JOB MARKET PAPER: The Impact of Discretionary Rental Rate Adjustments on Enrolling Agricultural Lands in the Conservation Reserve Program

Abstract

This paper examines the causal impact of discretionary adjustments by local boards to counties' soil rental rates for the Conservation Reserve Program on program enrollment over 2016-2022. I use a coarsened exact matching method to pair most similar counties and then estimate both the average treatment effect and the marginal treatment effect of rate changes. The results suggest that, on average, a $1 increase in a county's soil rental rate leads to a 58.84 acre increase in county CRP general acreage enrollment, with no effect on highly beneficial continuous acreage lands. The results suggest that competitive general acres are much more price sensitive than continuous acres, and thus that county rate adjustments are highly effective at enrolling acres but increase enrollment costs for the most environmentally beneficial lands.

Introduction

Agricultural production features substantial environmental externalities which have little direct regulation in the U.S. It is estimated that approximately one third of global greenhouse gas emissions are attributable to agriculture (Vermeulen et al., 2012), which are derived in large part from soil management and fertilizer use associated from active production. Additionally, the overuse of fertilizer, pesticide use, and soil erosion worsen downstream water quality, as evidenced by the currently 4,347 square mile dead zone in the Gulf of Mexico (NOAA, 2023; Paudel & Crago, 2021). However, the U.S. has no national regulation on either the water pollution or greenhouse gas emissions of agricultural production; the former is a nonpoint source pollutant not regulated under the Clean Water Act. Instead, the U.S.'s primary tool for reducing agricultural pollution is a diversity of voluntary land conservation programs, the success of which are inherently sensitive to the decision-making of producers. The largest program in this suite is the Conservation Reserve Program (CRP), which encompasses approximately 22 million acres (2.5% of all agricultural land) and costs approximately $1.8 billion dollars in fiscal year 2022 (NASS, 2023).

The Conservation Reserve Program (CRP) is a program administered by the Farm Service Agency (FSA) that pays farmers yearly rent in order to set aside farmland for 10-15 year contracts, which alter the ecological and economic landscape of the area. The initial intended benefits of the program were: increase alternative income for farmers, reduced commodity production in order to support crop prices, and provide environmental benefits from reducing production on marginal lands, specifically reducing erosion, reducing runoff, and increasing soil quality. In a modern context, the CRP is a combination of a land retirement program, a working lands program (through exceptions for grassland acres), and a payment for ecosystem services program. While existing data makes it difficult to estimate the effect of CRP on water quality, an associative study found that increased CRP acres was associated with better downstream water quality (Yin et al., 2021) and field-level studies find that CRP acres reduce erosion and increase soil quality (Karlen et al., 1999; Vandever et al., 2021). CRP acres also help enable regional biodiversity through increased wildlife habitat connectivity and reduced fragmentation (Dunn et al., 1993). To degree to which the CRP creates new environmental benefits rather paying farmers for benefits they would have already provided is a matter of scholarly debate (Arnold et al., 2013; Rosenberg & Pratt, n.d.), and there is considerable heterogeneity in how much land stays retired after leaving the CRP (Bigelow et al., 2020; Hendricks & Er, 2018; Morefield et al., 2016; Roberts & Lubowski,

2007). Beyond conservation, CRP enrollment slightly increases local agricultural land values (Wu & Lin, 2010) and potentially increases recreational activity in exchange for lowered agricultural production (Sullivan et al., 2004), with significant heterogeneity by location in both effects.

To achieve its objectives efficiently, the FSA has to set rates that are competitive with market rental rates, which are effectively production opportunity costs, for cropland which would confer the greatest environmental benefit if enrolled. The CPR uses a county-specific rate cap, called the soil rental rate (SRR), which limits the proposed rental payments in application bids. Since 2007, each county's SRR has been set at the mean cropland rental rate for that county as determined by an annual survey conducted by the USDA National Agricultural Statistics Service (NASS). However, the SRR cap can negatively impact the CRP's efficiency if county rates are set too low, discouraging participation relative to opportunity cost of farming or renting the land to other producers, or too high, resulting in enrollment of productive land and overspending for environmental benefits (Cramton et al., 2021).

In setting rental rates, the CRP features a largely unexamined source of administrative discretion: a county's producer-elected Farm Service Agency (FSA) county committee (COC) can submit a request to adjust their county's SRR, resulting in an approved alternative rate change. Alternative rental rates can theoretically help CRP rents adapt to the local conditions and remain competitive by suggesting rates based on local information, but the incentives of local county committees may not line up with efficient outcomes. If counties are incentivized to adopt higher rates to benefit their county's farmers, then we should generally anticipate rates to be above efficient levels and thus there will be a higher cost for the CRP's environmental benefits.

In the case of the 2010 39th CRP general contract signup, the approval process for alternates rates failed to approve rates based on sound evidence and created a lasting impact on CRP rates (OIG, 2012). 686 of 687 state-proposed alternate county rates were adopted based on state-provided evidence, which the FSA evaluated as less than strong for 97% of cases (OIG, 2012). These changes led to an estimated increase of $12.7 million in rent payments annually across the 331 counties with awardees compared to baseline rates (OIG, 2012). For the 41st cohort, the FSA carried forward many of the alternate rates previously approved and approved an additional 150 alternate rates, 45 of which were *lower* rates than baseline rates (OIG, 2012). This occurrence exemplifies at the very least a procedural failure in alternative rate setting, and it further suggests both a willingness of counties to submit rates with poor backing evidence and an ability for such rates to get enacted. This large scale failure of the process lead to the development of the current evaluation process, which has yet to be assessed by quantitative research.

This paper is the first to assess the role of alternative rates in CRP outcomes. Specifically, this paper investigates which county committees are more likely to adopt greater alternative rate adjustments and what the impact of those rates are on CRP enrollment and rental payments. Additionally, while prior work has covered the legal role of county committees (Galperin, 2020) and one study has investigated their electoral dynamics (Simonovits et al., 2021), this is the first study to connect the role of county committees in CRP administration to program enrollment.

Background

First authorized by the Food Security Act of 1985 (Subtitle D), the Conservation Reserve Program (CRP) (administered by the FSA) provides annual rental payments to contracted producers who set aside land

from production and plant some form of cover vegetation, with the purposes of reducing the environmental impacts of agricultural production and for reducing the oversupply of commodity crops (Stubbs, 2014). The CRP has a maximum amount of enrollment land which has shifted over time, peaking in 2007 (Figure 1). The program is limited by this cap on acreage, rather than a budgetary cap for implementation. Land is eligible for CRP if it was cropped a certain number of prior years (requirement varies by farm bill) in addition to meeting sub-program specific requirements where relevant. CRP contracts are typically 10 to 15 years in duration, after which the enrollee can exit and put land back into production, reapply, or occasionally receive a USDA-offered extension (Stubbs, 2014). Early termination of a CRP contract requires the repayment of all rental payments plus interest and possible liquidation damages, up to the Commodity Credit Corporation's discretion (7 CFR § 1410.32). CRP contracts may require the implementation of additional conservation practices (e.g. establishing wetlands, forest cover, etc.), which FSA assists with via a 50% cost-share for those which establish permanent cover changes (Stubbs, 2014), although this cost-share has shifted over time and over specific programs to encourage or discourage participation.

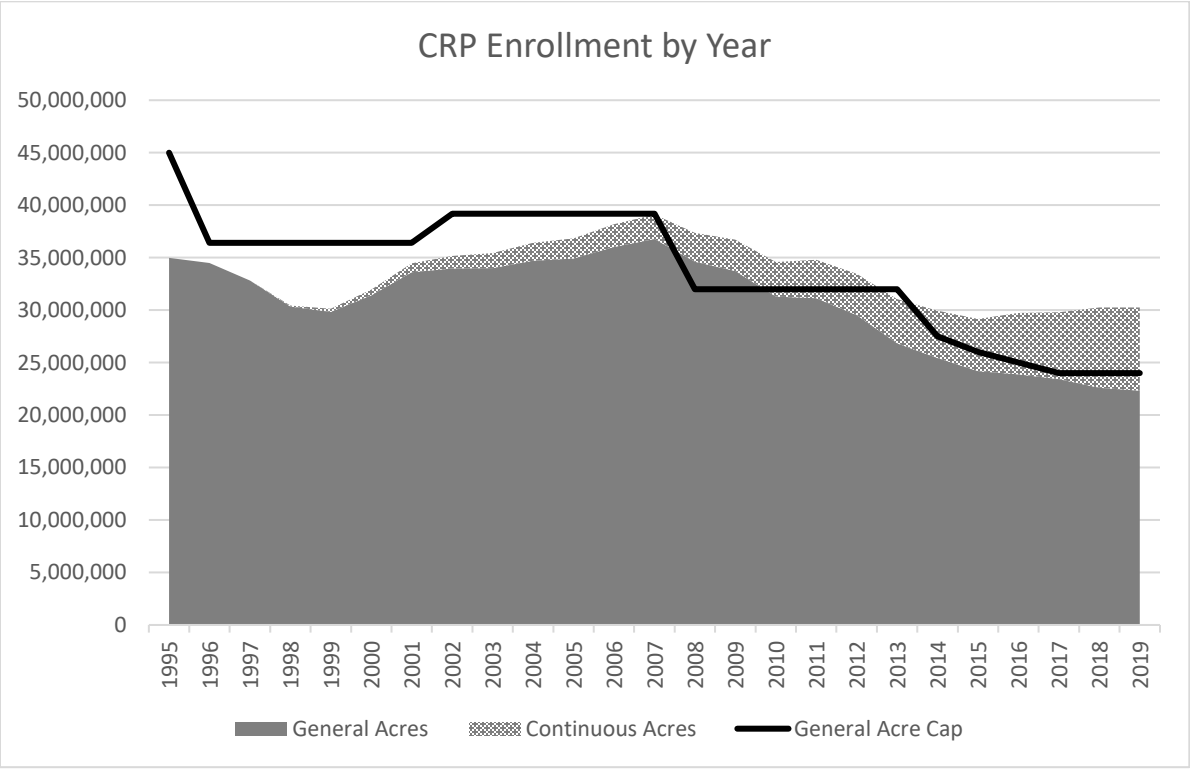

Figure 1. CRP Enrollment and Cap over Time. Data provided by FSA.

