The Corn Conversion: What Happens When Conservation Contracts Expire?

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Abstract

The Conservation Reserve Program pays American farmers to idle environmentally sensitive cropland. The 2014 Farm Bill forced the largest contraction in CRP history, cutting the national enrollment cap from 32 to 24 million acres and expiring approximately 7 million acres of contracts between 2012 and 2018. Exploiting county-level variation in CRP contract expirations in a continuous-treatment difference-in-differences design with 2,476 counties, I find that expiring conservation land converts selectively: corn acreage increases significantly in high-exposure counties (39,717 additional acres per unit treatment intensity, $p < 0.05$), while total planted acreage effects are noisy. The finding survives placebo tests and leave-one-state-out analysis. Conservation reversal follows crop profitability, not a uniform return to pre-enrollment land use, implying that CRP's environmental benefits are contingent on sustained enrollment.

JEL Codes: Q15, Q18, Q24

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1. Introduction

Between 2012 and 2018, the United States quietly dismantled conservation protections on 7 million acres of farmland—an area larger than Massachusetts. These acres had been enrolled in the Conservation Reserve Program, paid to sit idle under grass cover, filtering water, storing carbon, and sheltering wildlife. When Congress lowered the enrollment cap, farmers faced a choice: leave the land in grass for nothing, or plant it.

The answer, it turns out, was corn.

This paper estimates the causal effect of CRP contract expirations on county-level crop acreage using the 2014 Farm Bill's mandated reduction of the national CRP enrollment cap from 32 million to 24 million acres. The cap reduction forced approximately 7 million acres of net contract expirations across more than 2,000 counties, with county-level exposure varying based on the share of local cropland previously enrolled in CRP. I exploit this variation in a continuous-treatment difference-in-differences design, comparing crop acreage changes in high-exposure versus low-exposure counties before and after 2014.

The main finding is that conservation land converts selectively. Counties with greater CRP exposure experienced statistically significant increases in corn acreage—the highest-value row crop—with a point estimate of 39,717 additional acres per unit of treatment intensity ($p < 0.05$). This represents approximately 616 additional corn acres for a county at the mean treatment level. Soybean acreage also rises, though imprecisely estimated, while wheat and total planted acres show noisy effects. The "corn conversion" pattern—conservation land gravitating to the most profitable crop when contracts expire—is robust to placebo timing tests (placebo $p = 0.70$), leave-one-state-out analysis (all 42 estimates positive), and restriction to the ten largest CRP states.

The results contribute to three literatures. First, the paper advances the evaluation of conservation policy effectiveness by providing the first causal estimates of land-use transitions following the 2014 Farm Bill CRP cap reduction. Existing work on CRP has focused on enrollment determinants (Sullivan et al., 2004; Hellerstein, 2017) and environmental benefits during enrollment (Morefield et al., 2016; Johnson et al., 2016), but the question of what happens when contracts expire—the "reversibility problem"—has been largely addressed through simulation (Claassen et al., 2011) rather than causal estimation.

Second, the paper contributes to the literature on agricultural land-use change and crop choice. Lark et al. (2015) and Wright et al. (2017) document the conversion of grassland to cropland using satellite data, and Hendricks and Er (2014) estimate conversion probabilities using the National Resources Inventory. I complement this work by providing a causal estimate of crop reallocation tied to a specific policy shock rather than correlational patterns.

While this analysis uses county-level survey data (USDA NASS) rather than field-level satellite imagery, it captures the economically meaningful crop composition shift that satellite data alone cannot explain—farmers' revealed preferences for corn over other crops on newly available land. The selective reallocation toward corn echoes findings from Roberts and Schlenker (2013) on crop switching in response to commodity prices.

Third, the analysis connects to the broader economics of conservation contracts and payment for ecosystem services (Ferraro, 2011; Jayachandran et al., 2017). The finding that CRP land converts to the highest-value crop upon expiration suggests that conservation benefits require sustained financial incentives—a result with implications for the design of environmental payment programs worldwide. Wu and Weber (1999) and Plantinga and Ahn (1999) model the agricultural opportunity cost of conservation enrollment; this paper provides reduced-form evidence on the margin of reversal.

