Impact of Crop Insurance Premium Subsidy Rates on

Unit and Coverage Level Choices

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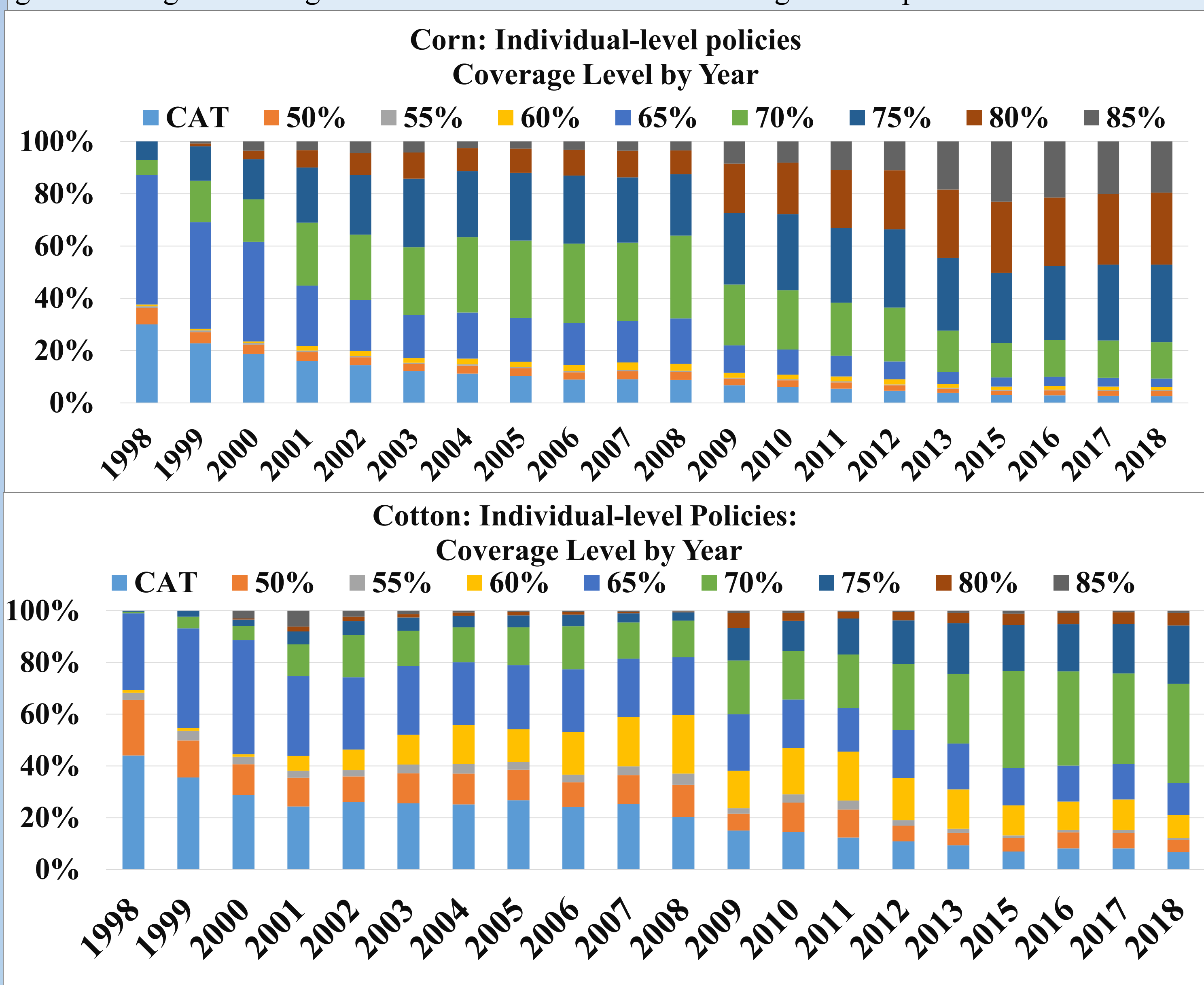
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Purpose

Before the 2008 Farm Bill, few producers insured their crops through enterprise units. After the 2008 Farm Bill, the percentage of land insured through enterprise units grew substantially over the next decade. Now over half of the corn acres insured are insured through enterprise units. This analysis examines how the change in the premium subsidy rates for enterprise units affected producers' decisions regarding unit structure and coverage level (i.e. the percent of revenue or yield guaranteed). By better understanding the choices that producers make, policymakers can better assess how to provide producers with viable options for crop insurance while minimizing the cost of the premium subsidies.

For this analysis, we focus on corn and cotton. Corn has had the most dramatic shift to enterprise units over the last decade. Cotton had a large transition to enterprise by practice units, which were introduced in the 2014 Farm Bill.

Figure 1: Insured acreage by coverage level for corn and cotton, excluding area-triggered policies. After 2008 we see movement towards higher coverage levels. This analysis hypothesizes that the growth in higher coverage levels is due to a shift to more acreage in enterprise units.