Enrollment in the CRP is optional and applicant based, and can be done via competitive general sign-up or continuous sign-up (Stubbs, 2014). Competitive general sign-up is available during specific enrollment periods, during which farmers submit applications. Annual rent payments average around $50 per acre (FSA, 2012; Stubbs, 2014). CRP rental payments are locked in at the application's acceptance for the duration of the CRP contract, and as a consequence future changes to the SRR do not impact existing contracts. As of the 1990 farm bill, FSA accepts offers with the highest evaluated Environmental Benefit

Index (EBI) in a reverse-auction based on FSA data collection and the farmer's application (Stubbs, 2014), practically implemented through establishing an EBI cutoff for accepting applications (Hellerstein, 2017). EBI criteria contains both endogenous and exogenous factors, giving applicants some degree of influence over the strength of their application (Hellerstein, 2017; Jacobs et al., 2014). The calculation of EBI criteria has changed with time, but as of 2007, criteria included (weights in parentheses) (FSA, 2010, 2013, 2022):

1. *Wildlife Factor:* expected wildlife benefits, based on cultivation of wildlife habitat (10 to 50 pts), wildlife enhancement (0, 5, or 20 pts), and overlap with geographic wildlife priority zones (0 or 30 pts).
2. *Water Quality Benefits from Reduced Erosion, Runoff, and Leaching Point Score:* location (0 to 25 pts), groundwater quality sensitivity and expected impact (0 to 25 pts), and erosion mitigation effects for surface water quality (0 to 45 pts).
3. *Erosion Factor (0 to 100 pts):* potential of land to erode due to wind or water, measured with the Erodibility Index (EI).
4. *Enduring Benefits Factor (0 to 50 pts):* likelihood of conservation practices to remain in use beyond CRP contract.
5. *Air Quality Benefits Factor:* potential to reduce airborne dust and particulates from wind erosion from cropland, including wind erosion impacts (0 to 25 pts), wind erosion soils (0 to 5 pts), location within air quality zones (0 or 5 pts), and potential for carbon sequestration (3 to 10 pts).

EBI is also a cost adjusted measure, not a cost-benefit analysis. It includes the cost of the proposed rental rate as a sixth point component according to the following equation (as of 2007):

$$2 * \text{Min}\left(10, \text{floor}\left(100 * \frac{r^m - r}{r^m}\right)\right) + \text{Max}\left(0, \text{Min}\left(5, \text{floor}\left(100 * \frac{r^m - r}{r^m}\right) - 10\right)\right)$$

Where r^m is the SRR for an offer and r is the offered rental rate for the offer. More simply, in equation B an offer gets a bonus of two EBI points up to 20 points for the first 10 percentage points the proposed rate is below the SRR, and an additional one EBI point for the next five percentage points. Any percentage points below 15 do not confer additional points. Research on bids from 1997-2003, before the modern EBI calculations, found that those farmers who offered rent discounts (thus were more competitive on price) were those with higher rent caps and lower scores for exogenous EBI components (Kirwan et al., 2005). However, the cost weight is the only factor of EBI that is hidden from applicants, and it is determined after all offers have been received (Hellerstein, 2017). Farmer learning in optimizing EBI scores and offered rates seems to decrease the cost-competitiveness of bids over time as well as increase the premium extracted from CRP payments (Kirwan et al., 2005).

Continuous signup is targeted at the most environmentally sensitive land, and it does so through a series of major initiatives geared at specific conservation practices (Stubbs, 2014). Applications are rolling and non-competitive, unlike general sign-up, and thus are not contingent on EBI calculations. Additionally, continuous CRP contracts pay on average around $100 per acre, more than double the annual rent of general sign due to targeting land that confers greater environmental benefit via enrollment (FSA, 2012;

Stubbs, 2014). Starting in 2000 and expanded in 2008, some continuous sign-up programs are also accompanied by a per acre signing incentive payment (SIP) of $100 to $150 per acre at contract approval, depending on the length of the contract (FSA, 2012). The Practice Incentive Payment (PIP) was implemented for some continuous programs (largely overlapping with SIP coverage) in the same timeframe, and reimburses up to an additional 40% of the costs of implementing approved conservation practices, administered as a one-time payment after the practice is implemented (FSA, 2012).

Rate Setting Process

Figure 2 illustrates the rate setting and bid process for the CRP (FSA, 2019). Rental rates are capped by county level soil rental rates (SRR), which are soil type specific. As of 2008, calculating SRR first starts with the National Agricultural Statistics Service's (NASS) Cash Rents Survey estimates the county average rental rates (AVGRT), which is collected from February to July (NASS, 2022). NASS surveys the population of farms with $1,000 or more in agricultural sales or potential sales based on a list of farms maintained by NASS, which includes a profile of farm historical production and size for sampling purposes (NASS, 2022). As of 2022, the sample was roughly 245,000 (NASS, 2022). If the survey is unable to obtain a sufficient number of responses for a given county, NASS calculates a multi-county rate instead. The AVGRT for each county is then multiplied by productivity factor (max: 1) based on predominant soil types, as publicly stored in the National Commodity Crop Productivity Index by the National Resources Conservation Service (NRCS) to become the publicly posted SRR. This rate is then multiplied by a percentage based on the type of signup to become the SRR; as of the 2018 farm bill, the maximum bid rate for general sign-up was set at 85% of the SRR and the maximum rate for continuous acres was set at 90% of the SRR, a decrease from 110% of the SRR under the 2014 farm bill. The SRR in use for a given CRP application is then a composite score based on the field's three predominant soil types.

SRR are generally updated each year there is a general signup period, however they still apply as carryover rates, even if out of date, to continuous signup acres which can enroll every year. When SRRs are updated, county FSA offices can request a change to county AVGRTs, known as "alternative rates" (FSA, 2019). Formally, a request for an alternative rate is submitted by a COC to their state FSA committee (STC) for review, and the SRC then submits all COC requests it deems complete and accurate to the federal FSA for approval. Requests must be accompanied by data and analysis that demonstrates that the alternative rate is a better approximation than the NASS rate, which the federal FSA weighs in making a decision on the rate. Evidence must reflect the same year of the NASS survey, which is typically a year prior to the forthcoming CRP signup (a rate update for 2020 CRP general signup would rely on NASS 2019 estimates). Because of this, alternative rates should theoretically not be used to account for more recent changes in the market, such as crop prices. Evidence guidelines have developed over time, with recommendations being more general in 2008 and developing into the following specific evidence criteria starting in 2019 (FSA, 2019):

- Average of cash rents from a random sample of lease agreements
- Cash rent estimates from a published survey
- Neighboring county NASS estimate comparisons (include at least 2 adjacent counties and justifications for how they are similar)
- Average of cash rents from FSA farm business plans
- Models that estimate cash rents, such as models that use returns to crop production or land value data

The request is then evaluated by a technical committee, which makes recommendations on rates to a committee of politically appointed FSA officials, who make the final decision on which rates are approved. If a request is approved, the real rate is often a negotiated rate between the proposal and the baseline rate. These adjustments can also be extended for additional years. The FSA also adjusts SRR for counties for which they believe the underlying evidence is poor. Despite these variety of mechanisms for ensuring rates for competitive applications, bids have been increasingly approaching SRR caps in more recent years, suggesting less rent price competition (Hellerstein, 2017). In this context where applicants increasingly bid at or right below the county SRR cap, setting that rate is likely quite consequential for program costs. Additionally, the COC alternative rate request process was temporarily removed from the CRP guidelines from 6/13/16 through 12/9/19 (FSA, 2006, 2016, 2019), during which there were no general signup periods.

How often COC alternative rate requests are made and approved should depend in large part on the quality of the NASS survey for a given county-year. When the NASS survey has lesser observations in a given county, its rate estimate will tend to be less accurate. In such a case, evidence provided by COCs and STCs should have greater weight in that: (1) the NASS rate estimate will tend to deviate from the true rate and (2) the evidence provided can exceed in case quantity the number of NASS survey points. This trend is likely particularly prevalent in counties with less producers or less cash rent arrangements.

