1.9010	0.0045
CountyState	CANADIANOKLAHOMA	-21.5316	1.9010	<.0001
CountyState	CARROLLILLINOIS	-2.1422	2.0640	0.2994
CountyState	CARROLLOHIO	-9.0342	1.9010	<.0001
CountyState	CARTEROKLAHOMA	-25.4921	1.9010	<.0001
CountyState	CASSILLINOIS	-6.5605	1.9010	0.0006
CountyState	CHAMPAIGNILLINOIS	6.5025	1.9562	0.0009
CountyState	CHAMPAIGNOHIO	3.2763	1.9010	0.0848
CountyState	CHEROKEEOKLAHOMA	-20.7285	2.0055	<.0001
CountyState	CHOCTAWOKLAHOMA	-23.5263	1.9010	<.0001
CountyState	CHRISTIANILLINOIS	2.2059	1.9138	0.2491
CountyState	CIMARRONOKLAHOMA	-26.1026	1.9010	<.0001
CountyState	CLARKILLINOIS	-2.9816	1.9010	0.1168
CountyState	CLARKOHIO	3.6105	1.9010	0.0576
CountyState	CLAYILLINOIS	-7.8500	1.9010	<.0001
CountyState	CLERMONTOHIO	-9.3592	2.0857	<.0001
CountyState	CLEVELANDOKLAHOMA	-22.8342	1.9010	<.0001
CountyState	CLINTONILLINOIS	-5.6132	1.9010	0.0032
CountyState	CLINTONOHIO	-1.2711	1.9010	0.5038
CountyState	COALOKLAHOMA	-23.7612	1.9882	<.0001
CountyState	COLESILLINOIS	1.8546	1.9138	0.3325
CountyState	COLUMBIANAOHIO	-6.7158	1.9010	0.0004

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	COMANCHEOKLAHOMA	-25.9789	1.9010	<.0001	CountyState	ERIEOHIO	2.3342	1.9010	0.2195
CountyState	COOKILLINOIS	-4.8365	2.1095	0.0219	CountyState	FAIRFIELDOHIO	-2.6000	1.9010	0.1714
CountyState	COSHOCTONOHIO	-7.9026	1.9010	<.0001	CountyState	FAYETTEILLINOIS	-4.9816	1.9010	0.0088
CountyState	COTTONOKLAHOMA	-24.1211	1.9010	<.0001	CountyState	FAYETTEOHIO	2.1895	1.9010	0.2495
CountyState	CRAIGOKLAHOMA	-21.5632	1.9010	<.0001	CountyState	FORDILLINOIS	4.9548	1.9138	0.0096
CountyState	CRAWFORDILLINOIS	-3.9816	1.9010	0.0362	CountyState	FRANKLINILLINOIS	-8.6395	1.9010	<.0001
CountyState	CRAWFORDOHIO	2.1921	1.9010	0.2489	CountyState	FRANKLINOHIO	-0.5605	1.9010	0.7681
CountyState	CREEKOKLAHOMA	-22.5947	1.9010	<.0001	CountyState	FULTONILLINOIS	-3.5079	1.9010	0.0650
CountyState	CUMBERLANDILLINOIS	-2.1395	1.9010	0.2604	CountyState	FULTONOHIO	5.9553	1.9010	0.0017
CountyState	CUSTEROKLAHOMA	-21.3211	1.9010	<.0001	CountyState	GALLATINILLINOIS	-5.1921	1.9010	0.0063
CountyState	CUYAHOGAOHIO	-12.9048	2.8391	<.0001	CountyState	GALLIAOHIO	-14.0048	2.8391	<.0001
CountyState	DARKEOHIO	3.4763	1.9010	0.0675	CountyState	GARFIELDOKLAHOMA	-20.5079	1.9010	<.0001
CountyState	DE KALBILLINOIS	8.5764	1.9138	<.0001	CountyState	GARVINOKLAHOMA	-21.5500	1.9010	<.0001
CountyState	DE WITTILLINOIS	3.3971	2.0861	0.1035	CountyState	GEAUGAOHIO	-11.1917	2.4183	<.0001
CountyState	DEFIANCEOHIO	-3.6947	1.9010	0.0520	CountyState	GRADYOKLAHOMA	-21.3526	1.9010	<.0001
CountyState	DELAWAREOHIO	0.5579	1.9010	0.7692	CountyState	GRANTOKLAHOMA	-21.1579	1.9010	<.0001
CountyState	DELAWAREOKLAHOMA	-20.2737	1.9010	<.0001	CountyState	GREENEILLINOIS	-1.5079	1.9010	0.4277
CountyState	DEWEYOKLAHOMA	-23.5026	1.9010	<.0001	CountyState	GREENEOHIO	-0.1395	1.9010	0.9415
CountyState	DOUGLASILLINOIS	4.9757	2.0434	0.0149	CountyState	GREEROKLAHOMA	-27.8079	1.9010	<.0001
CountyState	DU PAGEILLINOIS	-1.8991	2.1345	0.3737	CountyState	GRUNDYILLINOIS	-1.9440	2.0640	0.3463
CountyState	EDGARILLINOIS	-0.5079	1.9010	0.7893	CountyState	GUERNSEYOHIO	-15.1594	2.8391	<.0001
CountyState	EDWARDSILLINOIS	-7.5079	1.9010	<.0001	CountyState	HAMILTONILLINOIS	-7.7711	1.9010	<.0001
CountyState	EFFINGHAMILLINOIS	-2.2184	1.9010	0.2433	CountyState	HAMILTONOHIO	-5.1601	2.4192	0.0330
CountyState	ELLISOKLAHOMA	-29.7579	1.9010	<.0001	CountyState	HANCOCKILLINOIS	-2.7711	1.9010	0.1450

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	HANCOCKOHIO	3.4263	1.9010	0.0715	CountyState	JO DAVIESSILLINOIS	-3.5190	2.1095	0.0953
CountyState	HARDINILLINOIS	-11.0533	2.1896	<.0001	CountyState	JOHNSONILLINOIS	-11.0557	1.9414	<.0001
CountyState	HARDINOHIO	0.8842	1.9010	0.6419	CountyState	JOHNSTONOKLAHOMA	-24.7868	1.9010	<.0001
CountyState	HARMONOKLAHOMA	-30.9500	1.9010	<.0001	CountyState	KANEILLINOIS	5.9658	1.9010	0.0017
CountyState	HARPEROKLAHOMA	-28.1342	1.9010	<.0001	CountyState	KANKAKEEILLINOIS	4.4658	1.9010	0.0188
CountyState	HARRISONOHIO	-11.8685	2.8391	<.0001	CountyState	KAYOKLAHOMA	-20.0526	1.9010	<.0001
CountyState	HASKELLOKLAHOMA	-23.2290	1.9718	<.0001	CountyState	KENDALLILLINOIS	5.3222	1.9272	0.0058
CountyState	HENDERSONILLINOIS	-5.4251	1.9882	0.0064	CountyState	KINGFISHEROKLAHOMA	-23.9579	1.9010	<.0001
CountyState	HENRYILLINOIS	0.4587	1.9138	0.8106	CountyState	KIOWAOKLAHOMA	-25.2368	1.9010	<.0001
CountyState	HENRYOHIO	6.5605	1.9010	0.0006	CountyState	KNOXILLINOIS	-0.9697	1.9272	0.6149
CountyState	HIGHLANDOHIO	-6.8500	1.9010	0.0003	CountyState	KNOXOHIO	-6.8816	1.9010	0.0003
CountyState	HOCKINGOHIO	-13.5187	2.4191	<.0001	CountyState	LA SALLEILLINOIS	4.9007	1.9138	0.0105
CountyState	HOLMESOHIO	-8.1658	1.9010	<.0001	CountyState	LAKEILLINOIS	-3.0868	1.9010	0.1045
CountyState	HUGHESOKLAHOMA	-23.4184	1.9010	<.0001	CountyState	LAKEOHIO	-13.4866	2.8391	<.0001
CountyState	HURONOHIO	0.3421	1.9010	0.8572	CountyState	LATIMEROKLAHOMA	-18.4565	2.4190	<.0001
CountyState	IROQUOISILLINOIS	5.3079	1.9010	0.0052	CountyState	LAWRENCEILLINOIS	-6.1395	1.9010	0.0012
CountyState	JACKSONILLINOIS	-9.2974	1.9010	<.0001	CountyState	LAWRENCEOHIO	-11.3685	2.8391	<.0001
CountyState	JACKSONOHIO	-14.1118	2.3716	<.0001	CountyState	LEEILLINOIS	4.1457	1.9272	0.0315
CountyState	JACKSONOKLAHOMA	-26.6947	1.9010	<.0001	CountyState	LEFLOREOKLAHOMA	-20.3263	1.9010	<.0001
CountyState	JASPERILLINOIS	-3.5605	1.9010	0.0611	CountyState	LICKINGOHIO	-5.7526	1.9010	0.0025
CountyState	JEFFERSONILLINOIS	-8.8500	1.9010	<.0001	CountyState	LINCOLNOKLAHOMA	-23.8579	1.9010	<.0001
CountyState	JEFFERSONOHIO	-10.9412	2.8391	0.0001	CountyState	LIVINGSTONILLINOIS	5.4395	1.9010	0.0042
CountyState	JEFFERSONOKLAHOMA	-22.4368	1.9010	<.0001	CountyState	LOGANILLINOIS	5.7481	1.9272	0.0029
CountyState	JERSEYILLINOIS	-1.3500	1.9010	0.4776	CountyState	LOGANOHIO	0.4316	1.9010	0.8204