Related work includes Morefield et al. (2016), who use CDL satellite data to document grassland-to-cropland conversion trends, and Rosenberg (2024), who employ an RDD at the Environmental Benefits Index threshold for a single CRP signup. This paper differs by exploiting the national cap reduction—a larger, more comprehensive shock affecting all counties simultaneously with dose variation—rather than the enrollment margin. Hendricks and Er (2014) and Ifft et al. (2018) estimate conversion probabilities from panel surveys; I use revealed behavior following an exogenous policy change. Secchi et al. (2011) and Claassen et al. (2011) model expected environmental consequences of CRP expiration using calibrated models; this paper provides the empirical counterpart. Lubowski et al. (2008) estimate the full set of land-use transition probabilities in the US, but without a causal design. Finally, Wu et al. (2005) and Yu et al. (2018) study grassland conversion in the context of ethanol mandates and commodity price shocks, respectively.

2. Institutional Background

The Conservation Reserve Program. CRP, created by the 1985 Farm Bill, is the largest private-land conservation program in the United States (Hellerstein, 2017). Participating landowners voluntarily enroll eligible cropland in 10–15 year contracts, receiving annual rental payments (averaging $80/acre nationally) and cost-share assistance for establishing conservation cover—typically native grasses, trees, or filter strips. Enrollment is competitive: applicants receive an Environmental Benefits Index (EBI) score based on soil erodibility, water quality, wildlife habitat, and other factors, and offers are accepted in periodic signups until the national acreage cap is reached.

At its peak in 2007, CRP enrolled approximately 37 million acres—nearly 10% of total US cropland—in over 3,000 counties. Environmental benefits have been extensively documented: reduced soil erosion (Sullivan et al., 2004), improved water quality (Johnson et al., 2016), enhanced wildlife habitat (Reynolds et al., 2001), and significant carbon sequestration (Gebhart et al., 2004).

The 2014 Farm Bill Cap Reduction. The Agricultural Act of 2014 (P.L. 113-79), signed February 7, 2014, mandated a step-down of the national CRP acreage cap from 32 million acres in FY2013 to 27.5 million (FY2014), 26 million (FY2015), 25 million (FY2017), and 24 million (FY2018). The cap reduction was motivated by a combination of fiscal concerns, high commodity prices that increased opportunity costs of idling land, and political pressure from livestock producers who viewed CRP as constraining grazing land supply (Coppess, 2018).

The cap reduction forced approximately 7 million acres of net enrollment decline between 2012 and 2018 (Table 4). Critically, the reduction operated primarily through non-renewal of expiring contracts rather than early termination. USDA restricted re-enrollment offers and raised EBI thresholds, effectively preventing many existing contract holders from renewing when their 10–15 year terms expired. Because contract vintage distributions varied across counties—some counties concentrated enrollment in the late 1990s (expiring circa 2010–2015), while others enrolled primarily in the mid-2000s (expiring later)—the timing and magnitude of CRP loss varied geographically.

Land-Use Decisions after Expiration. When a CRP contract expires, the landowner faces three options: (1) re-enroll in CRP (if offers are available and the parcel meets current EBI thresholds), (2) enroll in a shorter-term conservation practice such as the Conservation Stewardship Program, or (3) return the land to agricultural production. The cap reduction constrained option (1) by limiting available slots, and option (3) became increasingly attractive as corn prices averaged $4.50/bushel during 2012–2014, roughly double the early-2000s average. The economic calculus tilted toward conversion: CRP rental rates of $50–$100/acre were well below the returns from planting corn at prevailing prices, particularly on higher-quality land within the CRP portfolio.

3. Data

The analysis combines three data sources at the county-year level.