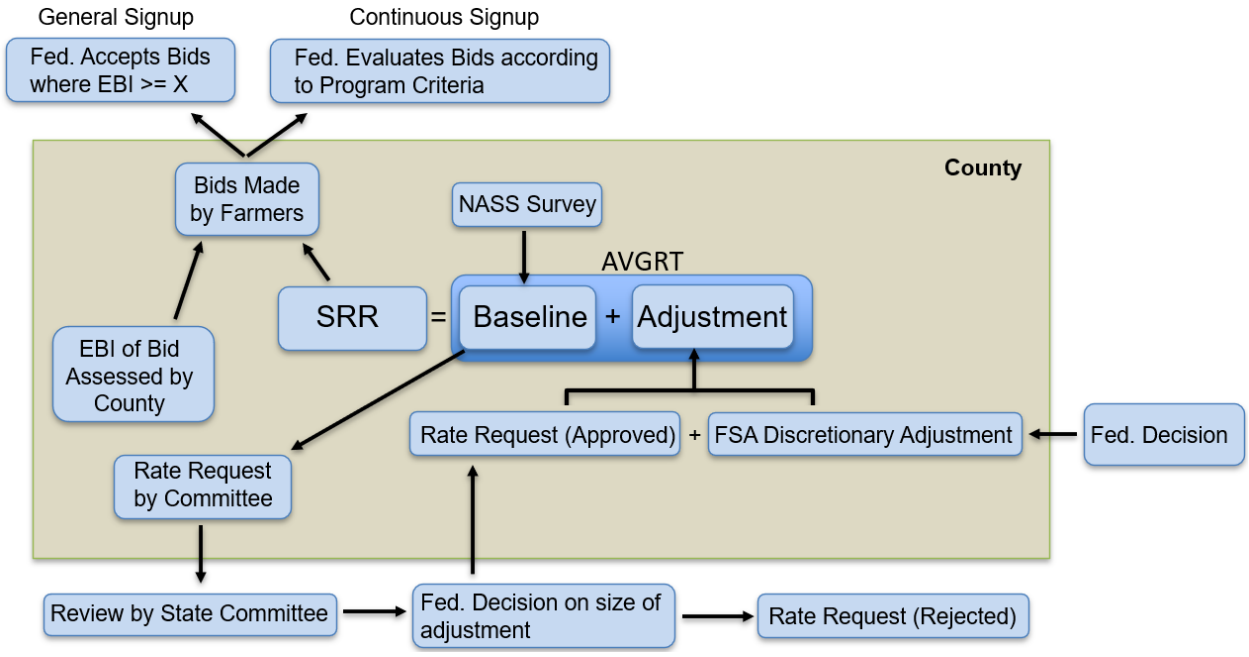

Figure 2. CRP Rate Setting and Bid Process.

FSA County Committees

FSA county committees (COC) were initially established in the 1935 farm bill (P.L. 74-46, 16 U.S.C. §590h(b)(5)) to help facilitate the local implementation of FSA policies, and in a modern context these committees share work with state and area committees. Most importantly for this context, county

committees are tasked with administering conversation programs, informing local farmers of FSA programs, serving as a two-way communication channel between the FSA and local farmers, reviewing local applications for programs, and appointing a county FSA executive (Feder & Cowan, 2013). FSA county committees are made up of producer-elected producers and have at least three and up to 11 members who each serve three-year terms up to a maximum of nine years served. The jurisdiction of a committee is either a county or less commonly a multi-county district, with election districts called local administrative areas (LAA). Currently there are approximately 7,700 elected farmers serving across committees (*County Committee Elections*, 2023). There is little to no academic research on who these committee members are, but I expect that they reflect the majority demographics of farmers: white, older men (NASS, 2017).

To my understanding, there has been no empirical policy or economic analysis of the role of county committees in the administration of the CRP or other programs. A lone empirical, non-causal study finds evidence that program payments increase farmer participation in elections, although this effect is potentially driven by the larger farmers both receiving greater payments and being more involved in county committee elections (Simonovits et al., 2021). The authors also find that conservation payments had a lesser impact on voting behavior compared to price support payments, indicating that the CRP may be less salient business in the eyes of producer voters compared to other programs which have more temporally dynamic payouts. Other more general work on the CRP

Theory and Hypotheses

Next, I turn to why COC might request alternative rates. Most likely, baseline rates may simply misestimate the AVGRT, and thus a rate request can correct the AVGRT estimation. However, this motivation assumes that COC members sufficiently seek efficient implementation of the CRP, such that they will navigate the request process. Alternatively, rates could instead be strategic and motivated by conflicts of interest. However, COC motivated by conflicts of interest still need to secure approval at both the state level (by the STC) and the federal level, checks intended to reduce conflicts of interest. Another possibility is that COC may choose to not pursue a rate request where NASS misestimates the AVGRT. Reaching a decision on a rate appeal is not costless, and gathering information to support a request is not costless.

Figure 3 illustrates my model of how a COC might secure a rate request based on a conflict of interest motivation. The core channel is that a COC must evade effective STC oversight, which should disqualify a suspect request, through either deceiving the STC or colluding with the STC. Deception could be accomplished through the strategic selection of evidence. After securing STC approval, the request goes to a technical committee of the federal FSA, which makes a recommendation to the politically appointed FSA executives. This group makes the final decision on rates and importantly can override a rejection of the technical committee, which could be driven in part by lobbying pressure. I expect that this system of checking is most vulnerable when NASS estimations are poor, and thus rate adjustments are justified on grounds of efficiency. Poor NASS estimations necessitate that the data used to construct them is less numerous or poorer quality, and as a consequence the federal review committee has a worse baseline of information to compare COC evidence against. In such a situation, a COC could potentially present evidence that exceeds NASS quality yet presents an inaccurate rate. This effect is likely minimal for STCs, who should have a better understanding of the conditions of the counties in their states and have one or more conservation specialists to inform their decisions. Additionally, COC must make a decision of how

far from the "true" rate they want to deviate. The further the deviation, the greater likelihood of the request being caught by STC oversight or rejected by the FSA technical review.

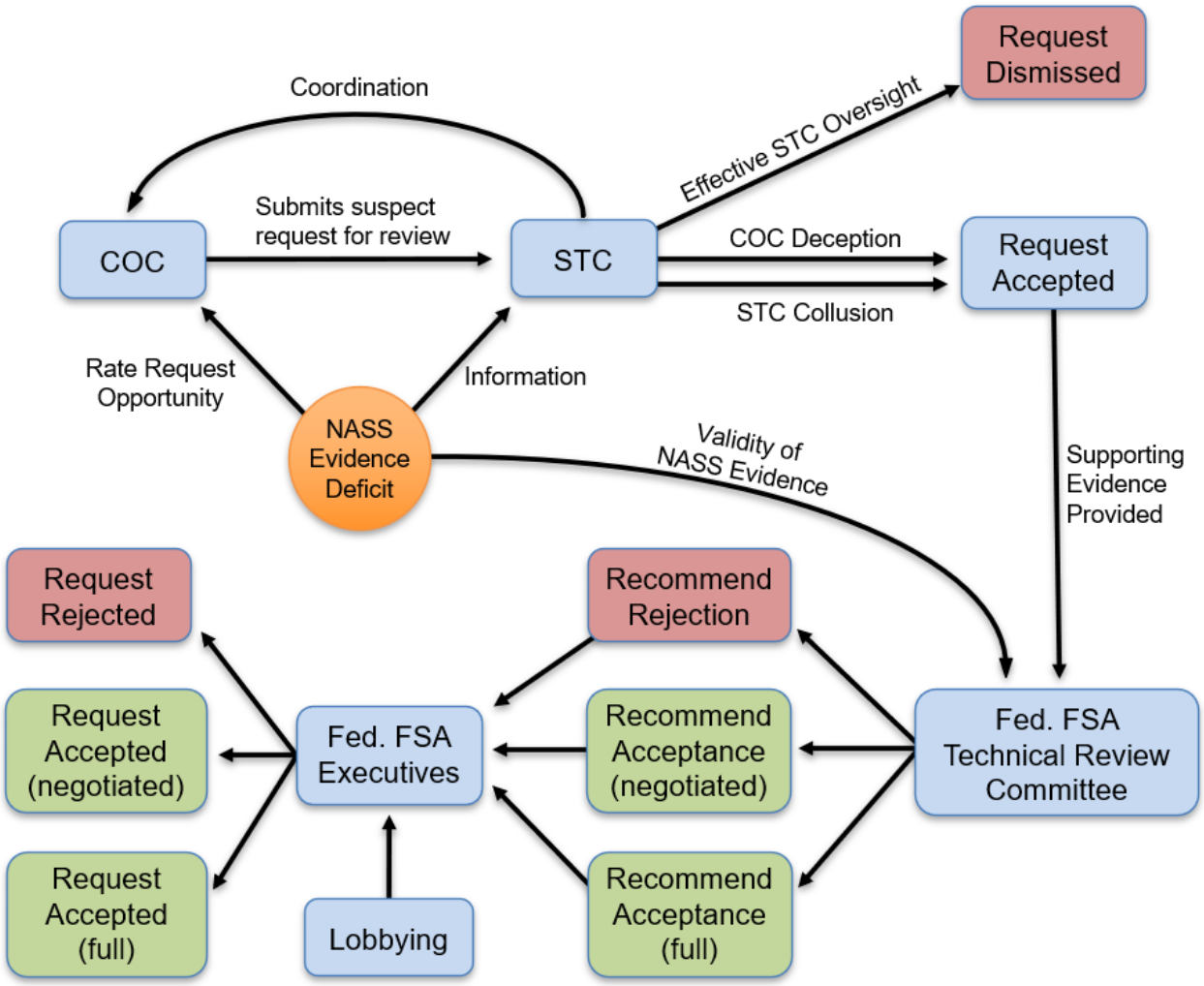

Figure 3. Theoretical Model of Conflicts of Interest in County Alternative Rate Requests

I theorize a number of potential biases that incentive COC rate requests towards inefficiency. Generally, we may expect local counties to specify inefficient rates since they are not accountable for per-county CRP costs. Instead, they are limited by a rule that CRP land cannot exceed 25% of county cropland. The cost of providing higher than efficient rates is born by the federal government and is external to county benefits. Counties are theoretically encouraged to set a higher alternative rate to increase the number of enrolled acres up until the land cap, local farmer income transfers, and realized local environmental benefits.

County committees may also obtain benefit from the goodwill or fiscal success of farmers in their county. Since CRP rent constitutes an income transfer to participating farmers that depends on the county rate, the county agency can increase the maximum transfer and marginally increase the number of enrolled plot-farmers by specifying a higher rate. Since county committee members are farmers

themselves, they may have a conflict of interest in setting CRP rates higher to enable higher payments for their own fields or fields of friends or family. Alternatively, county committee members may seek to lower CRP rates so that lesser CPR enrollment leads to a smaller distortion on land values, and thus they can purchase additional land more cheaply. Both positive and negative rate adjustments are present in the limited rate data published prior to this analysis (OIG, 2012).