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	LOGANOKLAHOMA	-23.2026	1.9010	<.0001	CountyState	MEIGSOHIO	-14.2062	2.7454	<.0001
CountyState	LORAINOHIO	-6.0079	1.9010	0.0016	CountyState	MENARDILLINOIS	4.3605	1.9010	0.0218
CountyState	LOVEOKLAHOMA	-22.7184	1.9010	<.0001	CountyState	MERCERILLINOIS	-1.3521	1.9562	0.4894
CountyState	LUCASOHIO	5.8000	1.9010	0.0023	CountyState	MERCEROHIO	4.5553	1.9010	0.0166
CountyState	MACONILLINOIS	2.2752	2.0240	0.2610	CountyState	MIAMIOHIO	3.3184	1.9010	0.0809
CountyState	MACOUPINILLINOIS	-0.2974	1.9010	0.8757	CountyState	MONROEILLINOIS	-5.0342	1.9010	0.0081
CountyState	MADISONILLINOIS	-4.4289	1.9010	0.0198	CountyState	MONROEOHIO	-13.4775	2.8391	<.0001
CountyState	MADISONOHIO	3.8816	1.9010	0.0412	CountyState	MONTGOMERYILLINOIS	-0.9026	1.9010	0.6349
CountyState	MAHONINGOHIO	-8.2158	1.9010	<.0001	CountyState	MONTGOMERYOHIO	0.2184	1.9010	0.9085
CountyState	MAJOROKLAHOMA	-24.1684	1.9010	<.0001	CountyState	MORGANILLINOIS	3.8991	1.9138	0.0416
CountyState	MARIONILLINOIS	-6.1132	1.9010	0.0013	CountyState	MORGANOHIO	-11.8774	2.4710	<.0001
CountyState	MARIONOHIO	1.9395	1.9010	0.3076	CountyState	MORROWOHIO	-1.3868	1.9010	0.4657
CountyState	MARSHALLILLINOIS	-2.2318	1.9138	0.2436	CountyState	MOULTRIEILLINOIS	3.2458	2.0239	0.1088
CountyState	MARSHALLOKLAHOMA	-23.1995	1.9138	<.0001	CountyState	MURRAYOKLAHOMA	-24.0009	1.9138	<.0001
CountyState	MASONILLINOIS	-5.3763	1.9010	0.0047	CountyState	MUSKINGUMOHIO	-9.5816	1.9010	<.0001
CountyState	MASSACILLINOIS	-11.6921	1.9010	<.0001	CountyState	MUSKOGEEOKLAHOMA	-22.2737	1.9010	<.0001
CountyState	MAYESOKLAHOMA	-22.1632	1.9010	<.0001	CountyState	NOBLEOHIO	-14.4775	2.8391	<.0001
CountyState	MCCLAINOKLAHOMA	-22.4184	1.9010	<.0001	CountyState	NOBLEOKLAHOMA	-20.8079	1.9010	<.0001
CountyState	MCCURTAINOKLAHOMA	-22.4158	1.9010	<.0001	CountyState	NOWATAOKLAHOMA	-24.1947	1.9010	<.0001
CountyState	MCDONOUGHILLINOIS	-2.8890	1.9562	0.1397	CountyState	OGLEILLINOIS	5.8079	1.9010	0.0023
CountyState	MCHENRYILLINOIS	0.9395	1.9010	0.6212	CountyState	OKFUSKEEOKLAHOMA	-25.4132	1.9010	<.0001
CountyState	MCINTOSHOKLAHOMA	-21.9500	1.9414	<.0001	CountyState	OKLAHOMAOKLAHOMA	-23.9184	1.9010	<.0001
CountyState	MCLEANILLINOIS	5.9395	1.9010	0.0018	CountyState	OKMULGEEOKLAHOMA	-21.9211	1.9010	<.0001
CountyState	MEDINAOHIO	-8.2947	1.9010	<.0001	CountyState	OSAGEOKLAHOMA	-22.6921	1.9010	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	OTTAWAOHIO	0.01579	1.9010	0.9934	CountyState	RICHLANDOHIO	-4.6579	1.9010	0.0143
CountyState	OTTAWAOKLAHOMA	-20.2026	1.9010	<.0001	CountyState	ROCK ISLANDILLINOIS	-1.4140	2.0861	0.4979
CountyState	PAULDINGOHIO	-0.7184	1.9010	0.7055	CountyState	ROGER MILLSOKLAHOMA	-27.2526	1.9010	<.0001
CountyState	PAWNEEOKLAHOMA	-21.9711	1.9010	<.0001	CountyState	ROGERSOKLAHOMA	-22.8079	1.9010	<.0001
CountyState	PAYNEOKLAHOMA	-23.0105	1.9010	<.0001	CountyState	ROSSOHIO	-1.9368	1.9010	0.3083
CountyState	PEORIAILLINOIS	-2.5079	1.9010	0.1871	CountyState	SALINEILLINOIS	-7.1279	1.9138	0.0002
CountyState	PERRYILLINOIS	-10.9289	1.9010	<.0001	CountyState	SANDUSKYOHIO	2.9158	1.9010	0.1251
CountyState	PERRYOHIO	-11.0789	1.9010	<.0001	CountyState	SANGAMONILLINOIS	3.6441	1.9272	0.0587
CountyState	PIATTILLINOIS	6.9610	1.9717	0.0004	CountyState	SCHUYLERILLINOIS	-3.9816	1.9010	0.0362
CountyState	PICKAWAYOHIO	0.7737	1.9010	0.6840	CountyState	SCIOTOOHIO	-11.7283	1.9562	<.0001
CountyState	PIKEILLINOIS	-2.8763	1.9010	0.1303	CountyState	SCOTTILLINOIS	-1.2974	1.9010	0.4950
CountyState	PIKEOHIO	-11.9920	1.9883	<.0001	CountyState	SEMINOLEOKLAHOMA	-25.8474	1.9010	<.0001
CountyState	PITTSBURGOKLAHOMA	-22.2588	1.9272	<.0001	CountyState	SENECAOHIO	0.2079	1.9010	0.9129
CountyState	PONTOTOCOKLAHOMA	-23.4710	1.9138	<.0001	CountyState	SEQUOYAHOKLAHOMA	-19.9895	1.9010	<.0001
CountyState	POPEILLINOIS	-12.0991	2.1345	<.0001	CountyState	SHELBYILLINOIS	-0.8763	1.9010	0.6448
CountyState	PORTAGEOHIO	-7.5895	1.9010	<.0001	CountyState	SHELBYOHIO	1.9211	1.9010	0.3123
CountyState	POTTAWATOMIEOKLAHOMA	-22.8263	1.9010	<.0001	CountyState	ST CLAIRILLINOIS	-4.3237	1.9010	0.0230
CountyState	PREBLEOHIO	0.4158	1.9010	0.8269	CountyState	STARKILLINOIS	0.5237	2.0641	0.7997
CountyState	PULASKIILLINOIS	-10.4289	1.9010	<.0001	CountyState	STARKOHIO	-7.0816	1.9010	0.0002
CountyState	PUSHMATAHAOKLAHOMA	-19.1039	2.4705	<.0001	CountyState	STEPHENSOKLAHOMA	-25.2263	1.9010	<.0001
CountyState	PUTNAMILLINOIS	-1.2841	2.0861	0.5382	CountyState	STEPHENSONILLINOIS	0.6500	1.9010	0.7324
CountyState	PUTNAMOHIO	2.1947	1.9010	0.2483	CountyState	SUMMITOHIO	-11.2436	2.5284	<.0001
CountyState	RANDOLPHILLINOIS	-7.6395	1.9010	<.0001	CountyState	TAZEWELLILLINOIS	0.3605	1.9010	0.8496
CountyState	RICHLANDILLINOIS	-5.7184	1.9010	0.0026	CountyState	TEXASOKLAHOMA	-21.3579	1.9010	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	TILLMANOKLAHOMA	-24.0842	1.9010	<.0001
CountyState	TRUMBULLOHIO	-6.2658	1.9010	0.0010
CountyState	TULSAOKLAHOMA	-22.3184	1.9010	<.0001
CountyState	TUSCARAWASOHIO	-10.0237	1.9010	<.0001
CountyState	UNIONILLINOIS	-10.6117	1.9138	<.0001
CountyState	UNIONOHIO	0.07895	1.9010	0.9669
CountyState	VAN WERTOHIO	5.9632	1.9010	0.0017
CountyState	VERMILIONILLINOIS	5.7553	1.9010	0.0025
CountyState	VINTONOHIO	-12.1139	2.8391	<.0001
CountyState	WABASHILLINOIS	-5.3237	1.9010	0.0051
CountyState	WAGONEROKLAHOMA	-22.3132	1.9010	<.0001
CountyState	WARRENILLINOIS	-2.3516	2.1094	0.2650
CountyState	WARRENOHIO	-4.4316	1.9010	0.0198
CountyState	WASHINGTONILLINOIS	-5.4026	1.9010	0.0045
CountyState	WASHINGTONOHIO	-12.4415	1.9138	<.0001
CountyState	WASHINGTONOKLAHOMA	-23.5105	1.9010	<.0001
CountyState	WASHITAOKLAHOMA	-23.7816	1.9010	<.0001
CountyState	WAYNEILLINOIS	-8.6132	1.9010	<.0001
CountyState	WAYNEOHIO	-3.8158	1.9010	0.0448
CountyState	WHITEILLINOIS	-6.4289	1.9010	0.0007
CountyState	WHITESIDEILLINOIS	-2.2184	1.9010	0.2433
CountyState	WILLIAMSOHIO	-2.1632	1.9010	0.2552
CountyState	WILLIAMSONILLINOIS	-13.4060	1.9272	<.0001
CountyState	WILLILLINOIS	2.5447	1.9010	0.1807
CountyState	WINNEBAGOILLINOIS	0.5447	1.9010	0.7745
CountyState	WOODFORDILLINOIS	0.7553	1.9010	0.6912
CountyState	WOODOHIO	5.5763	1.9010	0.0034
CountyState	WOODSOKLAHOMA	-22.5158	1.9010	<.0001
CountyState	WOODWARDOKLAHOMA	-26.4632	1.9010	<.0001
CountyState	WYANDOTOHIO	0	.	.
Year		0.5490	0.008007	<.0001

Appendix F. Descriptive Statistics County Yield Regression Equations through 2013