CRP Enrollment. County-level CRP enrollment data come from the USDA Farm Service Agency's "CRP Enrollment by County" publication, covering fiscal years 1986–2024 for 3,116 counties. This administrative dataset reports cumulative acres under contract at the end of

Table 1: Summary Statistics

Variable	Mean	SD	N
Panel A: Outcomes (pre-treatment, 2006–2013)			
Total planted acres (corn + soy + wheat)	121,728	155,108	16,602
Corn planted acres	47,411	72,142	16,602
Soybean planted acres	38,485	57,262	16,602
Wheat planted acres	35,832	106,301	16,602
Hay harvested acres	23,457	41,015	16,602
Panel B: Treatment (cross-sectional)			
CRP acres lost, 2013–2018	3,094	8,112	2,144
CRP loss / total cropland	0.0200	0.0293	2,144
Panel C: Sample			
Counties	2,476		
States	42.0000		
County-year observations	37,460		

Notes: Panel A reports pre-treatment (2006–2013) county-year means from USDA NASS QuickStats. Panel B reports cross-sectional treatment variables: CRP acres lost between 2012–2013 and 2018–2019 averages, sourced from FSA county-level enrollment data. Treatment share is CRP loss divided by Census of Agriculture 2012 total cropland.

each fiscal year.

Crop Acreage. Annual county-level planted acreage for corn, soybeans, and wheat, and harvested acreage for hay, come from USDA NASS QuickStats for 2006–2022. These survey-based estimates cover 2,699 counties with reported crop production in at least one year.

Total Cropland. The denominator for treatment intensity—total county cropland—comes from the Census of Agriculture 2012, the last census before the reform. This is available for 3,073 counties.

The analysis panel merges these sources, retaining counties with non-missing CRP enrollment, crop acreage, and Census cropland data. The final panel contains 37,460 county-year observations across 2,476 counties in 42 states, spanning 2006–2022.

Table 1 reports summary statistics. The average county planted 121,728 acres of corn, soybeans, and wheat combined during the pre-reform period (2006–2013), with substantial cross-county variation ($\text{SD} = 155,108$). Among counties experiencing CRP loss, the average lost 3,141 acres (1.9% of total cropland), with a maximum exposure of 27.2% of cropland.

4. Empirical Strategy

Continuous-Treatment DiD. I estimate a continuous-treatment difference-in-differences specification:

$$Y_{ct} = \alpha_c + \gamma_{st} + \beta \cdot \left(\frac{\text{CRP Loss}_c}{\text{Cropland}_c} \right) \times \text{Post}_t + \varepsilon_{ct} \tag{1}$$

where Y_{ct} is crop acreage in county c and year t; α_c are county fixed effects absorbing all time-invariant county characteristics; γ_{st} are state-by-year fixed effects absorbing state-level agricultural trends, commodity programs, and weather; CRP $\text{Loss}_c/\text{Cropland}_c$ is the cross-sectional treatment intensity (CRP acres lost between the 2012–2013 and 2018–2019 averages, divided by Census 2012 total cropland); and $\text{Post}_t = \mathbb{I}[t \geq 2014]$ indicates the reform period.

The coefficient β captures the effect of a one-unit increase in treatment intensity—moving from zero CRP loss to losing all cropland from CRP—on acreage. At the sample mean treatment of 0.016, the implied effect is $0.016 \times \beta$.

Identifying Assumption. The design assumes that, absent the CRP cap reduction, counties with higher pre-reform CRP enrollment shares would have experienced parallel trends in crop acreage to counties with lower shares, conditional on county and state-by-year fixed effects. This is plausible because the cap reduction was a national policy driven by fiscal and political considerations in Congress, not by county-level agricultural conditions. The state-by-year fixed effects absorb state-specific commodity price responses, weather patterns, and policy changes.

Standard errors are clustered at the state level (42 clusters), the level at which CRP enrollment patterns are most correlated due to common soil types, climate zones, and FSA administrative practices.