County committees may also be incentivized by organized farmer interests who exert pressure on them to enact a higher or lower CRP rate. These interests may offer bribes, side-payments, and pecuniary or non-pecuniary benefit in exchange for a rate change. Farmer organizations could lobby for higher rates to increase CRP returns to their members, while businesses that serve farm production, such as input suppliers, could lobby for lower rates in order to marginally increase acres in production and thus the market for their services. Business influence could also be indirect through public messaging campaigns and advertising to farmers. Additionally, this may have equity concerns, as counties with more white male farmers may be able to better leverage their greater existing resources to accrue greater CRP benefits for farmers in their counties.

H1: On net, alternative rates will raise rental rates above SRR rate estimates.

Using the economic rational that higher rental rate offers will induce greater program uptake, I hypothesize:

H2: Alternative rates which are higher than survey rate estimates will increase CRP enrollment, all other determinants equal.

Methodology

Data

This paper will draw on yearly data on CRP rental rates, average market rental rates, CRP enrollment and payment data, FSA county committee elections, and county-level economic indicators from 2008-2022. By rental rates, I am referring to cash rental rates for non-irrigated production. I have obtained NASS's baseline SRR survey rates and county-level alternative rates from the FSA/ERS. The NASS survey was not conducted in the years 2015 and 2018 (relevant for each immediately proceeding year), although this does not endanger the analysis as 2016 signups used rates set based on 2014 NASS data and no general acres were enrolled or reenrolled in 2019. I also have data on which counties submitted alternative rate requests for 2015-2023, as well as the used rate and the rate adjustment, if approved. The quality and availability of rate request data prior to 2015 is poor. Additionally, I do not have data on the actual rate which was requested, and this request rate cannot be inferred from the data since the approved rate is often a negotiation between the request and the initial base rate. In addition to rate requests, I calculate the additive FSA discretionary rate adjustment by comparing the base rate, based off NASS's survey of county rental rates and FSA approximations of rental rates for non-surveyed counties, to the rate in use. For counties with alternative requests, I calculate this additive adjustment by subtracting the negotiated rate from the rate in use. For 2008-2014 I do not have data on which counties submitted requests, but the difference between the base rate and rate in use is a combination of the alternative rate adjustments and FSA discretionary adjustments. Additionally, I have data on CRP entry, exit, and reenrollment data by county and by general vs continuous CRP contract type. Notably, calculations of CRP land flows from this data do not exactly match reported acres, perhaps due to uncaptured attrition

or delayed entry to the program. Additionally, I have yearly data from the FSA for 2007 through 2019 on elections for county committees.

I include estimations of the number of eligible acres for enrollment in the CRP general signup by county, as provided by Seth Spawn of the University of Wisconsin Madison Global Land Use and Environment Lab. CRP eligibility changes over time and is defined in the most recently passed farm bill for each year. General acres must be planted in four of six prior crops years, a fixed time range set by the farm bill, and must also be classified as highly erodible land (HEL) (an Erodibility Index of 8 or higher), with the FSA providing a special layer of this classification. The main limiter for calculating eligibility is that relatively accurate estimations of cropland cover, the Cropland Data Layer, only go as far back as 2008. As a consequence, for signup years before the 2018 farm bill, I do not have sufficient data to fully calculate eligibility for multiyear grasses, which are excluded from eligibility if they have been planted for longer than 12 years. The estimations for 2019-2022 account for HEL, four of six years farmed from 2012 to 2017, and inclusive of multiyear grasses. Estimations for 2015-2018 account for HEL and four to six years farmed from 2008 to 2013, but do not include multiyear grasses.

I also account for programmatic payments and crop disaster assistance which might be related to CRP uptake. I include aggregate crop insurance payouts to farmers from the USDA's Risk Management Agency as the most comprehensive accounting of crop losses, including losses due to weather, wildlife, a decline in prices, etc. The remaining programmatic payment data is provided by the FSA, which details individual payments to farmers across a diversity of programs. I manually coded these programs into the following categories and aggregated by county: crop disaster payments for uninsured crops, decoupled/counter-cyclical payments, market fluctuation program payments, payments from COVID and 2019 trade war mitigation policies, disaster payments to diary/livestock (excluded), disaster payments for forestry (excluded), conservation payments (excluded), and miscellaneous payments (excluded). The included program payments help account for the impact of federal agricultural payments, including a quantification of crop loss.

Finally, I include the demographics for the primary producers of farms in each county, based on the 2017 census. I include the total number of primary producers as well as the percentage of primary producers that are black.

Research Design

All analysis was conducted in R (v4.2.3). First, I employ descriptive statistics in order to assess the characteristics of counties making rate requests, as well as the distribution of those rate changes themselves. Since rate requests are only available for years 2015-2022, my descriptive analysis of 2008-2014 is limited. Additionally, I separately analyze descriptive for pseudo never-taker counties, or those counties which had no CRP acres prior to a rate request. To my understanding, this is the first presentation of the descriptive distribution of county alternative rates.

Second, I use coarsened exact matching (CEM) in order to causally compare counties with approved rate requests to similar counties without approved requests (Iacus et al., 2012). CEM matches observations along an *n*-dimensional matrix, where *n* is the number of matching variables. Matching variables are divided into bins, in my case using the Sturges' rule, which comprise the strata (cells) of the matrix. Strata which contain at least one treated and one control observation are keep, and those observations are output as pairs. For robustness, I use both many-to-many matching technique in which strata with

any number of treated and control observations are used (so long as each has at least one) as well as a k-to-k matching technique (still matching on counties), in which strata are restricted to an equal amount of treated and control observations. Additionally, I run the CEM separately for positive and negative rate adjustments treatments in order to preserve a unidirectional influence. For each specification, I think take the sample average treatment effect on the treated (SATT) of the outcome variables: the number of CRP offers made by applicants (*offers*), the total enrollment across both general and continuous signup acres (*enroll, all*), the total enrollment of general signup acres (*enroll, gen*), the total enrollment of continuous signup acres (*enroll, cont*), the total number of reenrolling acres (*reenroll, all*), and the total number of newly added acres (*newly added, all*). I match on the following variables: baseline rate (before adjustment), number of general CRP acres in the past year, number of continuous CRP acres in the past year, number of acres expiring this year, estimated number of acres eligible for CRP enrollment, estimate number of acres in agricultural field crop production (excluding orchards and forestry), summed of decoupled/counter-cyclical payments, crop disaster payments, compensation payments for COVID-19 and international trade disputes, number of primary producers in 2017, and percentage of black primary producers in 2017. I specify a binary bin for percentage of black primary producers[1] and a bin structure for baseline rate which increases in bin size as rate size increases.[2] Where counties with requests were missing a NASS baseline estimate, such as due to poor survey data quality, I use the baseline rate given from NASS to COC when considering making requests. Additionally, I run CEM models for two geographic matching specifications: matching within state and matching with two adjacent counties of the treated county (two-step).

A limitation of the above CEM method is that it computes an SATT for a binary treatment, and thus the effect is on having an approved rate request regardless of size. Within each strata output by the CEM process, I construct manual pairs where counties are more tightly matched on their baseline rates, relative to coarsened matching. I employ two criteria for manually matching within strata: (1) the difference between the treated and control baseline rates must not exceed in absolute value 30% and (2) the real rate of the treatment county exceeds the real rate of the control county by at least 1. I then divide the treatment effect for each treated unit by the real rate difference between treated and control counties, resulting in a sample average marginal treatment effect (SAME) on the treated, per dollar of rate adjustment.

An additional potential limitation is that treated counties may have systematically less accurate estimates of NASS rates and thus confound matches on NASS baselines, since poor NASS estimations are the on-paper justification for rate requests. To account for this, I run a set of CEM models using imputed data for counties with no NASS estimation, which used FSA baselines in prior models, and with predominantly non-irrigated production. Imputed rates were calculated by Wesley Burnett of the ERS in a working paper, which used predictive mean matching based on adjacent counties and prior time periods using the R “mice” package.

[1] Black primary producer break points: 0, 0.05, 0.5

[2] Base rate breakpoints: 5, 10, 20, 30, 45, 60, 80, 100, 130, 170, 220, 280, 330, 385.

Results

Trends in Alternative Rates over Time

Descriptive analysis of CRP rates shows clear deviations in the setting of rates over time and by administration. The data generally exhibits a cyclical change in rates, which reflects that rates are generally updated prior to a general signup, but sometimes are updated in years which only have continuous signups (Table 1). During the Obama Administration (2008-2016), there are less than a 100 instances of rates matching NASS survey rates. This indicates that the Obama administration routinely and with great quantity approved county alternative rates and/or the FSA altered rates at their discretion without county input. This large adoption is in part reflected in the initial implementation of the alternative rate process in the 39th signup, which saw 687 rate requests and 686 approvals. The 39th signup was the first general signup under the 2008 farm bill's new rate system, with the first NASS survey conducted in 2008 and applied to rates in 2009 (Table 1). Under this administration, the NASS estimations were functionally a baseline and rarely the final rate in themselves. The 49th signup is the first sign-up under the Obama administration for which we have reliable data, and for it the FSA approved all 103 rate requests. In contrast, the Trump administration entertained no rate requests until late 2019 with the 54th signup and late 2020 for the 56th signup, which had 168 (57.1% approved) and 178 requests (78.7% approved) respectively. Additionally, the Trump administration oversaw a number of FSA discretionary rate changes in late 2017, without a general signup, which were then reverted to baseline rates for 2018 and most of 2019. The Trump administration then resume general sign-ups in 2020 and 2021 with some alternative rate approvals. The Biden administration has overseen both an increasing number of requests over time and high approval rates, with approvals at 300 (99.7%) in 2022 and 419 (97.0%) in 2023.