Corn Regression Equation Descriptive Statistics

Effect	CountyState	Estimate	Std Error	Pr > |t|
Intercept		-3018.60	34.5854	<.0001
CountyState	ADAIROKLAHOMA	-54.6190	12.6328	<.0001
CountyState	ADAMSILLINOIS	-1.6182	4.5130	0.7199
CountyState	ADAMSOHIO	-22.1909	4.5130	<.0001
CountyState	ALEXANDERILLINOIS	-12.5452	4.5664	0.0060
CountyState	ALFALFAOKLAHOMA	-49.8871	6.8966	<.0001
CountyState	ALLENOHIO	1.5841	4.5130	0.7256
CountyState	ASHLANDOHIO	-11.8909	4.5130	0.0084
CountyState	ASHTABULAOHIO	-15.8000	4.5130	0.0005
CountyState	ATHENSOHIO	-19.9159	4.5130	<.0001
CountyState	ATOKAOKLAHOMA	-57.2614	7.4199	<.0001
CountyState	AUGLAIZEOHIO	-2.1409	4.5130	0.6352
CountyState	BEAVEROKLAHOMA	6.7013	4.7571	0.1590
CountyState	BECKHAMOKLAHOMA	-51.7477	11.0546	<.0001
CountyState	BELMONTOHIO	-25.3840	4.7574	<.0001
CountyState	BLAINEOKLAHOMA	-43.7527	7.7446	<.0001
CountyState	BONDILLINOIS	-18.8061	4.5391	<.0001
CountyState	BOONEILLINOIS	7.5154	4.5391	0.0978
CountyState	BROWNILLINOIS	-3.9205	4.5130	0.3850
CountyState	BROWNOHIO	-10.8386	4.5130	0.0163
CountyState	BRYANOKLAHOMA	-43.6016	4.6555	<.0001
CountyState	BUREAUILLINOIS	15.4864	4.5130	0.0006
CountyState	BUTLEROHIO	-9.4523	4.5130	0.0362
CountyState	CADDOOKLAHOMA	-29.8709	4.9636	<.0001
CountyState	CALHOUNILLINOIS	-4.6991	4.5391	0.3006
CountyState	CANADIANOKLAHOMA	-38.2206	4.8340	<.0001
CountyState	CARROLLILLINOIS	15.7591	4.5130	0.0005
CountyState	CARROLLOHIO	-25.2109	4.5391	<.0001
CountyState	CARTEROKLAHOMA	-41.9705	7.1359	<.0001
CountyState	CASSILLINOIS	15.1818	4.5130	0.0008
CountyState	CHAMPAIGNILLINOIS	17.8727	4.5130	<.0001
CountyState	CHAMPAIGNOHIO	2.9909	4.5130	0.5075
CountyState	CHEROKEEOKLAHOMA	-51.7221	12.6351	<.0001
CountyState	CHOCTAWOKLAHOMA	-41.4837	4.5664	<.0001
CountyState	CHRISTIANILLINOIS	23.7409	4.5130	<.0001
CountyState	CIMARRONOKLAHOMA	14.0028	4.6555	0.0026
CountyState	CLARKILLINOIS	1.2265	4.5391	0.7870
CountyState	CLARKOHIO	6.7523	4.5130	0.1346
CountyState	CLAYILLINOIS	-22.2893	4.5391	<.0001
CountyState	CLERMONTOHIO	-11.3828	4.5391	0.0122
CountyState	CLEVELANDOKLAHOMA	-41.4864	4.7218	<.0001
CountyState	CLINTONILLINOIS	-17.7341	4.5130	<.0001
CountyState	CLINTONOHIO	7.5455	4.5130	0.0946

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	COALOKLAHOMA	-62.1933	21.4097	0.0037	CountyState	EDWARDSILLINOIS	-16.4205	4.5130	0.0003
CountyState	COLESILLINOIS	15.2273	4.5130	0.0007	CountyState	EFFINGHAMILLINOIS	-8.8477	4.5130	0.0500
CountyState	COLUMBIANAOHIO	-11.4477	4.5130	0.0112	CountyState	ELLISOKLAHOMA	-8.8035	5.4469	0.1061
CountyState	COMANCHEOKLAHOMA	-56.5440	7.1366	<.0001	CountyState	ERIEOHIO	3.9750	4.5130	0.3784
CountyState	COOKILLINOIS	-10.1841	4.6245	0.0277	CountyState	FAIRFIELDOHIO	-2.1000	4.5130	0.6417
CountyState	COSHOCTONOHIO	-1.8932	4.5130	0.6749	CountyState	FAYETTEILLINOIS	-15.7250	4.5130	0.0005
CountyState	COTTONOKLAHOMA	-77.9166	9.2136	<.0001	CountyState	FAYETTEOHIO	2.4833	4.5391	0.5843
CountyState	CRAIGOKLAHOMA	-57.4288	4.5391	<.0001	CountyState	FORDILLINOIS	4.8841	4.5130	0.2792
CountyState	CRAWFORDILLINOIS	-8.1091	4.5130	0.0724	CountyState	FRANKLINILLINOIS	-30.9568	4.5130	<.0001
CountyState	CRAWFORDOHIO	5.2864	4.5130	0.2415	CountyState	FRANKLINOHIO	-6.2656	4.5664	0.1701
CountyState	CREEKOKLAHOMA	-57.5633	9.9949	<.0001	CountyState	FULTONILLINOIS	4.5841	4.5130	0.3098
CountyState	CUMBERLANDILLINOIS	-0.03864	4.5130	0.9932	CountyState	FULTONOHIO	6.9932	4.5130	0.1213
CountyState	CUSTEROKLAHOMA	-46.2771	4.9636	<.0001	CountyState	GALLATINILLINOIS	-4.9955	4.5130	0.2684
CountyState	CUYAHOGAOHIO	-17.0955	6.8991	0.0132	CountyState	GALLIAOHIO	-19.5341	4.5948	<.0001
CountyState	DARKEOHIO	1.9864	4.5130	0.6598	CountyState	GARFIELDOKLAHOMA	-47.6435	6.3294	<.0001
CountyState	DE KALBILLINOIS	18.8205	4.5130	<.0001	CountyState	GARVINOKLAHOMA	-35.0152	4.6554	<.0001
CountyState	DE WITTILLINOIS	19.6823	4.5391	<.0001	CountyState	GEAUGAOHIO	-18.8055	4.5664	<.0001
CountyState	DEFIANCEOHIO	-7.2591	4.5130	0.1078	CountyState	GRADYOKLAHOMA	-42.0587	4.7572	<.0001
CountyState	DELAWAREOHIO	-4.2159	4.5130	0.3502	CountyState	GRANTOKLAHOMA	-56.5056	5.0124	<.0001
CountyState	DELAWAREOKLAHOMA	-63.9250	7.7451	<.0001	CountyState	GREENEILLINOIS	4.0659	4.5130	0.3676
CountyState	DEWEYOKLAHOMA	-56.6786	6.4953	<.0001	CountyState	GREENEOHIO	6.3250	4.5130	0.1611
CountyState	DOUGLASILLINOIS	14.4250	4.5130	0.0014	CountyState	GREEROKLAHOMA	-30.7728	11.0567	0.0054
CountyState	DU PAGEILLINOIS	-2.2656	4.6555	0.6265	CountyState	GRUNDYILLINOIS	7.2705	4.5130	0.1072
CountyState	EDGARILLINOIS	13.6977	4.5130	0.0024	CountyState	GUERNSEYOHIO	-20.2854	4.5391	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	HAMILTONILLINOIS	-21.8500	4.5130	<.0001	CountyState	JEFFERSONOHIO	-23.4139	4.6555	<.0001
CountyState	HAMILTONOHIO	-9.3200	4.5391	0.0401	CountyState	JEFFERSONOKLAHOMA	-43.6160	21.4100	0.0417
CountyState	HANCOCKILLINOIS	5.7591	4.5130	0.2019	CountyState	JERSEYILLINOIS	2.4386	4.5130	0.5890
CountyState	HANCOCKOHIO	1.8477	4.5130	0.6822	CountyState	JO DAVIESSILLINOIS	4.7614	4.5130	0.2914
CountyState	HARDINILLINOIS	-31.7023	4.6555	<.0001	CountyState	JOHNSONILLINOIS	-27.6335	4.5391	<.0001
CountyState	HARDINOHIO	-0.6295	4.5130	0.8891	CountyState	JOHNSTONOKLAHOMA	-38.5658	5.5294	<.0001
CountyState	HARMONOKLAHOMA	-46.2095	7.4156	<.0001	CountyState	KANEILLINOIS	13.8318	4.5130	0.0022
CountyState	HARPEROKLAHOMA	-5.3934	5.7088	0.3448	CountyState	KANKAKEEILLINOIS	3.7273	4.5130	0.4089
CountyState	HARRISONOHIO	-25.3026	4.5664	<.0001	CountyState	KAYOKLAHOMA	-57.6003	4.9641	<.0001
CountyState	HASKELLOKLAHOMA	-44.9501	5.1748	<.0001	CountyState	KENDALLILLINOIS	6.5750	4.5130	0.1452
CountyState	HENDERSONILLINOIS	15.4932	4.5130	0.0006	CountyState	KINGFISHEROKLAHOMA	-45.7136	6.4958	<.0001
CountyState	HENRYILLINOIS	11.4205	4.5130	0.0114	CountyState	KIOWAOKLAHOMA	-40.0102	8.1359	<.0001
CountyState	HENRYOHIO	7.8364	4.5130	0.0825	CountyState	KNOXILLINOIS	15.1591	4.5130	0.0008
CountyState	HIGHLANDOHIO	-5.5977	4.5130	0.2149	CountyState	KNOXOHIO	-5.8227	4.5130	0.1970
CountyState	HOCKINGOHIO	-13.1063	4.5391	0.0039	CountyState	LA SALLEILLINOIS	12.6273	4.5130	0.0052
CountyState	HOLMESOHIO	-8.7273	4.5130	0.0532	CountyState	LAKEILLINOIS	-19.0402	4.5948	<.0001
CountyState	HUGHESOKLAHOMA	-46.6124	4.7944	<.0001	CountyState	LAKEOHIO	-21.9705	6.8991	0.0015
CountyState	HURONOHIO	-0.6341	4.5130	0.8883	CountyState	LATIMEROKLAHOMA	-46.4114	12.6327	0.0002
CountyState	IROQUOISILLINOIS	8.1750	4.5130	0.0701	CountyState	LAWRENCEILLINOIS	-12.2381	4.5664	0.0074
CountyState	JACKSONILLINOIS	-23.0795	4.5130	<.0001	CountyState	LAWRENCEOHIO	-21.8186	4.6245	<.0001
CountyState	JACKSONOHIO	-19.7990	4.5948	<.0001	CountyState	LEEILLINOIS	12.9977	4.5130	0.0040
CountyState	JACKSONOKLAHOMA	-51.7741	9.9902	<.0001	CountyState	LEFLOREOKLAHOMA	-53.6602	5.7095	<.0001
CountyState	JASPERILLINOIS	-8.8295	4.5130	0.0504	CountyState	LICKINGOHIO	-5.9477	4.5130	0.1876
CountyState	JEFFERSONILLINOIS	-29.2800	4.5391	<.0001	CountyState	LINCOLNOKLAHOMA	-53.9277	5.7087	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	LIVINGSTONILLINOIS	7.3545	4.5130	0.1032	CountyState	MCINTOSHOKLAHOMA	-52.1953	5.1182	<.0001
CountyState	LOGANILLINOIS	20.6705	4.5130	<.0001	CountyState	MCLEANILLINOIS	18.1364	4.5130	<.0001
CountyState	LOGANOHIO	-2.3159	4.5130	0.6078	CountyState	MEDINAOHIO	-15.0955	4.5130	0.0008
CountyState	LOGANOKLAHOMA	-60.1750	7.7446	<.0001	CountyState	MEIGSOHIO	-23.2843	4.5664	<.0001
CountyState	LORAINOHIO	-11.8841	4.5130	0.0085	CountyState	MENARDILLINOIS	18.6660	4.5391	<.0001
CountyState	LOVEOKLAHOMA	-49.2427	6.1826	<.0001	CountyState	MERCERILLINOIS	13.1886	4.5130	0.0035
CountyState	LUCASOHIO	8.4182	4.5130	0.0622	CountyState	MERCEROHIO	1.1273	4.5130	0.8028
CountyState	MACONILLINOIS	24.6364	4.5130	<.0001	CountyState	MIAMIOHIO	3.5409	4.5130	0.4327
CountyState	MACOUPINILLINOIS	7.0909	4.5130	0.1162	CountyState	MONROEILLINOIS	-13.9682	4.5130	0.0020
CountyState	MADISONILLINOIS	-7.0932	4.5130	0.1160	CountyState	MONROEOHIO	-24.5277	4.7575	<.0001
CountyState	MADISONOHIO	4.1386	4.5130	0.3591	CountyState	MONTGOMERYILLINOIS	6.3136	4.5130	0.1618
CountyState	MAHONINGOHIO	-14.1955	4.5130	0.0017	CountyState	MONTGOMERYOHIO	-4.6864	4.5130	0.2991
CountyState	MAJOROKLAHOMA	-19.5178	4.8749	<.0001	CountyState	MORGANILLINOIS	20.6386	4.5130	<.0001
CountyState	MARIONILLINOIS	-23.8341	4.5130	<.0001	CountyState	MORGANOHIO	-18.9841	4.5130	<.0001
CountyState	MARIONOHIO	-1.0386	4.5130	0.8180	CountyState	MORROWOHIO	-6.7682	4.5130	0.1337
CountyState	MARSHALLILLINOIS	12.1727	4.5130	0.0070	CountyState	MOULTRIEILLINOIS	23.2591	4.5130	<.0001
CountyState	MARSHALLOKLAHOMA	-44.2492	5.1174	<.0001	CountyState	MURRAYOKLAHOMA	-54.7182	7.4156	<.0001
CountyState	MASONILLINOIS	3.7727	4.5130	0.4032	CountyState	MUSKINGUMOHIO	-6.8955	4.5130	0.1266
CountyState	MASSACILLINOIS	-18.9614	4.5391	<.0001	CountyState	MUSKOGEEOKLAHOMA	-39.3991	4.5664	<.0001
CountyState	MAYESOKLAHOMA	-60.5290	4.5391	<.0001	CountyState	NOBLEOHIO	-27.4490	4.7219	<.0001
CountyState	MCCLAINOKLAHOMA	-40.9591	4.7571	<.0001	CountyState	NOBLEOKLAHOMA	-84.7355	6.8983	<.0001
CountyState	MCCURTAINOKLAHOMA	-53.5736	4.8748	<.0001	CountyState	NOWATAOKLAHOMA	-54.7773	4.8335	<.0001
CountyState	MCDONOUGHILLINOIS	16.7568	4.5130	0.0002	CountyState	OGLEILLINOIS	13.0273	4.5130	0.0039
CountyState	MCHENRYILLINOIS	1.1114	4.5130	0.8055	CountyState	OKFUSKEEOKLAHOMA	-53.2170	5.7085	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	OKLAHOMAOKLAHOMA	-43.5382	4.7216	<.0001	CountyState	PUTNAMOHIO	1.9477	4.5130	0.6661
CountyState	OKMULGEEOKLAHOMA	-50.0192	4.6880	<.0001	CountyState	RANDOLPHILLINOIS	-26.9247	4.5391	<.0001
CountyState	OSAGEOKLAHOMA	-52.2897	5.5288	<.0001	CountyState	RICHLANDILLINOIS	-23.0773	4.5130	<.0001
CountyState	OTTAWAOHIO	-2.5205	4.5130	0.5765	CountyState	RICHLANDOHIO	-7.2045	4.5130	0.1104
CountyState	OTTAWAOKLAHOMA	-53.8603	4.6244	<.0001	CountyState	ROCK ISLANDILLINOIS	10.9828	4.5391	0.0156
CountyState	PAULDINGOHIO	-3.0182	4.5130	0.5037	CountyState	ROGER MILLSOKLAHOMA	-28.1448	12.6327	0.0259
CountyState	PAWNEEOKLAHOMA	-47.8404	6.6847	<.0001	CountyState	ROGERSOKLAHOMA	-56.9999	5.6144	<.0001
CountyState	PAYNEOKLAHOMA	-58.1695	6.3297	<.0001	CountyState	ROSSOHIO	-5.2195	4.5391	0.2502
CountyState	PEORIAILLINOIS	11.2886	4.5130	0.0124	CountyState	SALINEILLINOIS	-20.2568	4.5130	<.0001
CountyState	PERRYILLINOIS	-34.9000	4.5130	<.0001	CountyState	SANDUSKYOHIO	4.6568	4.5130	0.3022
CountyState	PERRYOHIO	-6.8727	4.5130	0.1278	CountyState	SANGAMONILLINOIS	24.2159	4.5130	<.0001
CountyState	PIATTILLINOIS	24.4455	4.5130	<.0001	CountyState	SCHUYLERILLINOIS	0.6591	4.5130	0.8839
CountyState	PICKAWAYOHIO	-4.7182	4.5130	0.2958	CountyState	SCIOTOOHIO	-18.1686	4.5391	<.0001
CountyState	PIKEILLINOIS	1.3364	4.5130	0.7671	CountyState	SCOTTILLINOIS	9.1409	4.5130	0.0428
CountyState	PIKEOHIO	-17.5283	4.5664	0.0001	CountyState	SEMINOLEOKLAHOMA	-55.5959	9.9898	<.0001
CountyState	PITTSBURGOKLAHOMA	-48.0365	6.0450	<.0001	CountyState	SENECAOHIO	-1.2795	4.5130	0.7768
CountyState	PONTOTOCOKLAHOMA	-44.1160	6.6850	<.0001	CountyState	SEQUOYAHOKLAHOMA	-29.7896	4.7574	<.0001
CountyState	POPEILLINOIS	-34.7305	4.6555	<.0001	CountyState	SHELBYILLINOIS	7.7864	4.5130	0.0845
CountyState	PORTAGEOHIO	-17.3784	4.5391	0.0001	CountyState	SHELBYOHIO	-0.02727	4.5130	0.9952
CountyState	POTTAWATOMIEOKLAHOMA	-46.3404	4.7574	<.0001	CountyState	ST CLAIRILLINOIS	-8.8932	4.5130	0.0488
CountyState	PREBLEOHIO	1.5023	4.5130	0.7392	CountyState	STARKILLINOIS	16.7205	4.5130	0.0002
CountyState	PULASKIILLINOIS	-15.5341	4.5130	0.0006	CountyState	STARKOHIO	-12.0455	4.5130	0.0076
CountyState	PUSHMATAHAOKLAHOMA	-54.9047	15.3085	0.0003	CountyState	STEPHENSOKLAHOMA	-44.1558	7.7445	<.0001
CountyState	PUTNAMILLINOIS	13.8898	4.5391	0.0022	CountyState	STEPHENSONILLINOIS	7.5682	4.5130	0.0936

Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	SUMMITOHIO	-18.8593	4.6245	<.0001
CountyState	TAZEWELLILLINOIS	17.1455	4.5130	0.0001
CountyState	TEXASOKLAHOMA	22.1628	4.5948	<.0001
CountyState	TILLMANOKLAHOMA	-61.0481	5.6144	<.0001
CountyState	TRUMBULLOHIO	-8.9886	4.5130	0.0464
CountyState	TULSAOKLAHOMA	-50.5147	8.6163	<.0001
CountyState	TUSCARAWASOHIO	-11.1432	4.5130	0.0136
CountyState	UNIONILLINOIS	-19.7750	4.5130	<.0001
CountyState	UNIONOHIO	-1.7045	4.5130	0.7057
CountyState	VAN WERTOHIO	4.8977	4.5130	0.2778
CountyState	VERMILIONILLINOIS	11.5727	4.5130	0.0104
CountyState	VINTONOHIO	-16.7573	4.6555	0.0003
CountyState	WABASHILLINOIS	-11.0091	4.5130	0.0147
CountyState	WAGONEROKLAHOMA	-53.0984	4.8335	<.0001
CountyState	WARRENILLINOIS	20.1795	4.5130	<.0001
CountyState	WARRENOHIO	-1.9955	4.5130	0.6584
CountyState	WASHINGTONILLINOIS	-21.9545	4.5130	<.0001
CountyState	WASHINGTONOHIO	-13.9023	4.5130	0.0021
CountyState	WASHINGTONOKLAHOMA	-59.1254	5.4468	<.0001
CountyState	WASHITAOKLAHOMA	-44.0907	5.9225	<.0001
CountyState	WAYNEILLINOIS	-23.5068	4.5130	<.0001
CountyState	WAYNEOHIO	-6.6705	4.5130	0.1394
CountyState	WHITEILLINOIS	-12.6000	4.5130	0.0052
CountyState	WHITESIDEILLINOIS	8.7364	4.5130	0.0529
CountyState	WILLIAMSOHIO	-7.2432	4.5130	0.1085
CountyState	WILLIAMSONILLINOIS	-29.9409	4.5130	<.0001
CountyState	WILLILLINOIS	-2.0068	4.5130	0.6566
CountyState	WINNEBAGOILLINOIS	1.9386	4.5130	0.6675
CountyState	WOODFORDILLINOIS	16.2636	4.5130	0.0003
CountyState	WOODOHIO	2.9659	4.5130	0.5111
CountyState	WOODSOKLAHOMA	-69.6569	21.4083	0.0011
CountyState	WOODWARDOKLAHOMA	-49.8500	8.1366	<.0001
CountyState	WYANDOTOHIO	0	.	.
Year		1.5773	0.01729	<.0001