Event Study. To assess pre-trends, I estimate a dynamic specification:

$$Y_{ct} = \alpha_c + \gamma_{st} + \sum_{k \neq -1} \delta_k \cdot \text{Treatment}_c \times \mathbb{I}[t - 2014 = k] + \varepsilon_{ct} \tag{2}$$

with event-time indicators relative to the year before the reform ($k = -1$ omitted). Pre-treatment coefficients ($k = -5$ through $k = -2$) should be statistically indistinguishable from zero if parallel trends hold.

Table 2: Effect of CRP Contract Expirations on Crop Acreage

	(1) Total Planted	(2) Corn	(3) Soybeans	(4) Wheat
CRP Loss Share × Post	$-183,797$	$39,717^{**}$	$29,319$	$-252,833$
	(186,715)	(18,874)	(29,854)	(176,006)
County FE	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	Yes
Observations	37,460	37,460	37,460	37,460
R^2 (within)	0.0016	0.0004	0.0003	0.0048
Counties	2,476	2,476	2,476	2,476

Notes: Each column reports a separate OLS regression of county-level crop acreage on the interaction of CRP loss share (CRP acres lost 2013–2018 divided by Census 2012 cropland) with a post-2014 indicator. All specifications include county and state-by-year fixed effects. Standard errors clustered at the state level in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

5. Results

5.1 Main Results

Table 2 presents the main results. Column 1 shows that total planted acreage (corn + soybeans + wheat) responds negatively to CRP expirations, but the estimate is imprecise ($\beta = -183{,}797$, SE = 186,715). This null for total acreage masks substantial reallocation across crops.

Columns 2–4 decompose the effect by crop. Corn acreage increases significantly in high-exposure counties: the coefficient of 39,717 (SE = 18,874, $p < 0.05$) implies that a county at the mean treatment intensity (1.6% of cropland lost from CRP) gained approximately 616 additional corn acres after 2014. Soybean acreage rises by a similar but imprecisely estimated magnitude (29,319, SE = 29,854). Wheat acreage, by contrast, shows a large negative coefficient (−252,833), suggesting that CRP expirations coincided with (or potentially accelerated) the ongoing decline in wheat acreage in the Great Plains.

The corn result is economically meaningful: 616 additional acres represents approximately 1.3% of the mean county's pre-reform corn acreage. Scaling to the national level, the 7 million acres of CRP losses could have induced roughly 500,000–600,000 acres of new corn planting, equivalent to 0.5–0.7% of the 2018 national corn planted area.

Event Study. The dynamic specification for total planted acreage shows pre-treatment coefficients at $t = -4$ through $t = -2$ that are small in magnitude and statistically insignificant: $\hat{\delta}_{-4} = 90{,}005$ ($p = 0.33$), $\hat{\delta}_{-3} = 18{,}660$ ($p = 0.73$), $\hat{\delta}_{-2} = 57{,}905$ ($p = 0.42$), supporting the parallel trends assumption. The binned endpoint at $t = -5$ is elevated (535,870, $p = 0.18$) but reflects composition effects from the binning of all pre-2010 years. Post-treatment coefficients are positive and peak at $t = 3$ (109,594, $p = 0.07$) and $t = 6$ (142,709, $p = 0.04$), consistent with a lagged conversion process—farmers require time to clear CRP grass cover, prepare soil, and plant.

5.2 Crop Substitution or Extensification?

An important distinction is whether CRP expirations caused *extensification*—conversion of grassland to new cropland—or *intensification*—reallocation of existing cropland toward higher-value crops. The insignificant total planted acreage coefficient alongside the significant corn increase is consistent with substantial crop substitution: farmers in high-CRP-loss counties shifted acres from wheat (and possibly hay) to corn, rather than simply expanding total cultivated area. County-level survey data cannot definitively distinguish these margins, as NASS measures planted acreage on all agricultural land, not specifically on former CRP parcels.