Table 1. Rate Adjustment and General Sign-Up Dates, since 2009

Year	Sign-Up	General Sign-Up Dates	Date of Rate Adjustment	Requests Made	Requests Approved	Approval Rate
2009		---	9/3/2009	N/A		
2010	39	8/2/10-8/27/10	7/29/2010	687	686	99.9%
2011	41	3/14/11-4/15/11	3/5/2011	No data available		
2012	43	3/12/12-4/13/12	---	N/A		
2013	45	5/14/13-6/14/13	5/11/2013	No data available		
2014		---	---	N/A		
2015	49	12/01/15-2/26/16	6/1/2015	103	103	100%
2016						
2017		---	10/23/2017	N/A		
2018		---	6/3/2018	N/A		
2019		---	---	N/A		
2020	54	12/09/19-2/28/20	12/2/2019	168	96	57.1%
2021	56	1/4/21-2/12/21	12/1/2020	178	140	78.7%
2022	58	1/31/22-3/11/22	1/31/2022	301	300	99.7%
2023	60	2/27/23-4/07/23	---	432	419	97.0%

Next, I turn to a peculiar feature of rates prior to 2017: initially positive adjustments become negative in subsequent years. A "carryover" rate results when a rate adjustment, whether through a county rate request or at the discretion of the federal FSA, is enacted in one year and then is used for one or more of the following years. Many carryover rates occur because there is not a general signup every year and thus the FSA does not update rates yearly. In years where rates are not updated, new NASS estimations of the baseline rates are not implemented, and the FSA does not allow counties to make alternative rate requests. Other carryover rates are initial adjustments that are withheld beyond the year of the adjustment, even when rates are updated. Figure 4 plots the distribution of initial rate adjustments and carryover rates, including (indistinguishably) both alternative requests and FSA discretionary adjustments. Figure 5 plots the same data but only for rate adjustments which are positive in the initial year. Although rate adjustments are typically positive and modest in magnitude, 2480 initially positive rate adjustments result in carryover rates that become negative adjustments in at least one subsequent year (34.1% of all new rates, 35.8% of all new positive rates), considering the new NASS estimations of the baseline rate. As a consequence, rate adjustments intended to increase benefits for farmers applying for general CRP acres may effectively penalize the next year's applicants for predominantly continuous CRP acres in some counties, where baseline rate changes surpass the alternative rate's adjustment. Notably, counties without a rate deviation from the NASS baseline also do not update during off-years, meaning they face an effective adjustment equal to the difference in the current NASS baseline and the NASS baseline of the last rate setting period. Such rates are not included in Figures 4 and 5.

Descriptive Trends in Rate Requests

Next, I turn attention to another potential explanation for rate requests: counties may request rates in order to increase participation in the counties which do not participate in the CRP. For 2015-2022, a total of 100 county-years had both a rate request and no CRP acres in the prior year. 85 of these 100 requests were approved (85%), and all were positive except for three adjustments at -109 (-87% change). Figure 6A plots the absolute change in rates due to the rate request and Figure 6B plots the percentage change in rates. Of these data, 20 of 35 (57.1%) were accepted for 2015-2021, where I can observe enrollment outcomes. Despite large rate changes—both in absolute and percentile terms—for a number of counties, only a single county had subsequent CRP offers. The sole county offered 70.7 acres and had all acres accepted into the program.

After subsetting to only county-years with some participation in the CRP, I observe 414 requests from 2015-2021. 327 of the 414 rates were accepted (79.0%) and 37 were negative adjustments (8.9%). Figure 6C plots the absolute change in rates due to the rate request and Figure 6D plots the percentage change in rates. These rate distributions indicate that most adjustments are small in real and percentile terms, a number of rate adjustments greatly exceed the baseline rates. Positive rates adjustments that add between 25% and 100% of the baseline rate are prevalent, indicating that there is sizable rate variation which could translate to CRP enrollment effects.

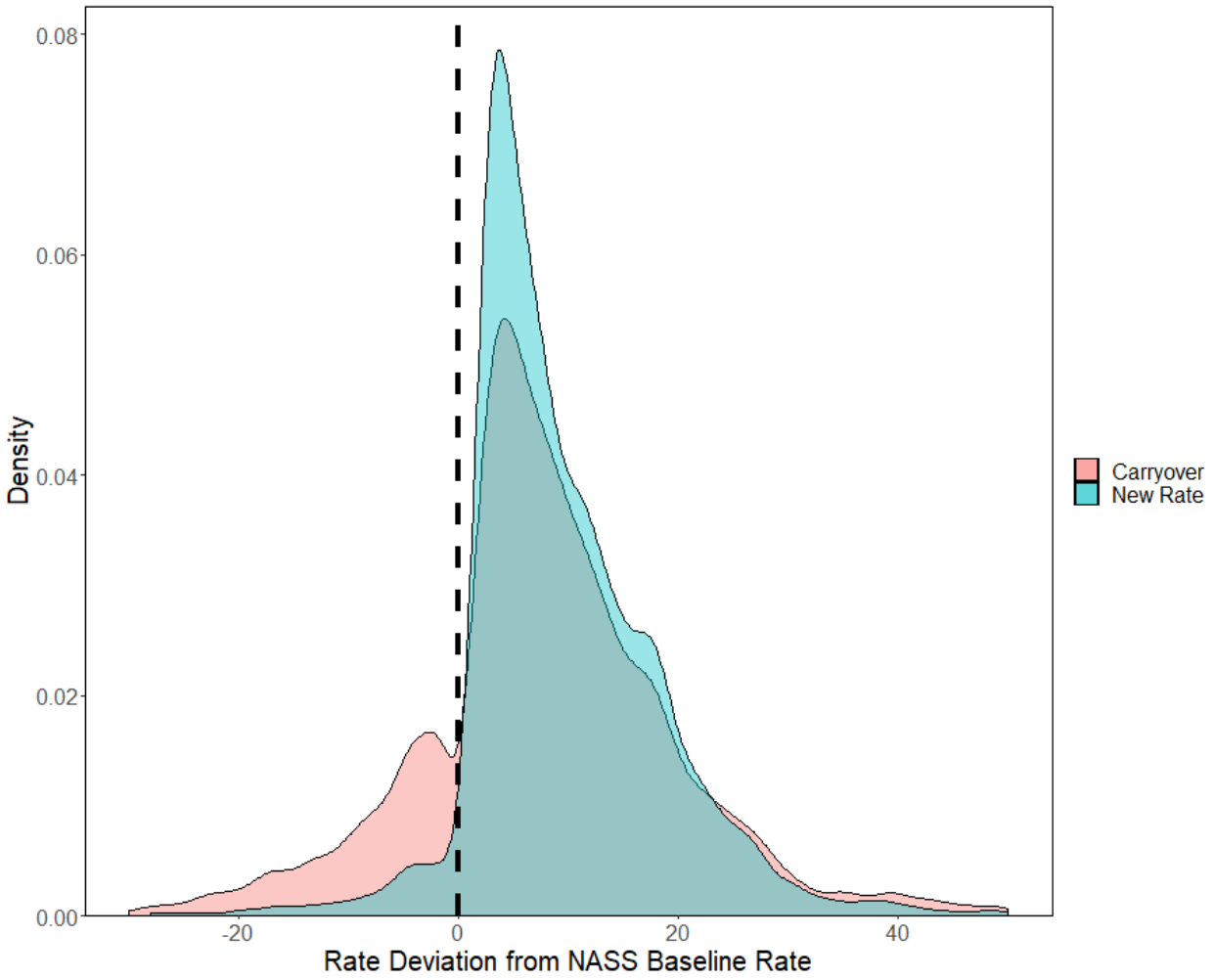

Figure 4. Histogram Distribution of New Rate Adjustments and Carryover Rates, 2009-2016, on County-Year Observations. Rate change tails below -30 and above 50 are trimmed for visualization.