Soybean Regression Equation Descriptive Statistics

Effect	CountyState	Estimate	Std Error	Pr > |t|
Intercept		-696.95	8.9194	<.0001
CountyState	ADAIROKLAHOMA	-10.9107	1.9977	<.0001
CountyState	ADAMSILLINOIS	0.01136	1.1637	0.9922
CountyState	ADAMSOHIO	-4.4054	1.1704	0.0002
CountyState	ALEXANDERILLINOIS	-5.9559	1.1775	<.0001
CountyState	ALFALFAOKLAHOMA	-16.7320	1.5940	<.0001
CountyState	ALLENOHIO	0.8273	1.1637	0.4772
CountyState	ASHLANDOHIO	-2.5227	1.1637	0.0302
CountyState	ASHTABULAOHIO	-4.0523	1.1637	0.0005
CountyState	ATHENSOHIO	-2.3909	1.2681	0.0594
CountyState	ATOKAOKLAHOMA	-12.6669	1.8413	<.0001
CountyState	AUGLAIZEOHIO	0.8955	1.1637	0.4416
CountyState	BEAVEROKLAHOMA	-10.0553	1.9972	<.0001
CountyState	BECKHAMOKLAHOMA	-26.5150	5.5200	<.0001
CountyState	BELMONTOHIO	-8.8552	5.5205	0.1087
CountyState	BLAINEOKLAHOMA	-11.0015	1.7238	<.0001
CountyState	BONDILLINOIS	-5.7230	1.1704	<.0001
CountyState	BOONEILLINOIS	2.1159	1.1637	0.0691
CountyState	BROWNILLINOIS	-0.4659	1.1637	0.6889
CountyState	BROWNOHIO	-3.6591	1.1637	0.0017
CountyState	BRYANOKLAHOMA	-13.6380	1.1848	<.0001
CountyState	BUREAUILLINOIS	6.7273	1.1637	<.0001
CountyState	BUTLEROHIO	-1.6318	1.1637	0.1609
CountyState	CADDOOKLAHOMA	-14.6402	1.3195	<.0001
CountyState	CALHOUNILLINOIS	-0.1393	1.1704	0.9053
CountyState	CANADIANOKLAHOMA	-14.6235	1.2004	<.0001
CountyState	CARROLLILLINOIS	7.9114	1.1637	<.0001
CountyState	CARROLLOHIO	-4.9576	1.2266	<.0001
CountyState	CARTEROKLAHOMA	-8.6333	2.3759	0.0003
CountyState	CASSILLINOIS	3.5091	1.1637	0.0026
CountyState	CHAMPAIGNILLINOIS	6.7864	1.1637	<.0001
CountyState	CHAMPAIGNOHIO	1.9659	1.1637	0.0912
CountyState	CHEROKEEOKLAHOMA	-8.6585	2.8515	0.0024
CountyState	CHOCTAWOKLAHOMA	-12.8353	1.2088	<.0001
CountyState	CHRISTIANILLINOIS	6.5795	1.1637	<.0001
CountyState	CIMARRONOKLAHOMA	-11.3607	2.0979	<.0001
CountyState	CLARKILLINOIS	0.9227	1.1637	0.4278
CountyState	CLARKOHIO	2.7750	1.1637	0.0171
CountyState	CLAYILLINOIS	-7.6136	1.1637	<.0001
CountyState	CLERMONTOHIO	-4.4227	1.1637	0.0001
CountyState	CLEVELANDOKLAHOMA	-15.0455	1.2926	<.0001
CountyState	CLINTONILLINOIS	-4.9159	1.1637	<.0001
CountyState	CLINTONOHIO	2.5227	1.1637	0.0302
CountyState	COALOKLAHOMA	-15.4544	1.9972	<.0001
CountyState	COLESILLINOIS	5.0432	1.1637	<.0001
CountyState	COLUMBIANAOHIO	-2.3957	1.1704	0.0407

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
					CountyState	ELLISOKLAHOMA	-9.1128	3.2571	0.0052
CountyState	COMANCHEOKLAHOMA	-23.9817	3.2572	<.0001	CountyState	ERIEOHIO	0.5114	1.1637	0.6604
CountyState	COOKILLINOIS	-3.6782	1.2088	0.0024	CountyState	FAIRFIELDOHIO	0.7909	1.1637	0.4967
CountyState	COSHOCTONOHIO	-0.9659	1.1637	0.4065	CountyState	FAYETTEILLINOIS	-5.5205	1.1637	<.0001
CountyState	COTTONOKLAHOMA	-21.5610	2.3757	<.0001	CountyState	FAYETTEOHIO	2.4893	1.1704	0.0335
CountyState	CRAIGOKLAHOMA	-19.0818	1.1637	<.0001	CountyState	FORDILLINOIS	3.4591	1.1637	0.0030
CountyState	CRAWFORDILLINOIS	-2.3523	1.1637	0.0433	CountyState	FRANKLINILLINOIS	-8.2886	1.1637	<.0001
CountyState	CRAWFORDOHIO	2.2523	1.1637	0.0530	CountyState	FRANKLINOHIO	-0.8378	1.1775	0.4768
CountyState	CREEKOKLAHOMA	-13.2119	1.2801	<.0001	CountyState	FULTONILLINOIS	2.8727	1.1637	0.0136
CountyState	CUMBERLANDILLINOIS	0.3364	1.1637	0.7726	CountyState	FULTONOHIO	2.1015	1.1704	0.0726
CountyState	CUSTEROKLAHOMA	-11.4976	1.3670	<.0001	CountyState	GALLATINILLINOIS	-2.9023	1.1637	0.0126
CountyState	CUYAHOGAOHIO	-6.2294	1.8414	0.0007	CountyState	GALLIAOHIO	-2.3208	1.2799	0.0698
CountyState	DARKEOHIO	2.5455	1.1637	0.0287	CountyState	GARFIELDOKLAHOMA	-19.3899	1.3196	<.0001
CountyState	DE KALBILLINOIS	6.6114	1.1637	<.0001	CountyState	GARVINOKLAHOMA	-11.4329	1.1925	<.0001
CountyState	DE WITTILLINOIS	7.4770	1.1704	<.0001	CountyState	GEAUGAOHIO	-4.5765	1.3055	0.0005
CountyState	DEFIANCEOHIO	-4.8409	1.1637	<.0001	CountyState	GRADYOKLAHOMA	-13.4164	1.1848	<.0001
CountyState	DELAWAREOHIO	-0.4318	1.1637	0.7106	CountyState	GRANTOKLAHOMA	-19.9489	1.4255	<.0001
CountyState	DELAWAREOKLAHOMA	-17.2048	1.1925	<.0001	CountyState	GREENEILLINOIS	3.2205	1.1637	0.0057
CountyState	DEWEYOKLAHOMA	-6.6422	2.5761	0.0099	CountyState	GREENEOHIO	3.2432	1.1637	0.0053
CountyState	DOUGLASILLINOIS	6.4955	1.1637	<.0001	CountyState	GREEROKLAHOMA	-10.4762	3.9463	0.0080
CountyState	DU PAGEILLINOIS	-1.0861	1.2088	0.3690	CountyState	GRUNDYILLINOIS	2.4932	1.1637	0.0322
CountyState	EDGARILLINOIS	5.1250	1.1637	<.0001	CountyState	GUERNSEYOHIO	-4.0175	1.4477	0.0055
CountyState	EDWARDSILLINOIS	-2.8500	1.1637	0.0143	CountyState	HAMILTONILLINOIS	-7.0205	1.1637	<.0001
CountyState	EFFINGHAMILLINOIS	-2.4273	1.1637	0.0370	CountyState	HAMILTONOHIO	-1.4023	1.1637	0.2282