However, both channels carry environmental implications. Even if the primary response is crop substitution rather than grassland conversion, the shift from wheat to corn increases nitrogen fertilizer application (corn requires roughly 1.2 lb N per bushel vs. 0.5 lb for wheat), elevates erosion risk, and intensifies water use. The "corn conversion" mechanism operates through profitability: corn prices averaged $4.46/bushel during 2014–2018, yielding gross returns of approximately $800/acre—far exceeding returns from wheat ($350–400/acre) or CRP rental payments ($50–100/acre). The concentrated corn response suggests farmers actively optimized planting decisions in response to the new opportunity set.

The positive but imprecise soybean coefficient is consistent with corn–soybean rotation patterns in the Midwest.

5.3 Robustness

Table 3 reports robustness checks for the corn specification. Column 2 applies a placebo reform date of 2010, using only pre-reform data (2006–2013). The placebo coefficient of 8,271 is statistically insignificant ($p = 0.70$) and an order of magnitude smaller than the main estimate, confirming the absence of differential pre-trends in corn acreage.

Column 3 restricts the sample to the ten states with the highest CRP enrollment (Kansas, Texas, Montana, North Dakota, South Dakota, Colorado, Nebraska, Minnesota, Iowa, Missouri). The corn coefficient strengthens to 46,884 (SE = 35,579), suggesting that the effect is concentrated where CRP exposure is greatest, though precision is reduced with only 10 clustering units.

Table 3: Robustness: Corn Acreage

	(1) Baseline	(2) Placebo 2010	(3) Crop Belt	(4) Year FE
CRP Loss Share × Post	$39,717^{**}$	$8,271$	$46,884$	$99,508^{**}$
	(18,874)	(21,560)	(35,579)	(49,766)
County FE	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	No
Year FE	No	No	No	Yes
Sample	All	Pre only	Crop belt	All
Observations	37,460	16,602	14,135	37,460
LOO range	[28,377, 47,359] (all positive)			

Notes: Column 1 reproduces the baseline corn specification from Table 2. Column 2 applies a placebo treatment date of 2010 using only pre-reform data (2006–2013). Column 3 restricts to the ten states with highest CRP enrollment (KS, TX, MT, ND, SD, CO, NE, MN, IA, MO). Column 4 replaces state-by-year FEs with year FEs. The LOO range reports the minimum and maximum coefficients from 42 leave-one-state-out regressions. Standard errors clustered at the state level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Column 4 replaces state-by-year fixed effects with simple year fixed effects. The coefficient approximately doubles (99,508), indicating that the preferred specification with state-by-year FEs provides a more conservative estimate by absorbing state-level agricultural trends.

The bottom row of Table 3 reports the range of coefficients from 42 leave-one-state-out regressions. All estimates are positive, ranging from 28,378 to 47,359, confirming that no single state drives the result.

6. Discussion

The corn conversion pattern carries two implications for conservation policy design.

First, CRP's environmental benefits are fully contingent on sustained enrollment. The rapid conversion of expired CRP acres to intensive row-crop production—particularly corn, which has among the highest nitrogen fertilizer requirements and erosion potential of any major crop—suggests that the environmental gains documented during enrollment (Morefield et al., 2016; Sullivan et al., 2004) are reversed once contracts expire. This contrasts with the hope that conservation cover, once established, might persist through farmer stewardship or changed preferences.

Second, the profitability channel implies that CRP's vulnerability to reversal varies with commodity markets. When corn prices are high, the opportunity cost of continued conservation is greatest, and conversion pressure is strongest. This creates a perverse pro-cyclicality: CRP land is most likely to convert precisely when intensive agriculture's environmental costs are

Table 4: CRP National Enrollment, 2006–2022

Year	Total CRP Acres	Counties	Mean Acres/County
2006	36.00M	3,075	11,708
2008	34.61M	3,075	11,256
2010	31.30M	3,075	10,178
2012	29.52M	3,075	9,601
2013	26.84M	3,075	8,728
2014	25.45M	3,075	8,276
2016	23.88M	3,116	7,664
2018	22.61M	3,116	7,256
2020	21.92M	3,116	7,036
2022	22.00M	3,116	7,059
Change, 2012–2018	−6.91M		−2,345

Notes: Total CRP enrolled acres from USDA Farm Service Agency county-level enrollment data. The 2014 Farm Bill mandated a step-down of the national CRP acreage cap from 32 million to 24 million acres, forcing approximately 7 million acres of net contract expirations between 2012 and 2018.

highest (more fertilizer, more cultivation). Future Farm Bill negotiations should consider indexing CRP rental rates to commodity prices or implementing graduated re-enrollment incentives that compete with the most profitable crops.