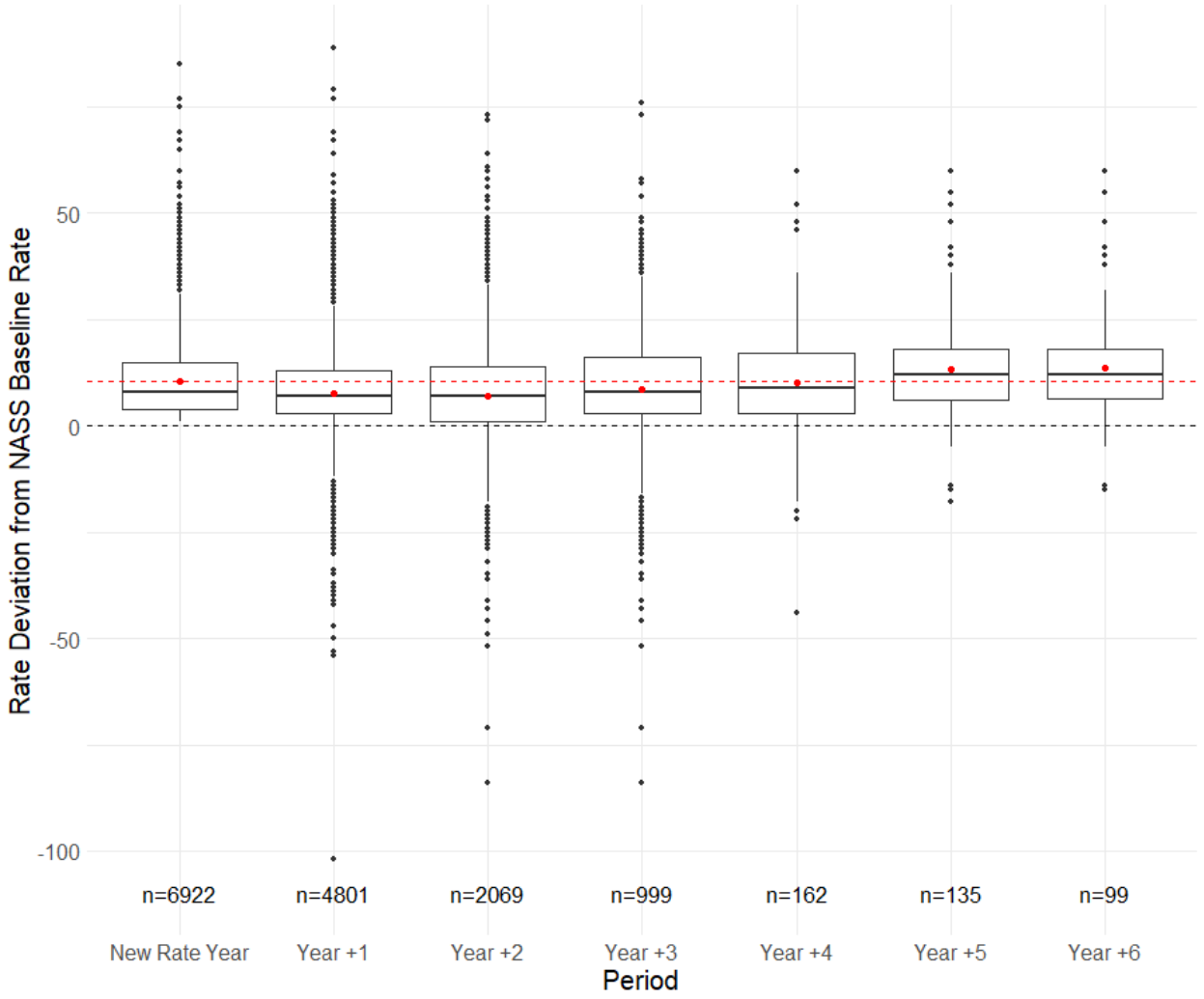

Figure 5. Boxplot Distribution of New Rate Adjustments and Carryover Rates, 2009-2016, for County-Years with Initially Positive New Rate Adjustments. Red dots show the mean of each period, and the red dotted line indicates the mean of the first period.

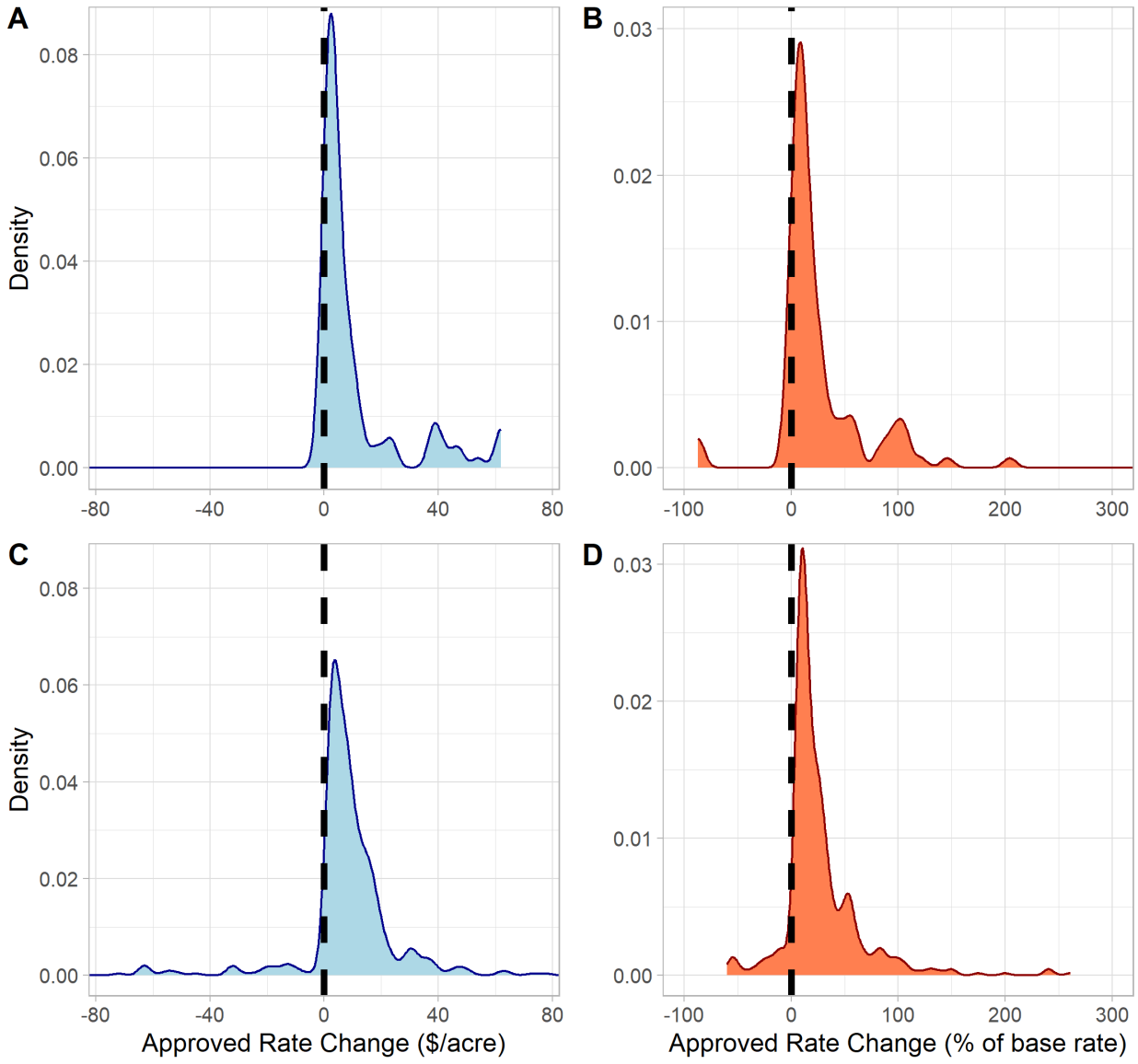

Figure 6. Distribution of Approved Rate Changes for Counties with No Prior CRP Enrollment (A and B) and for Countries with Prior CRP Enrollment (C and D).

Descriptive Differences Between Counties Based on Request Status

The intent of rate requests is that they allow a county to appeal poor quality NASS estimates, and by extension a key driver of rate request should be poor NASS data quality. While I cannot directly observe poor NASS quality, I can observe when counties receive a smoother multi-county rate. Of a total of 1173 rates request from 2016-2023, 279 (23.8%) were in county-years with a smoothed multi-county rate. In total, 5662 county-years had a smoothed multi-county rate over the time period; however, these data include many counties where the CRP is likely irrelevant to farmers or there is little agricultural production. Additionally, for 2021-2022 survey years (relevant for 2022 and 2023 sign-ups respectively) the NASS survey provides a coefficient of variation (CV) for each rate estimate which provides a snapshot for how great the variance of the underlying data is, not including smoothed multi-county rates. A higher CV might indicate poorer quality underlying data. County-years with rate requests had a mean CV of 7.42 and a median of 6.2, which is higher than the respective 5.73 and 4.7 of county-years without a rate request (applying the subsample filter, explained below).

In order to further understand which counties apply for rates and what the impact of those rates are, I calculated the means for a number of variables of interest across counties based on if that county: did not submit a request, did submit a request, and if that county had an approved request. Table 2 displays the difference in means. In order to narrow the sample down to a more comparable subgroup, I apply the prior subsample where I only include counties with some prior CPR participation, specifically where "CRP Acres All, lag" was nonzero. Additionally, I remove 11 states in which no county ever requested an alternative rate (AK, DE, FL, HI, LA, MA, NV, NJ, OK, SC, WV), Washington DC, and the US territories.

In interpreting this table, it is first important to point out that the number of CRP eligible acres and the number of acres in agricultural production are largely balanced across categories, indicating that rate requests are likely not driven by how many acres could be enrolled in a given county. Similarly, the number of producers is relatively balanced, as were the number of acres enrolled in continuous CRP were relatively balanced. Rather, those counties with greater participation in CRP general signup appear to be more likely to make requests and have those requests approved. Similarly, having a past rate request is much more likely in counties with current rate requests, suggesting that some counties more often need rate requests (such as more frequently having poor quality survey estimates) and/or learning by boards that helps navigate the rate request process.

For the other variables, both counties that make a rate request and counties with an approved rate request have on average a lower proportion of black primary producers and higher payments from crop disaster programs, crop insurance, and market fluctuation programs. In terms of outcomes, we see that counties with requests and/or approved requests receive more CRP offers and specifically more general signup offers. In contrast, continuous signups do not appear to be as sensitive to rate requests and changes. Election variables appear to be balanced across rate request status, although I currently only have election data for the 2015/2016 and 2020 signup periods and thus the election data only covers approximately 23% of the rate request data.

Table 2. Summary Statistics by Alternative Rate Request Status, means reported. Data for 2016, 2020, 2021, and 2022. For all counties with prior CRP acreage >0 and states with at least 1 alternative rate request in the time period.