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	HANCOCKILLINOIS	2.6136	1.1637	0.0247	CountyState	JERSEYILLINOIS	1.3227	1.1637	0.2557
CountyState	HANCOCKOHIO	0.2045	1.1637	0.8605	CountyState	JO DAVIESSILLINOIS	4.0409	1.1637	0.0005
CountyState	HARDINILLINOIS	-8.4045	1.2005	<.0001	CountyState	JOHNSONILLINOIS	-7.3749	1.1775	<.0001
CountyState	HARDINOHIO	0.3568	1.1637	0.7591	CountyState	JOHNSTONOKLAHOMA	-12.6851	1.8413	<.0001
CountyState	HARMONOKLAHOMA	-22.9773	5.5200	<.0001	CountyState	KANEILLINOIS	4.1909	1.1637	0.0003
CountyState	HARPEROKLAHOMA	-19.5795	3.2571	<.0001	CountyState	KANKAKEEILLINOIS	1.6841	1.1637	0.1479
CountyState	HARRISONOHIO	-5.6694	1.5272	0.0002	CountyState	KAYOKLAHOMA	-16.7023	1.1637	<.0001
CountyState	HASKELLOKLAHOMA	-14.5514	1.2268	<.0001	CountyState	KENDALLILLINOIS	2.7159	1.1637	0.0196
CountyState	HENDERSONILLINOIS	5.7159	1.1637	<.0001	CountyState	KINGFISHEROKLAHOMA	-12.7620	1.4254	<.0001
CountyState	HENRYILLINOIS	6.8841	1.1637	<.0001	CountyState	KIOWAOKLAHOMA	-18.7009	2.0979	<.0001
CountyState	HENRYOHIO	2.2409	1.1637	0.0542	CountyState	KNOXILLINOIS	8.0045	1.1637	<.0001
CountyState	HIGHLANDOHIO	-1.3250	1.1637	0.2549	CountyState	KNOXOHIO	-1.1518	1.1704	0.3251
CountyState	HOCKINGOHIO	-1.5149	1.2004	0.2070	CountyState	LA SALLEILLINOIS	5.1955	1.1637	<.0001
CountyState	HOLMESOHIO	-0.9652	1.1848	0.4153	CountyState	LAKEILLINOIS	-6.2909	1.1775	<.0001
CountyState	HUGHESOKLAHOMA	-16.6650	1.2088	<.0001	CountyState	LAKEOHIO	-7.4837	1.9135	<.0001
CountyState	HURONOHIO	-1.7295	1.1637	0.1372	CountyState	LATIMEROKLAHOMA	-12.3982	2.0986	<.0001
CountyState	IROQUOISILLINOIS	3.5932	1.1637	0.0020	CountyState	LAWRENCEILLINOIS	-3.8886	1.1637	0.0008
CountyState	JACKSONILLINOIS	-5.2614	1.1637	<.0001	CountyState	LAWRENCEOHIO	-3.4395	1.3851	0.0130
CountyState	JACKSONOHIO	-2.6123	1.2266	0.0332	CountyState	LEEILLINOIS	5.1409	1.1637	<.0001
CountyState	JACKSONOKLAHOMA	-14.5262	1.5273	<.0001	CountyState	LEFLOREOKLAHOMA	-13.6695	1.2005	<.0001
CountyState	JASPERILLINOIS	-1.9523	1.1637	0.0934	CountyState	LICKINGOHIO	-0.5295	1.1637	0.6491
CountyState	JEFFERSONILLINOIS	-8.8727	1.1637	<.0001	CountyState	LINCOLNOKLAHOMA	-15.9567	1.4252	<.0001
CountyState	JEFFERSONOHIO	-2.6289	2.2221	0.2368	CountyState	LIVINGSTONILLINOIS	3.9977	1.1637	0.0006
CountyState	JEFFERSONOKLAHOMA	-19.3928	3.9464	<.0001	CountyState	LOGANILLINOIS	7.1773	1.1637	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	LOGANOHIO	-0.1750	1.1637	0.8805	CountyState	MEDINAOHIO	-3.7364	1.1637	0.0013
CountyState	LOGANOKLAHOMA	-21.0344	1.7230	<.0001	CountyState	MEIGSOHIO	-2.6670	1.3344	0.0457
CountyState	LORAINOHIO	-4.7864	1.1637	<.0001	CountyState	MENARDILLINOIS	5.2026	1.1704	<.0001
CountyState	LOVEOKLAHOMA	-12.1159	1.9970	<.0001	CountyState	MERCERILLINOIS	6.4955	1.1637	<.0001
CountyState	LUCASOHIO	0.6318	1.1704	0.5894	CountyState	MERCEROHIO	2.0364	1.1637	0.0802
CountyState	MACONILLINOIS	6.7500	1.1637	<.0001	CountyState	MIAMIOHIO	2.8614	1.1637	0.0140
CountyState	MACOUPINILLINOIS	1.7091	1.1637	0.1420	CountyState	MONROEILLINOIS	-3.3023	1.1637	0.0046
CountyState	MADISONILLINOIS	-2.3273	1.1637	0.0455	CountyState	MONROEOHIO	-7.0467	1.9129	0.0002
CountyState	MADISONOHIO	2.5023	1.1637	0.0316	CountyState	MONTGOMERYILLINOIS	0.6886	1.1637	0.5540
CountyState	MAHONINGOHIO	-2.1439	1.1704	0.0670	CountyState	MONTGOMERYOHIO	0.3023	1.1637	0.7951
CountyState	MAJOROKLAHOMA	-9.7777	1.6322	<.0001	CountyState	MORGANILLINOIS	6.7795	1.1637	<.0001
CountyState	MARIONILLINOIS	-6.6682	1.1637	<.0001	CountyState	MORGANOHIO	-3.4406	1.4477	0.0175
CountyState	MARIONOHIO	0.1636	1.1637	0.8882	CountyState	MORROWOHIO	-0.9341	1.1637	0.4222
CountyState	MARSHALLILLINOIS	5.3341	1.1637	<.0001	CountyState	MOULTRIEILLINOIS	6.4045	1.1637	<.0001
CountyState	MARSHALLOKLAHOMA	-18.7946	2.8505	<.0001	CountyState	MURRAYOKLAHOMA	-14.9382	1.9123	<.0001
CountyState	MASONILLINOIS	0.9045	1.1637	0.4370	CountyState	MUSKINGUMOHIO	-0.6278	1.1924	0.5986
CountyState	MASSACILLINOIS	-7.0023	1.1637	<.0001	CountyState	MUSKOGEEOKLAHOMA	-13.9773	1.1637	<.0001
CountyState	MAYESOKLAHOMA	-17.5363	1.1848	<.0001	CountyState	NOBLEOHIO	-4.9208	2.3769	0.0385
CountyState	MCCLAINOKLAHOMA	-14.2765	1.1704	<.0001	CountyState	NOBLEOKLAHOMA	-19.4958	1.3344	<.0001
CountyState	MCCURTAINOKLAHOMA	-14.8695	1.2005	<.0001	CountyState	NOWATAOKLAHOMA	-18.1336	1.2005	<.0001
CountyState	MCDONOUGHILLINOIS	6.1636	1.1637	<.0001	CountyState	OGLEILLINOIS	5.6159	1.1637	<.0001
CountyState	MCHENRYILLINOIS	0.1205	1.1637	0.9176	CountyState	OKFUSKEEOKLAHOMA	-14.9238	1.2004	<.0001
CountyState	MCINTOSHOKLAHOMA	-16.8304	1.2465	<.0001	CountyState	OKLAHOMAOKLAHOMA	-14.0532	1.3504	<.0001
CountyState	MCLEANILLINOIS	7.6841	1.1637	<.0001	CountyState	OKMULGEEOKLAHOMA	-18.2681	1.1704	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	OSAGEOKLAHOMA	-14.6403	1.1848	<.0001	CountyState	RICHLANDILLINOIS	-5.5932	1.1637	<.0001
CountyState	OTTAWAOHIO	-2.3614	1.1637	0.0425	CountyState	RICHLANDOHIO	-1.7705	1.1637	0.1282
CountyState	OTTAWAOKLAHOMA	-16.4818	1.1637	<.0001	CountyState	ROCK ISLANDILLINOIS	5.1682	1.1637	<.0001
CountyState	PAULDINGOHIO	-2.9432	1.1637	0.0114	CountyState	ROGERSOKLAHOMA	-15.8552	1.1704	<.0001
CountyState	PAWNEEOKLAHOMA	-17.2395	1.1924	<.0001	CountyState	ROSSOHIO	0.5568	1.1637	0.6323
CountyState	PAYNEOKLAHOMA	-17.6262	1.4477	<.0001	CountyState	SALINEILLINOIS	-5.3682	1.1637	<.0001
CountyState	PEORIAILLINOIS	5.3523	1.1637	<.0001	CountyState	SANDUSKYOHIO	-0.4205	1.1637	0.7179
CountyState	PERRYILLINOIS	-7.8682	1.1637	<.0001	CountyState	SANGAMONILLINOIS	7.7523	1.1637	<.0001
CountyState	PERRYOHIO	-1.1408	1.1704	0.3297	CountyState	SCHUYLERILLINOIS	0.5477	1.1637	0.6379
CountyState	PIATTILLINOIS	8.1591	1.1637	<.0001	CountyState	SCIOTOOHIO	-2.6078	1.1704	0.0259
CountyState	PICKAWAYOHIO	0.3977	1.1637	0.7325	CountyState	SCOTTILLINOIS	2.7295	1.1637	0.0190
CountyState	PIKEILLINOIS	0.8909	1.1637	0.4439	CountyState	SEMINOLEOKLAHOMA	-15.4257	1.4481	<.0001
CountyState	PIKEOHIO	-2.3404	1.1848	0.0483	CountyState	SENECAOHIO	-1.5818	1.1637	0.1741
CountyState	PITTSBURGOKLAHOMA	-15.3818	1.2927	<.0001	CountyState	SEQUOYAHOKLAHOMA	-11.9455	1.1637	<.0001
CountyState	PONTOTOCOKLAHOMA	-15.7748	1.7232	<.0001	CountyState	SHELBYILLINOIS	1.4614	1.1637	0.2092
CountyState	POPEILLINOIS	-10.1198	1.2005	<.0001	CountyState	SHELBYOHIO	1.3114	1.1637	0.2598
CountyState	PORTAGEOHIO	-3.4759	1.1704	0.0030	CountyState	ST CLAIRILLINOIS	-2.0045	1.1637	0.0850
CountyState	POTTAWATOMIEOKLAHOMA	-14.4924	1.1848	<.0001	CountyState	STARKILLINOIS	8.0114	1.1637	<.0001
CountyState	PREBLEOHIO	2.4182	1.1637	0.0377	CountyState	STARKOHIO	-1.0023	1.1637	0.3891
CountyState	PULASKIILLINOIS	-5.1773	1.1637	<.0001	CountyState	STEPHENSOKLAHOMA	-13.1707	2.3759	<.0001
CountyState	PUSHMATAHAOKLAHOMA	-10.9342	2.2221	<.0001	CountyState	STEPHENSONILLINOIS	4.8636	1.1637	<.0001
CountyState	PUTNAMILLINOIS	6.3023	1.1637	<.0001	CountyState	SUMMITOHIO	-4.5213	1.2266	0.0002
CountyState	PUTNAMOHIO	-0.7250	1.1637	0.5333	CountyState	TAZEWELLILLINOIS	7.5364	1.1637	<.0001
CountyState	RANDOLPHILLINOIS	-5.4205	1.1637	<.0001	CountyState	TEXASOKLAHOMA	-7.0293	1.3195	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	TILLMANOKLAHOMA	-16.4821	1.6748	<.0001
CountyState	TRUMBULLOHIO	-2.0705	1.1637	0.0752
CountyState	TULSAOKLAHOMA	-14.8035	1.2005	<.0001
CountyState	TUSCARAWASOHIO	-1.0155	1.1704	0.3856
CountyState	UNIONILLINOIS	-5.4273	1.1637	<.0001
CountyState	UNIONOHIO	-0.7818	1.1637	0.5017
CountyState	VAN WERTOHIO	2.5909	1.1637	0.0260
CountyState	VERMILIONILLINOIS	4.3977	1.1637	0.0002
CountyState	VINTONOHIO	-2.8361	1.7786	0.1108
CountyState	WABASHILLINOIS	-1.7364	1.1637	0.1357
CountyState	WAGONEROKLAHOMA	-12.8512	1.1925	<.0001
CountyState	WARRENILLINOIS	8.9091	1.1637	<.0001
CountyState	WARRENOHIO	-1.1682	1.1637	0.3155
CountyState	WASHINGTONILLINOIS	-6.7500	1.1637	<.0001
CountyState	WASHINGTONOHIO	-1.4618	1.2463	0.2409
CountyState	WASHINGTONOKLAHOMA	-16.7545	1.1637	<.0001
CountyState	WASHITAOKLAHOMA	-8.2693	1.6320	<.0001
CountyState	WAYNEILLINOIS	-7.0295	1.1637	<.0001
CountyState	WAYNEOHIO	0.6386	1.1637	0.5832
CountyState	WHITEILLINOIS	-4.1182	1.1637	0.0004
CountyState	WHITESIDEILLINOIS	5.5091	1.1637	<.0001
CountyState	WILLIAMSOHIO	-3.1364	1.1637	0.0070
CountyState	WILLIAMSONILLINOIS	-8.6636	1.1637	<.0001
CountyState	WILLILLINOIS	0.08409	1.1637	0.9424
CountyState	WINNEBAGOILLINOIS	1.2500	1.1637	0.2828
CountyState	WOODFORDILLINOIS	7.5477	1.1637	<.0001
CountyState	WOODOHIO	0.6545	1.1637	0.5738
CountyState	WOODSOKLAHOMA	-22.0391	2.5760	<.0001
CountyState	WOODWARDOKLAHOMA	-15.9648	3.2572	<.0001
CountyState	WYANDOTOHIO	0	.	.
Year		0.3689	0.004460	<.0001