Corn: Individual-level policies Coverage Level by Year

Cotton: Individual-level Policies: Coverage Level by Year

Background

The premium subsidy rates over the last twenty years have risen notably on two occasions: the Agricultural Risk Protection Act of 2000 (ARPA) and the Food, Conservation, and Energy Act of 2008 (2008 Farm Bill). ARPA raised the percent of premium covered by subsidy on all the major unit types—basic, optional, and enterprise units, while the 2008 Farm Bill raised premium subsidies only for enterprise units. Table 1 shows the current premium subsidy rates, and below provides a description of each unit type.

- A basic unit is all insurable acreage of the insured crop in the county in which the operator has either a 100 percent crop share or is owned by one person and operated by another person on a share basis.
- An optional unit is a subdivision of a basic unit. Optional units may divide a basic unit by location or practice.
- An enterprise unit is all insurable acreage of the same insured crop, in which the farmer has some share within one county.
- The enterprise by practice unit was introduced in the 2014 Farm Bill, similar to the enterprise unit but the insured crop is divided by practice, such as irrigated and non-irrigated.

Table 1: Current premium subsidy rates by unit structure

Coverage Level	Percent							
	50	55	60	65	70	75	80	85
Basic/Optional Unit	67	64	64	59	59	55	48	38
Enterprise Unit	80	80	80	80	80	77	68	53

Figure 2: Percent of insured acres for corn and cotton by unit structure. For corn, we see a sudden transition from optional and basic units to enterprise units. The change for cotton is less pronounced, but we see a higher uptake of enterprise units by practice after this unit structure was introduced in the 2014 Farm Bill.