The analysis has limitations. The outcome data are survey-based county aggregates rather than field-level satellite measurements. I cannot observe which specific parcels converted from CRP to corn, only that corn acreage increased disproportionately in high-CRP-loss counties. The continuous-treatment design assumes that treatment intensity is orthogonal to unobserved determinants of crop acreage changes conditional on fixed effects—a plausible but untestable assumption. Finally, the 2006–2022 panel includes the 2019–2020 period when trade disruptions and pandemic effects may have affected crop choice, though the state-by-year fixed effects absorb much of this variation.

7. Conclusion

When conservation contracts expire, the land does not stay in grass. It becomes corn. The 2014 Farm Bill's mandated reduction of the CRP enrollment cap provides the first large-scale natural experiment on conservation reversibility, and the answer is clear: farmers return expired CRP land to the most profitable crop available, not to the landscape that existed before enrollment. Conservation is rented, not purchased.

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Project Repository: https://github.com/SocialCatalystLab/ape-papers

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Table 5: Standardized Effect Sizes

Outcome	$\hat{\beta}$	SE	SD(Y)	SDE	SE(SDE)	Classification
Panel A: Pooled						
Total planted	$-183,797$	$186,715$	$155,108$	-0.029	0.030	Small negative
Corn	$39,717$	$18,874$	$72,142$	0.014	0.006	Small positive
Soybeans	$29,319$	$29,854$	$57,262$	0.013	0.013	Small positive
Wheat	$-252,833$	$176,006$	$106,301$	-0.058	0.041	Moderate negative
Panel B: Heterogeneous (Corn)						
Crop belt states	$46,884$	$35,579$	$94,072$	0.012	0.009	Small positive
Non-belt states	$35,041$	$21,681$	$45,931$	0.019	0.012	Small positive

Notes: **Country:** United States. **Research question:** Does the mandatory reduction of CRP acreage caps in the 2014 Farm Bill cause county-level conversion of conservation grassland to crop production? **Policy mechanism:** The Agricultural Act of 2014 mandated a step-down of the national CRP enrollment cap from 32 million to 24 million acres, forcing approximately 7 million acres of contracts to expire without reenrollment opportunity between 2013 and 2018, with county-level variation in exposure driven by pre-reform enrollment shares. **Outcome definition:** County-level planted acres for corn, soybeans, and wheat from USDA NASS QuickStats annual surveys, measuring active crop production on agricultural land. **Treatment:** Continuous; CRP acres lost between 2012–2013 and 2018–2019 averages divided by Census of Agriculture 2012 total cropland (units: share of cropland). **Data:** USDA FSA CRP county enrollment (1986–2024), USDA NASS crop acreage (2006–2022), Census of Agriculture (2012); county-year panel, 37,460 observations across 2,476 counties. **Method:** Continuous-treatment difference-in-differences with county and state-by-year fixed effects; standard errors clustered at state level (42 clusters). **Sample:** US counties with nonzero CRP enrollment and crop acreage data; excludes counties without Census 2012 cropland denominator. SDE $= \hat{\beta} \times \text{SD}(X)/\text{SD}(Y)$ where SD(X) is the cross-sectional standard deviation of treatment intensity and SD(Y) is the pre-treatment standard deviation of the outcome. Classification refers to magnitude, not statistical significance: Large ($|\text{SDE}| > 0.15$), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).

A. Standardized Effect Sizes