Wheat Regression Equation Descriptive Statistics

Effect	CountyState	Estimate	Std Error	Pr > |t|
Intercept		-996.81	13.7388	<.0001
CountyState	ASHTABULAOHIO	14.7235	1.8412	<.0001
CountyState	BONDILLINOIS	18.2730	1.8412	<.0001
CountyState	BOONEILLINOIS	29.2048	1.8189	<.0001
CountyState	BRYANOKLAHOMA	-0.2846	1.8531	0.8780
CountyState	BUREAUILLINOIS	26.9246	1.8412	<.0001
CountyState	BUTLEROHIO	18.8909	1.8412	<.0001
CountyState	CANADIANOKLAHOMA	0.4636	1.8084	0.7977
CountyState	CARROLLILLINOIS	24.5647	1.9534	<.0001
CountyState	CHAMPAIGNILLINOIS	29.8170	1.9213	<.0001
CountyState	CHAMPAIGNOHIO	27.0554	1.8298	<.0001
CountyState	CHRISTIANILLINOIS	25.1689	1.8298	<.0001
CountyState	CIMARRONOKLAHOMA	-4.3160	1.8298	0.0184
CountyState	CLARKOHIO	27.4164	1.8189	<.0001
CountyState	CLAYILLINOIS	15.8760	1.8298	<.0001
CountyState	CLEVELANDOKLAHOMA	-1.2065	1.8189	0.5071
CountyState	CLINTONILLINOIS	18.3567	1.8189	<.0001
CountyState	CLINTONOHIO	22.4125	1.8298	<.0001
CountyState	COLESILLINOIS	25.0748	1.8412	<.0001
CountyState	COLUMBIANAOHIO	16.4493	1.8189	<.0001
CountyState	CRAWFORDILLINOIS	19.5273	1.8084	<.0001
CountyState	CREEKOKLAHOMA	0.1681	1.8298	0.9268
CountyState	CUMBERLANDILLINOIS	21.1939	1.8189	<.0001
CountyState	DE KALBILLINOIS	33.0887	1.8189	<.0001
CountyState	DEFIANCEOHIO	20.3227	1.8084	<.0001
CountyState	DEWEYOKLAHOMA	-1.8250	1.8084	0.3129
CountyState	EDWARDSILLINOIS	16.5288	1.8189	<.0001
CountyState	ERIEOHIO	25.8867	1.8298	<.0001
CountyState	FAYETTEILLINOIS	18.3386	1.8531	<.0001
CountyState	FAYETTEOHIO	26.6404	1.8189	<.0001
CountyState	FRANKLINILLINOIS	15.5000	1.8084	<.0001
CountyState	FRANKLINOHIO	23.4565	1.8298	<.0001
CountyState	FULTONOHIO	29.9982	1.8189	<.0001
CountyState	GARFIELDOKLAHOMA	1.8025	1.8189	0.3217
CountyState	GARVINOKLAHOMA	0.9842	1.8189	0.5884
CountyState	GEAUGAOHIO	11.8183	2.3288	<.0001
CountyState	GRANTOKLAHOMA	1.1705	1.8084	0.5175
CountyState	GREENEILLINOIS	21.1523	1.8084	<.0001
CountyState	GREEROKLAHOMA	-5.5762	1.8189	0.0022
CountyState	GRUNDYILLINOIS	21.7625	2.0087	<.0001
CountyState	HAMILTONILLINOIS	16.7978	1.8298	<.0001
CountyState	HANCOCKOHIO	26.6818	1.8084	<.0001
CountyState	HARDINOHIO	23.7694	1.8189	<.0001
CountyState	HARMONOKLAHOMA	-8.1461	1.8412	<.0001
CountyState	HIGHLANDOHIO	17.5637	1.8189	<.0001
CountyState	HURONOHIO	23.7932	1.8084	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	JACKSONOHIO	8.5831	2.2879	0.0002	CountyState	MONTGOMERYILLINOIS	22.3334	1.8189	<.0001
CountyState	JASPERILLINOIS	19.4565	1.8298	<.0001	CountyState	MORGANILLINOIS	26.1039	1.8298	<.0001
CountyState	JO DAVIESSILLINOIS	20.1850	2.0510	<.0001	CountyState	MORROWOHIO	22.5628	1.8298	<.0001
CountyState	KANEILLINOIS	29.9370	1.8298	<.0001	CountyState	MUSKINGUMOHIO	13.2466	1.8189	<.0001
CountyState	KANKAKEEILLINOIS	28.4252	1.8298	<.0001	CountyState	MUSKOGEEOKLAHOMA	1.1710	1.8412	0.5248
CountyState	KIOWAOKLAHOMA	-3.4614	1.8084	0.0556	CountyState	NOBLEOKLAHOMA	0.8955	1.8084	0.6205
CountyState	KNOXILLINOIS	22.2717	1.8412	<.0001	CountyState	NOWATAOKLAHOMA	-1.2716	1.8189	0.4845
CountyState	KNOXOHIO	16.3982	1.8189	<.0001	CountyState	OGLEILLINOIS	29.7365	1.8189	<.0001
CountyState	LEEILLINOIS	27.9924	1.8655	<.0001	CountyState	OKMULGEEOKLAHOMA	0.9090	1.8655	0.6261
CountyState	LIVINGSTONILLINOIS	28.8775	1.8298	<.0001	CountyState	OSAGEOKLAHOMA	-0.2437	1.8189	0.8934
CountyState	LOGANOKLAHOMA	-0.8477	1.8084	0.6392	CountyState	PAULDINGOHIO	22.6318	1.8084	<.0001
CountyState	LORAINOHIO	17.4156	1.8298	<.0001	CountyState	PEORIAILLINOIS	20.9490	1.8298	<.0001
CountyState	LOVEOKLAHOMA	-0.4819	1.8298	0.7923	CountyState	PERRYILLINOIS	12.7636	1.8084	<.0001
CountyState	MACOUPINILLINOIS	22.1288	1.8189	<.0001	CountyState	PIATTILLINOIS	29.9830	1.9213	<.0001
CountyState	MAHONINGOHIO	15.4121	1.8189	<.0001	CountyState	PICKAWAYOHIO	24.9405	1.8412	<.0001
CountyState	MAJOROKLAHOMA	-1.8650	1.8189	0.3052	CountyState	PIKEOHIO	12.1284	1.9370	<.0001
CountyState	MARIONOHIO	25.2252	1.8189	<.0001	CountyState	PREBLEOHIO	24.4076	1.8412	<.0001
CountyState	MARSHALLILLINOIS	21.4104	1.8189	<.0001	CountyState	PUTNAMILLINOIS	21.9137	2.0293	<.0001
CountyState	MARSHALLOKLAHOMA	-0.4375	1.8785	0.8159	CountyState	PUTNAMOHIO	25.2000	1.8084	<.0001
CountyState	MCCLAINOKLAHOMA	-0.4318	1.8084	0.8113	CountyState	ROCK ISLANDILLINOIS	21.5387	2.0293	<.0001
CountyState	MCDONOUGHILLINOIS	20.1948	1.9213	<.0001	CountyState	ROGER MILLSOKLAHOMA	-4.8836	1.8298	0.0076
CountyState	MCLEANILLINOIS	29.3375	1.8298	<.0001	CountyState	ROSSOHIO	21.5834	1.8189	<.0001
CountyState	MERCERILLINOIS	22.3555	1.8921	<.0001	CountyState	SALINEILLINOIS	16.6083	1.8531	<.0001
CountyState	MERCEROHIO	27.6039	1.8189	<.0001	CountyState	SANDUSKYOHIO	26.7900	1.8189	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	SANGAMONILLINOIS	27.2165	1.8531	<.0001	CountyState	WYANDOTOHIO	23.4750	1.8084	<.0001
CountyState	SCHUYLERILLINOIS	18.6032	1.8189	<.0001	CountyState	ADAIROKLAHOMA	2.6729	1.9709	0.1751
CountyState	SCIOTOOHIO	10.1321	1.8655	<.0001	CountyState	ADAMSILLINOIS	19.3145	1.8531	<.0001
CountyState	SCOTTILLINOIS	22.3038	1.8298	<.0001	CountyState	ADAMSOHIO	9.1530	1.8298	<.0001
CountyState	SHELBYILLINOIS	22.5672	1.8298	<.0001	CountyState	ALEXANDERILLINOIS	12.6796	1.8189	<.0001
CountyState	SHELBYOHIO	25.1545	1.8084	<.0001	CountyState	ALFALFAOKLAHOMA	2.2295	1.8084	0.2176
CountyState	ST CLAIRILLINOIS	19.0932	1.8084	<.0001	CountyState	ALLENOHIO	26.6477	1.8084	<.0001
CountyState	STEPHENSONILLINOIS	25.5955	1.8084	<.0001	CountyState	ASHLANDOHIO	16.4515	1.8412	<.0001
CountyState	TAZEWELLILLINOIS	24.0551	1.8412	<.0001	CountyState	ATHENSOHIO	7.6729	2.5365	0.0025
CountyState	TUSCARAWASOHIO	14.1954	1.8298	<.0001	CountyState	ATOKAOKLAHOMA	-0.4101	1.9709	0.8352
CountyState	UNIONOHIO	23.4090	1.8189	<.0001	CountyState	AUGLAIZEOHIO	26.7205	1.8084	<.0001
CountyState	VAN WERTOHIO	29.3454	1.8189	<.0001	CountyState	BEAVEROKLAHOMA	-7.1297	1.8189	<.0001
CountyState	VERMILIONILLINOIS	29.4304	1.8189	<.0001	CountyState	BECKHAMOKLAHOMA	-5.2259	1.8189	0.0041
CountyState	WAGONEROKLAHOMA	-0.01818	1.8084	0.9920	CountyState	BELMONTOHIO	12.7362	2.7645	<.0001
CountyState	WARRENILLINOIS	20.7156	2.0742	<.0001	CountyState	BLAINEOKLAHOMA	-2.0250	1.8084	0.2628
CountyState	WARRENOHIO	20.1063	1.8189	<.0001	CountyState	BROWNILLINOIS	18.9629	1.8298	<.0001
CountyState	WASHINGTONOHIO	10.1492	1.8412	<.0001	CountyState	BROWNOHIO	12.8949	1.8655	<.0001
CountyState	WASHINGTONOKLAHOMA	-0.8568	1.8084	0.6356	CountyState	CADDOOKLAHOMA	1.5908	1.8189	0.3818
CountyState	WHITEILLINOIS	18.2500	1.8084	<.0001	CountyState	CALHOUNILLINOIS	18.0695	1.8531	<.0001
CountyState	WHITESIDEILLINOIS	21.4335	1.8298	<.0001	CountyState	CARROLLOHIO	13.4530	1.8298	<.0001
CountyState	WILLILLINOIS	26.3197	1.8412	<.0001	CountyState	CARTEROKLAHOMA	-2.0846	1.8655	0.2638
CountyState	WINNEBAGOILLINOIS	24.9690	1.8189	<.0001	CountyState	CASSILLINOIS	16.0584	1.8298	<.0001
CountyState	WOODFORDILLINOIS	23.8606	1.8189	<.0001	CountyState	CHEROKEEOKLAHOMA	2.7184	1.9891	0.1718
CountyState	WOODWARDOKLAHOMA	-4.6278	1.8189	0.0110	CountyState	CHOCTAWOKLAHOMA	-0.06391	1.8785	0.9729