Corn

Cotton
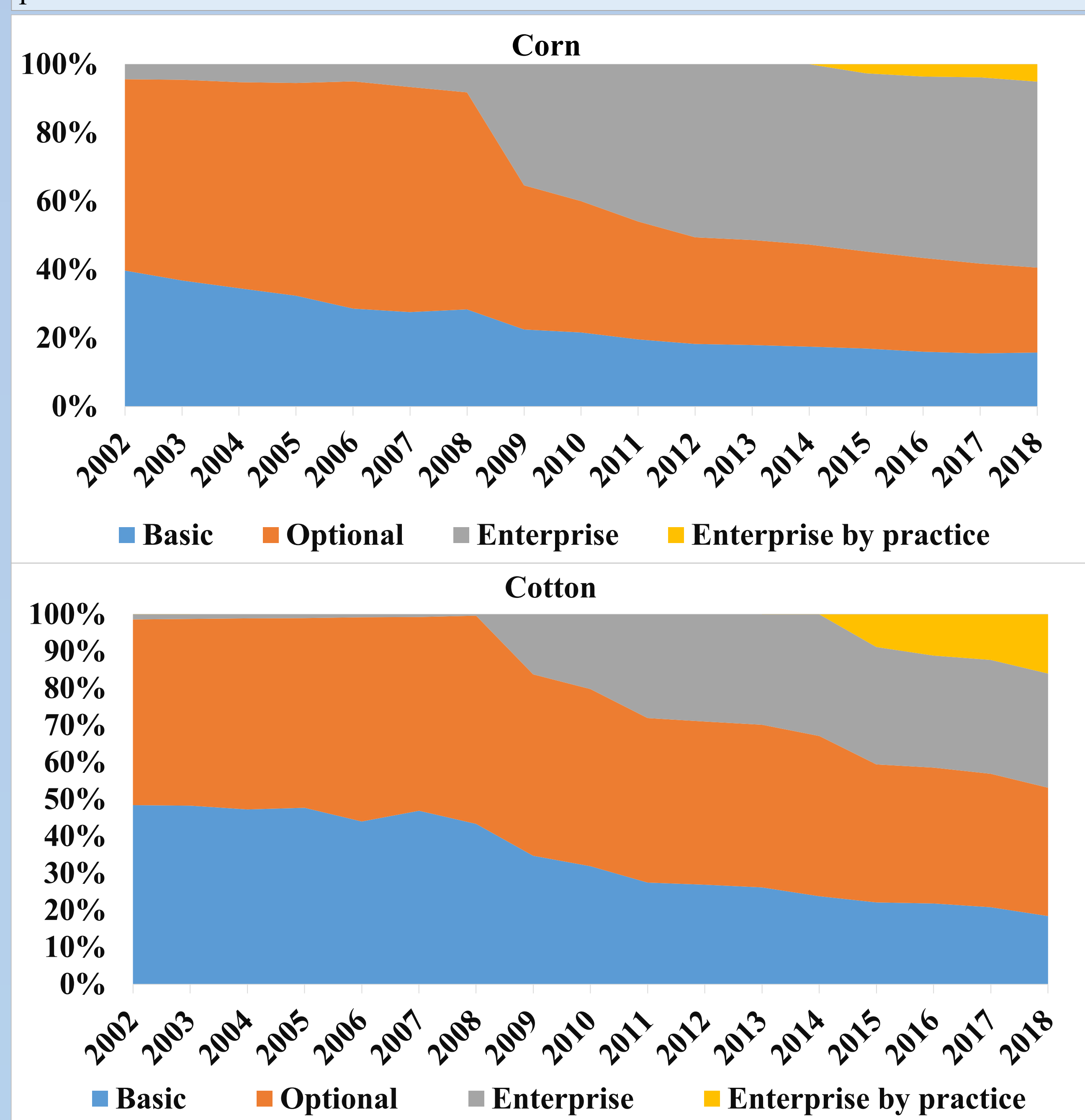
Method

Impact of the subsidy change on enterprise units is done through a censored Tobit model with random effects at the county level. With the proportion of insured acres by enterprise units relative to all acres insured for the respectively crops (corn and cotton) for each county from crop year 2003 to 2018 as the response variable. Given a proportion is used for the response variable, the Tobit is left-censored at zero and right censored at one. Explanatory variables include a dummy for the change in subsidy, an index for the previous marketing year average price, time trend, and the county base rate. The county base rate is a measure of the yield risk of a county.

The difference in average coverage levels among units is measured using a Wilcoxon rank sum test. For this, only the most recent year (2018) is examined in this analysis. The author compares the average coverage level at the county level for each unit structure. In other words, the average coverage level of enterprise units is compared to the average coverage level of basic units at the county level. Likewise, this comparison is also done between enterprise units and optional units.

Data

The data for this analysis comes from the USDA Risk Management Agency. County-level data is provided at the unit level by commodity type, practice, insurance plan type for 2003 to 2018. The analysis is limited to non-irrigated corn and cotton. Additionally, indexed prices are estimated from the marketing year prices from the National Agricultural Statistics Service. Prices are indexed using a 5-year Olympic average.

Results

Table 2: Panel Tobit results for the percent of insured corn acres under enterprise units

	Model 1		Model 2		Model 3	
	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error
(Intercept)	-0.482	0.011***	-46.470	1.229***	-43.500	1.322***
Subsidy.Dummy	0.366	0.002***	0.181	0.006***	0.185	0.006***
log(Base.Rate)	-0.063	0.004***	-0.063	0.004***	-0.063	0.004***
time			0.023	0.001***	0.022	0.001***
Corn.Indexed.Price					-0.0003	0.0001***
logSigmaMu	-2.040	0.018***		***	-2.043	0.018***
logSigmaNu	-1.310	0.002***		***	-1.338	0.002***
Log Likelihood	-9,416		-8,696		-8,678	
AIC	18,842		17,404		17,369	

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 3: Panel Tobit results for the percent of insured cotton acres under enterprise units.

	Model 1		Model 2		Model 3	
	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error
(Intercept)	-1.096	0.031***	-67.757	2.801***	-69.450	3.835***
Subsidy.Dummy	0.671	0.007***	0.388	0.014***	0.381	0.018***
log(Base.Rate)	-0.045	0.012***	-0.043	0.011***	-0.043	0.011***
time			0.033	0.001***	0.034	0.002***
Cotton.Indexed.Price					0.0002	0.0002
logSigmaMu	-1.533	0.034***	-1.548	0.033***	-1.548	0.033***
logSigmaNu	-1.132	0.006***	-1.185	0.005***	-1.185	0.005***
Log Likelihood	-3,203		-2,986		-2,986	
AIC	6,415		5,984		5,986	

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 4: Average coverage at the county-level by unit for 2018. The Wilcoxon rank sum test was conducted in addition to these summary statistics below. The Wilcoxon rank sum test was conducted on the observations including where the average coverage was set equal to "zero" due to no producers enrolling in that unit type for the county. For both corn and cotton, enterprise units had a statistically higher average coverage level at the county level when compared against basic units or optional units.

	Corn		Cotton	
Unit type	Including Zeroes	Excluding Zeroes	Including Zeroes	Excluding Zeroes
Enterprise, including by practice	60.5%	74.8%	53.7%	70.8%
Basic	57.6%	68.3%	46.4%	63.2%
Optional	56.6%	72.4%	41.9%	67.7%

Concluding Remarks

We see that the change in subsidy rates has played a significant role in producers moving from optional and basic units to enterprise units. Along with this, we see that the time trend plays an important role, as the percentage of acres in enterprise units increases over time. The inclusion of the base rate in the analysis shows that enterprise units are most popular among low risk producers. This may be caused by these producers having more uniform risks across a county, therefore they are more willing to shift from optional or basic units to enterprise units.

For the coverage levels by units, we see producers with the enterprise units enroll in higher coverage levels. This is to be expected give the higher subsidy rates and unit level discount (the latter which existed prior to the 2008 Farm Bill).