	No Request	Request	Approved Request	Used in CEM
CRP Acreage (acres)				
CRP Acres All, lag	7,565	17,478	18,694	
CRP Acres Gen, lag	4,385	13,308	14,452	✓
CRP Acres Cont, lag	3,053	4,041	4,092	✓
CRP Acres Expiring All, lag	779	2,852	3,073	✓
CRP Acres Expiring Gen, lag	613	2,674	2,897	
CRP Acres Expiring Cont, lag	166	177	176	
CRP Acres New All, lag	281	575	644	
CRP Acres New Gen, lag	85	387	432	
CRP Acres New Cont, lag	196	188	213	
CRP Eligible Acres (Approx)	45,622	46,367	45,462	✓
Cropland, lag (acres)	53,683	55,996	55,850	✓
Other Program Payments (total $)				
Crop Disaster Payments (uninsured)	383,177	566,168	557,235	✓
Crop Insurance Payments	3,271,558	5,188,055	5,061,218	✓
Decoupled/Counter-Cyclical Payments	2,101	696	775	✓
Market Fluctuation Program Payments	1,612,046	2,145,723	2,004,161	✓
COVID/Tradewar Payments	4,804,222	4,541,751	4,080,005	✓
Demographics				
# of Primary Producers	1,141	1,107	1,106	✓
% of Primary Producers Black	1.11%	0.68%	0.56%	✓
Outcomes (acres)				
CRP Offers	900	3,425	3,790	
Added CRP Acres: Gen (Excluding 2022)	617	2,045	2,351	
Added CRP Acres: Cont (Excluding 2022)	383	494	497	
Rate ($/acre, annual)				
Base Rate	92.3	56.1	53.5	✓
Used Rate	96.7	65.0	63.7	
Election Data, LAA Avg by County (2016 and 2019 only)				
Number of Elections, Lag	0.91	0.93	0.92	
Avg Number of Candidates Per Election, lag	1.57	1.59	1.58	
Sum of Votes, lag	70.96	63.76	62.75	
Vote Share for Winning Candidate, Avg, lag	0.65	0.71	0.71	
Past Requests				
Request Last Year	3.02%	24.95%	25.59%	
Request Any Prior Year	8.98%	38.34%	39.87%	
Approved Request Last Year	2.03%	20.80%	21.11%	
Approved Request Any Prior Year	7.52%	33.45%	34.54%	
N	8120	650	562	

CEM Matching

I run eleven CEM models estimating the difference in county-level CRP offer and enrollment outcomes by alternate rate request status, calculating the SATT (Table 3) and SAME (Table 4). Models 1-5 consistently estimate that a positive rate adjustment has a positive ATT for offers, enrollment across categories, reenrollment, and new acres for the following signup across differing matching specifications, including differing geographic matching criteria. In each of these models, 2022 is included only for offers due to data availability. Given the robustness of the positive effect across models, I adopt the most conservative SATT model, the rate matched two-step matching model (model 5), as the preferred specification. Model 5 indicates that the binary effect of having an approved positive rate request has a greater impact on general acres (353.71; $p<0.05$) vs continuous acres (22.32; $p<0.01$) and a greater impact on reenrollment (279.51; $p<0.05$) than new acres (96.52; $p<0.05$). I report the distribution of the treatment effects on enrollment for model 1 in Figure 7, which demonstrates that many counties have no treatment effect or a slight negative one. This top heavy distribution is likely due to the pseudo never-taker counties analyzed previously and the general trend that CRP enrollment is clustered in a minority of agricultural counties.

Models 6-11 produced the average marginal effect (SAME) for a single dollar raise in the county's rental rate. All models find a positive SAME for all outcomes except continuous acre enrollment, for which significance differs by model. Estimate sizes also differ across models, which indicates that accounting for geographic matching notably impacts the effect size. Again, I adopt the two-step model as the preferred conservative specification (Models 8 and 11). For the two-step models, incorporating imputed rate data does not meaningfully impact effect estimates, thus I adopt Model 11 as the preferred model. Model 11 finds that each additional dollar increase in rental rate increases CRP enrollment by 64.02 acres ($p<0.05$). The treatment effect decomposes for an effect of 58.84 general acres ($p<0.05$), but the effect on continuous acres is not significant (5.18, $p>0.05$). The effect is greater for reenrolled acres (50.1; $p<0.05$) compared to newly enrolled acres (13.92, $p<0.05$). The enrollment effect is positive for offers (45.51; $p<0.05$), although 18.51 less acres than for enrollment. Notably, this difference may in part be driven by the inclusion of 2022 in offers data but not enrollment data. Also note that all of the AME estimates are for all matched, treated counties, many of which had no treatment effect. As a consequence, the marginal effect is heterogenous.

Tables 3-4. Sample average treatment effect on the treated (SATT) and sample average marginal effect (SAME) for receiving an approved positive rate request. 2022 data is included in the Offers outcome only, due to data availability.

Model	(1)	(2)	(3)	(4)	(5)
Type	SATT	SATT	SATT	SATT	SATT
Offers	323.68***	301.71*	353.76***	388.03***	252.58*
	53.36	117.36	35.76	72.9	93.31
Enroll, All	352.34***	343.01*	339.05***	357.46***	376.03*
	53.39	133.67	38.82	89.92	135.34
Enroll, Gen	309.87***	291.92*	297.82***	322.89***	353.71*
	52.42	133.05	39.16	90.08	135.35
Enroll, Cont	42.47***	51.09*	41.23***	34.57***	22.32**
	9.18	19.41	5.67	9.31	7.36
Reenroll, All	266.08***	267.4*	253.06***	290.66***	279.51*
	48.17	117.22	35.06	79.77	121.18
Newly Added, All	86.26***	75.61	85.99***	66.81***	96.52*
	12.46	39.85	13.47	19.95	42.52
Technique	Base	k-to-k	Rate Matched	Rate Matched	Rate Matched
Imputed	No	No	No	No	No
Geo Match	None	None	None	State	2-Step
Treated, Matched	355	350	307	139	180
Control, Matched	4701	350	1567	268	264
Strata	7435	7435	4902	8718	4902

*p<0.05, **p<0.01, ***p<0.005. Standard Errors in Parentheses

Model	(6)	(7)	(8)	(9)	(10)	(11)
Type	SAME	SAME	SAME	SAME	SAME	SAME
Offers	96.21***	100.03**	43.14*	83.43***	43.04***	45.51*
	12.45	34.82	17.24	11.03	9.73	18.97
Enroll, All	78.49***	100*	59.05*	78.53***	22.77**	64.02*
	13.67	41.62	24.24	14	8.1	27.96
Enroll, Gen	73***	93.77*	54.33*	74.92***	17.16*	58.84*
	13.69	41.61	24.11	13.99	7.47	27.79
Enroll, Cont	5.49***	6.24*	4.73	3.62***	5.61	5.18
	1.3	2.62	2.84	0.76	2.94	3.42
Reenroll, All	60.22***	81.13*	46.6*	60.15***	20.03**	50.1*
	11.66	35.44	22.03	12.51	6.91	25.42
Newly Added, All	18.27***	18.88*	12.45*	18.39***	2.74	13.92*
	4.29	7.23	4.46	4.25	1.8	5.07
Technique	Rate Matched	Rate Matched	Rate Matched	Rate Matched	Rate Matched	Rate Matched
Imputed	No	No	No	Yes	Yes	Yes
Geo Match	None	State	2-Step	None	Yes	2-Step
Treated, Matched	307	139	180	296	123	167
Control, Matched	1567	268	264	1528	239	246
Strata	4902	8718	4902	4902	8718	4902

*p<0.05, **p<0.01, ***p<0.005. Standard Errors in Parentheses

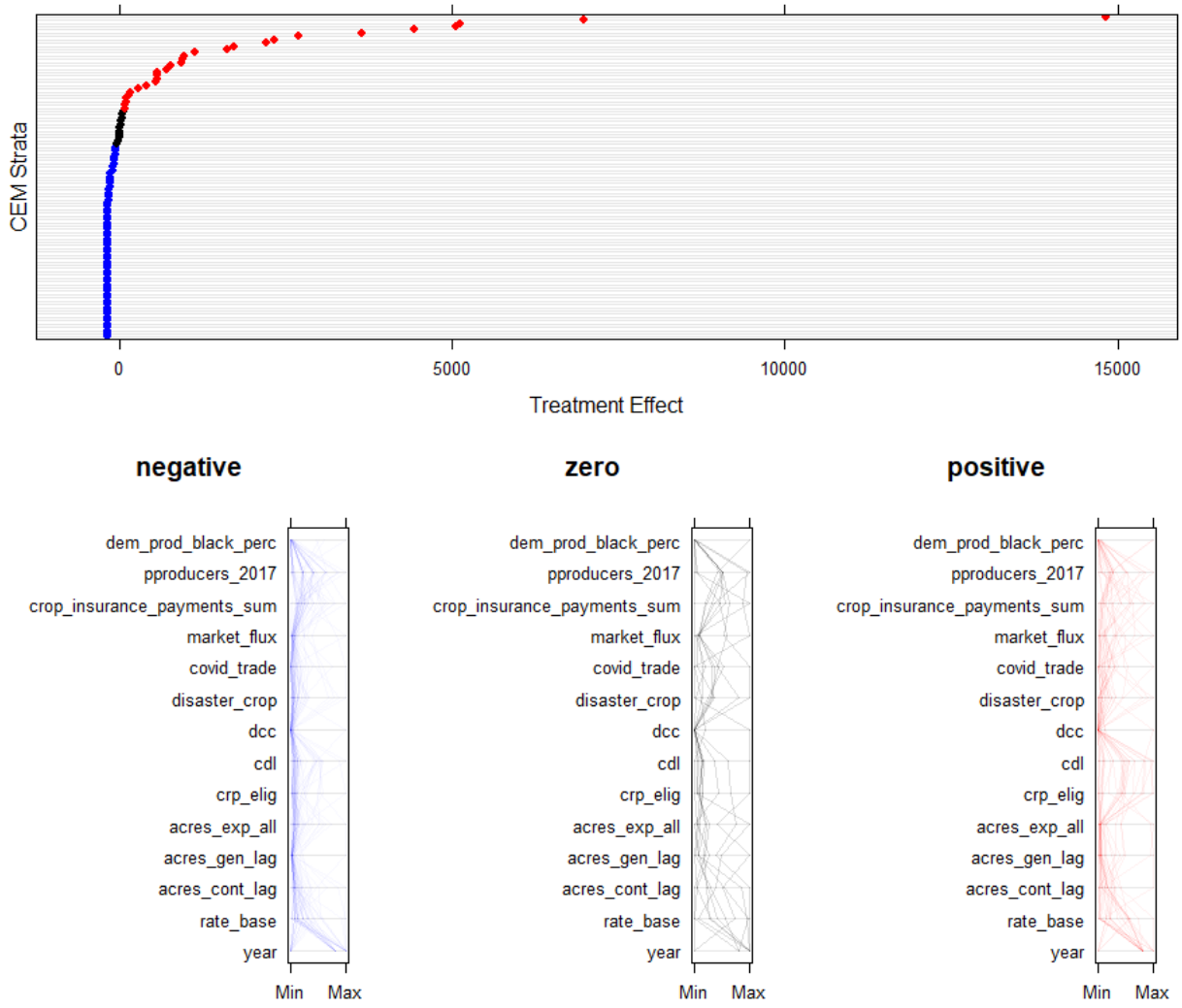

Figure 7. Map of Treatment Effects by Strata from CEM Regression for Model 1 (Table 3).