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	CLARKILLINOIS	20.2462	1.8189	<.0001	CountyState	GALLIAOHIO	9.0100	2.8615	0.0016
CountyState	CLERMONTOHIO	15.5345	2.0084	<.0001	CountyState	GRADYOKLAHOMA	0.3955	1.8084	0.8269
CountyState	COALOKLAHOMA	-0.9051	1.9212	0.6376	CountyState	GREENEOHIO	23.1100	1.8412	<.0001
CountyState	COMANCHEOKLAHOMA	-4.5909	1.8084	0.0111	CountyState	GUERNSEYOHIO	7.8555	2.8615	0.0061
CountyState	COOKILLINOIS	18.4321	2.0990	<.0001	CountyState	HAMILTONOHIO	17.9698	2.4239	<.0001
CountyState	COSHOCTONOHIO	15.8750	1.8084	<.0001	CountyState	HANCOCKILLINOIS	20.5477	1.8189	<.0001
CountyState	COTTONOKLAHOMA	-3.0682	1.8084	0.0898	CountyState	HARDINILLINOIS	12.2267	2.1832	<.0001
CountyState	CRAIGOKLAHOMA	1.7136	1.8084	0.3434	CountyState	HARPEROKLAHOMA	-6.2162	1.8189	0.0006
CountyState	CRAWFORDOHIO	26.0818	1.8084	<.0001	CountyState	HARRISONOHIO	11.1464	2.8615	<.0001
CountyState	CUSTEROKLAHOMA	0.2932	1.8084	0.8712	CountyState	HASKELLOKLAHOMA	0.1565	1.9536	0.9361
CountyState	CUYAHOGAOHIO	10.1100	2.8615	0.0004	CountyState	HENDERSONILLINOIS	17.4596	1.9535	<.0001
CountyState	DARKEOHIO	27.4000	1.8084	<.0001	CountyState	HENRYILLINOIS	24.4542	1.8412	<.0001
CountyState	DE WITTILLINOIS	26.6796	2.0744	<.0001	CountyState	HENRYOHIO	30.1318	1.8084	<.0001
CountyState	DELAWAREOHIO	24.1769	1.8189	<.0001	CountyState	HOCKINGOHIO	9.6571	2.3293	<.0001
CountyState	DELAWAREOKLAHOMA	2.6423	1.8655	0.1567	CountyState	HOLMESOHIO	15.5028	1.8189	<.0001
CountyState	DOUGLASILLINOIS	29.2590	1.9369	<.0001	CountyState	HUGHESOKLAHOMA	0.04398	1.8785	0.9813
CountyState	DU PAGEILLINOIS	21.3478	2.1254	<.0001	CountyState	IROQUOISILLINOIS	29.0091	1.8084	<.0001
CountyState	EDGARILLINOIS	23.0629	1.8189	<.0001	CountyState	JACKSONILLINOIS	14.4567	1.8189	<.0001
CountyState	EFFINGHAMILLINOIS	21.3031	1.8412	<.0001	CountyState	JACKSONOKLAHOMA	-4.4073	1.8189	0.0154
CountyState	ELLISOKLAHOMA	-7.3645	1.8298	<.0001	CountyState	JEFFERSONILLINOIS	14.6671	1.8189	<.0001
CountyState	FAIRFIELDOHIO	21.2523	1.8084	<.0001	CountyState	JEFFERSONOHIO	12.0736	2.8615	<.0001
CountyState	FORDILLINOIS	28.9976	1.8298	<.0001	CountyState	JEFFERSONOKLAHOMA	0.4515	1.8412	0.8063
CountyState	FULTONILLINOIS	19.8524	1.8531	<.0001	CountyState	JERSEYILLINOIS	21.3059	1.8189	<.0001
CountyState	GALLATINILLINOIS	19.3955	1.8084	<.0001	CountyState	JOHNSONILLINOIS	12.3569	1.9214	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|	Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	JOHNSTONOKLAHOMA	-1.3244	1.8785	0.4808	CountyState	MCHENRYILLINOIS	25.5227	1.8084	<.0001
CountyState	KAYOKLAHOMA	1.7386	1.8084	0.3364	CountyState	MCINTOSHOKLAHOMA	1.4626	1.9214	0.4465
CountyState	KENDALLILLINOIS	29.1551	1.8785	<.0001	CountyState	MEDINAOHIO	14.5792	1.8298	<.0001
CountyState	KINGFISHEROKLAHOMA	-1.5818	1.8084	0.3817	CountyState	MEIGSOHIO	8.8008	2.6788	0.0010
CountyState	LA SALLEILLINOIS	28.7140	1.8412	<.0001	CountyState	MENARDILLINOIS	27.8416	1.8412	<.0001
CountyState	LAKEILLINOIS	20.4331	1.8189	<.0001	CountyState	MIAMIOHIO	26.5045	1.8298	<.0001
CountyState	LAKEOHIO	9.5282	2.8615	0.0009	CountyState	MONROEILLINOIS	18.0909	1.8084	<.0001
CountyState	LATIMEROKLAHOMA	4.6948	2.4237	0.0528	CountyState	MONROEOHIO	9.5373	2.8615	0.0009
CountyState	LAWRENCEILLINOIS	17.2909	1.8084	<.0001	CountyState	MONTGOMERYOHIO	24.1451	1.8189	<.0001
CountyState	LAWRENCEOHIO	11.6464	2.8615	<.0001	CountyState	MORGANOHIO	11.0610	2.4236	<.0001
CountyState	LEFLOREOKLAHOMA	3.1361	1.8785	0.0951	CountyState	MOULTRIEILLINOIS	26.0256	1.9212	<.0001
CountyState	LICKINGOHIO	17.7912	1.8189	<.0001	CountyState	MURRAYOKLAHOMA	-0.5152	1.8785	0.7839
CountyState	LINCOLNOKLAHOMA	-1.4786	1.8189	0.4163	CountyState	NOBLEOHIO	8.5373	2.8615	0.0029
CountyState	LOGANILLINOIS	29.1902	1.8785	<.0001	CountyState	OKFUSKEEOKLAHOMA	-1.9508	1.8785	0.2991
CountyState	LOGANOHIO	23.9624	1.8189	<.0001	CountyState	OKLAHOMAOKLAHOMA	-1.0111	1.8189	0.5783
CountyState	LUCASOHIO	29.9232	1.8298	<.0001	CountyState	OTTAWAOHIO	23.7250	1.8084	<.0001
CountyState	MACONILLINOIS	24.3334	1.9535	<.0001	CountyState	OTTAWAOKLAHOMA	3.1470	1.8189	0.0836
CountyState	MADISONILLINOIS	19.2358	1.8189	<.0001	CountyState	PAWNEEOKLAHOMA	0.1673	1.8298	0.9271
CountyState	MADISONOHIO	28.1068	1.8084	<.0001	CountyState	PAYNEOKLAHOMA	-0.9460	1.8189	0.6030
CountyState	MARIONILLINOIS	17.7950	1.8189	<.0001	CountyState	PERRYOHIO	13.5205	1.8084	<.0001
CountyState	MASONILLINOIS	17.1091	1.8084	<.0001	CountyState	PIKEILLINOIS	20.5776	1.8298	<.0001
CountyState	MASSACILLINOIS	12.4774	1.8412	<.0001	CountyState	PITTSBURGOKLAHOMA	1.1704	1.9064	0.5393
CountyState	MAYESOKLAHOMA	0.4705	1.8084	0.7948	CountyState	PONTOTOCOKLAHOMA	-0.01617	1.8921	0.9932
CountyState	MCCURTAINOKLAHOMA	1.0466	1.8785	0.5774	CountyState	POPEILLINOIS	11.1478	2.1254	<.0001

Effect	CountyState	Estimate	Std Error	Pr > |t|
CountyState	PORTAGEOHIO	15.9818	1.8084	<.0001
CountyState	POTTAWATOMIEOKLAHOMA	-0.2705	1.8084	0.8811
CountyState	PULASKIILLINOIS	13.4617	1.8189	<.0001
CountyState	PUSHMATAHAOKLAHOMA	4.0601	2.4776	0.1013
CountyState	RANDOLPHILLINOIS	16.3000	1.8084	<.0001
CountyState	RICHLANDILLINOIS	18.2826	1.8189	<.0001
CountyState	RICHLANDOHIO	19.1251	1.8298	<.0001
CountyState	ROGERSOKLAHOMA	-0.7592	1.8189	0.6764
CountyState	SEMINOLEOKLAHOMA	-2.3850	1.8785	0.2043
CountyState	SENECAOHIO	23.4109	1.8189	<.0001
CountyState	SEQUOYAHOKLAHOMA	3.3295	1.8655	0.0743
CountyState	STARKILLINOIS	24.4665	2.0293	<.0001
CountyState	STARKOHIO	16.6035	1.8412	<.0001
CountyState	STEPHENSOKLAHOMA	-3.2827	1.8298	0.0728
CountyState	SUMMITOHIO	11.8441	2.5379	<.0001
CountyState	TEXASOKLAHOMA	1.0462	1.8189	0.5652
CountyState	TILLMANOKLAHOMA	-2.8000	1.8084	0.1216
CountyState	TRUMBULLOHIO	18.1447	1.8189	<.0001
CountyState	TULSAOKLAHOMA	1.1440	1.8785	0.5426
CountyState	UNIONILLINOIS	12.7480	1.8655	<.0001
CountyState	VINTONOHIO	10.9009	2.8615	0.0001
CountyState	WABASHILLINOIS	18.3224	1.8298	<.0001
CountyState	WASHINGTONILLINOIS	18.9568	1.8084	<.0001
CountyState	WASHITAOKLAHOMA	-2.0115	1.8189	0.2688
CountyState	WAYNEILLINOIS	15.2706	1.8189	<.0001
CountyState	WAYNEOHIO	19.4932	1.8084	<.0001
CountyState	WILLIAMSOHIO	22.2705	1.8084	<.0001
CountyState	WILLIAMSONILLINOIS	10.7575	1.8655	<.0001
CountyState	WOODOHIO	29.2523	1.8084	<.0001
CountyState	WOODSOKLAHOMA	0	.	.
Year		0.5159	0.006869	<.0001

VITA

Meagan Jeanine Rhodes

Candidate for the Degree of

Master of Science

Thesis: DETERMINING IMPLCICIT OPTION PREMIUMS FOR GORVERNMENT FARM PROGRAM PAYMENTS

Major Field: Agricultural Economics

Biographical:

Education:

Completed the requirements for the Master of Science in Agricultural Economics at Oklahoma State University, Stillwater, Oklahoma in July 2017.

Completed the requirements for the Bachelor of Science in your Agribusiness at Oklahoma State University, Stillwater, Oklahoma in 2015.

Experience:

Graduate Research and Teaching Assistant. Oklahoma State University, Department of Agricultural Economics, Stillwater, Oklahoma. August 2015 - Present.

Agriculture Legislative Intern. Oklahoma House/Senate Agriculture Committee, Oklahoma City, Oklahoma. January 2015 - May 2015.

Professional Memberships: Agricultural Economics Graduate Student Association.