Discussion

The current system of infrequent CRP rate updates appears to generate inefficiencies for continuous acre enrollment in off-years. While the current system updates rates typically for every general sign-up, a reasonable counterfactual would be that rates automatically update to the NASS standards each year regardless of general sign-ups. The existing rate setting practice takes significant labor on the part of the national FSA, as they have to both evaluate county alternative requests and decide on a suite of discretionary rate adjustments. The advantage of this process is that it accounts for potential errors in the NASS baseline rate survey and in the best case can set more effective and even efficient rates, but carryover rates show the consequences of this process when general signups do not occur every year. When rates are not updated, my analysis demonstrates that roughly a third of all rate adjustments flip from an initial positive adjustment to a negative one. This means that the while the process allowed for a positive improvement to applicant farmers for one year, that adjustment was eroded by the

intermittent nature of rate updates. These consequences are specifically borne by farmers seeking to enroll in continuous acre contracts during non-general sign-up years, which are also the acres with the greatest expected environmental benefits. As a consequence, the intermittent nature of rate updates disincentivizes enrolling those acres which provide the greatest environmental benefit, and this structure is not being eliminated but the current discretionary scheme.

Descriptive results suggest that county CRP rate adjustments are not well-targeted on the basis of eligible acres, as the mean of eligible acres is relatively equal across rate request status. Rather, CRP adoption appears to be primarily clustered in a number of counties with historically high amounts of CRP acres and higher amounts agricultural acres, regardless of eligibility. Although I assess differences on multiple other variables, the observed differences are naturally correlated with higher agricultural production. Since the number of producers is relatively balanced across request status, the higher number of acres in agriculture also indicates that counties who request and potentially adopt alternative rates have a greater degree of agricultural concentration. One potential explanation for this trend is that larger farms, and thus counties with larger farms, have a higher marginal propensity to produce CRP acre than counties with smaller farms. Counties which have a greater number of agricultural acres may have a greater degree of participation in county committees who in turn can have a larger impact when adjusting rates or otherwise implementing FSA programs, compared to other counties. Theoretically, larger producers also have marginally more acres to put into CRP and the loss of a production acre is marginally less costly to production for larger farmers than for small farmers. Higher opportunity costs due to small farm size may also help explain why black farmers have lower participation in the CRP (Jones, 1994). CRP participation, regardless of rate adjustments, may also be contingent on buy-in from local county committees and executives who help promote the program and advise farmers on the CRP. The 85 counties who received positive rate adjustments and had no prior CRP participation demonstrate that simply raising the SRR alone is not necessarily sufficient for inducing CRP participation in a county.

Positive rate adjustments lead to a causal increase in CRP enrollment across categories except continuous acres, which effectively targets the enrollment of lands with lower environmental benefits and increases the cost to the federal government of enrolling highly beneficial continuous acres. Based on the variety of models presented, it is possible that adjustments have a small effect on continuous enrollment that was simply not significant in the preferred specification. For example, an extreme change in SRR would likely increase continuous enrollment, even though I do not find this effect in. Even if that were the case, the small effect size is disproportional to the overall composition of CRP acres: continues acres comprise 35.1% of all signups for 2016, 2020, and 2021. This small to no effect is particularly notable given that continuous acres have no price competition and thus earn the full SRR (after standard modifiers). The heterogeneity of the effect indicates that the supply of general acres is much more price elastic than continuous acres, with the latter, on average, providing greater value in environmental benefits.

In assessing the impact of higher rates on general acres, there are countervailing forces. On one hand, intuitively, a higher rate can result in rate payments to exceed the opportunity costs of production for some farmers and thus induce an increase in bids. On the other hand, rate increases may harm both cost effectiveness and total environmental benefits. It is possible that positive rate adjustments actually result in lower environmental benefits per bid-acre because increasing the gap between the offered rate and the SRR increases the EBI of an offer (Kirwan et al., 2005). For example, if an offer were to bid a rate of $90 with a $90 cap, that offer would receive no additional EBI points. However, if the SRR was

adjusted to a cap of $100, then the offer of $90 would receive an additional 20 EBI points for having a 10% discount (to a maximum of 25 points for a 15% or greater discount), thus inflating the rank of that parcel in the reverse auction without any change to the parcel's actual environmental value. This strategizing of offered rent in relation to EBI is similar to Jacobs et al.'s (2014) study of an exogenous increase in EBI due to a priority area designation, which they find farmers are able to leverage to in setting their offered rental rates, which supports existing theory work (Vukina et al., 2008). Jacobs et al. (2014) further argue that farmers can use an EBI increase to instead lower the benefits of their proposed practices while still remaining competitive, thus decreasing both the transition cost of their bids and the environmental benefits to society.

Based on the prior literature (Jacobs et al., 2014; Kirwan et al., 2005; Vukina et al., 2008), I expect the adoption of alternative rates to have three effects on bids: (1) marginally, bids in counties with positive adjustments will have more flexibility to leverage rate discounts to increase their EBI (Jacobs et al., 2014), (2) counties where bids already leverage rate discounts will enjoy strict bid rate increases, since the EBI bonus of a rent discount is capped at 25, and (3) farmers may lower other endogenous EBI components in order to lower

To explore the implications of the effect of rate adjustments for the 2016, 2020 and 2021 sign up years, I calculate a series of back of the envelope calculations, assuming a soil adjustment of 1.0 and excluding any rare post-contract rate changes. Positive rental rate adjustments increased general acre signups by a total of approximately 228,545 acres and costing an additional total of between $169.2 mil and $253.8 mil for all general enrollment for their full 10 to 15 year contracts (respectively). These estimates put enrollment derived from alternative rates are approximately 0.8% of the 2023 acreage cap. For continuous acres, positive adjustments result in an additional cost of between $10.2 mil and $15.3 mil due to higher SRR for acres that would have still been enrolled in the counterfactual. These are an underestimates of the total costs of acres induced by alternative rates, as it does not include cost-share and other monetary incentives for induced general acres, although this cost component is typically relatively small (FSA, 2021).

The causal claim of these results relies on well-informed matches, and it is possible that unidentified omitted variables serve as a limitation. Additionally, this study can only address aggregate outcomes. As a consequence, I cannot observe the individual behaviors of farmers or the quality of the offers they make to the CRP. Future work could incorporate contract level data in order to see how the composition and quality of offers changes in counties which receive rental rate adjustments.

The main limitation of this analysis is that its precision is dependent on the quality of the underlying NASS estimation, which we expect to be systematically more variable for counties which submit rental rate requests. Since I match on similar NASS estimations, the NASS survey introduces variance in the difference between the "true" rates of paired counties. This poses a match quality problem in the form of differing opportunity costs to enrollment. This issue would not bias the results if NASS deviations from the "true" rate are centered on zero, but it does pose a precision problem regardless. While I address this shortcoming by using imputed data, the "true" rate is still unobservable. Current work is developing a spatial-temporal model in order to generate improved smoothed estimations of the "true" rate, and once developed, these estimations could be used to improve the precision of my results.

Another limitation in the interpretation of the CEM means analysis is that I cannot distinguish between the marginal effect of an additional $1 in alternative rate adjustment, $1 in higher rates due to the base

rate, and $1 in higher rates due to FSA discretionary adjustments, although I do estimate these effects only for counties treated with alternative rates. Assuming a linear supply function of bids, it doesn't matter where an additional dollar adjustment comes from. However, in reality the supply function of bid acres is unlikely to be linear, so the actual effect of rate changes on enrollment will depend on the supply curves of individual counties (see Iowa as an example: Secchi & Babcock, 2015).

Conclusions and Policy Implications

This paper demonstrates that county committees have the power to significantly influence CRP enrollment outcomes in their county by adjusting county-level CRP bid caps. So long as the FSA's goal is the enrollment of acres within the county-market system, alternative rates are an effective tool. In particular, alternative rates can theoretically improve the NASS estimations of SRRs considerably in some counties. However, alternative rates may also run contrary to the goals of maximizing both environmental benefits in net and the cost-effectiveness of such benefits. These countervailing influences on the program highlight the importance of assuring that alternative rates are as close to the "real" rental rate as possible, and state and federal oversight is the existing mechanisms for accountability. County committee decision-making of county committees is also theoretically accountable to local farmers through elections. In order to increase the effectiveness of existing evaluation mechanisms, the process should be characterized by increased transparency, scrutiny, and accountability. At time of writing, there are a number of ways the FSA could improve the transparency of the alternative rate process:

1. **Create a directory for COC members.** The names of elected COC members are public but require back tracing the victors of three years of election data, and the most recent year(s) of election data is not always posted.

2. **Publicize rate requests and decisions.** The rates that COC's request are currently withheld by FSA, and the results of requests are publicly available on request. In the case that COC requests are unreasonable, not releasing this information means that farmer constituents cannot use it make a more informed vote in future COC member elections. In the case that rate requests are successful through the process

3. **Release internal rate request recommendations.** As part of evaluating rate requests at a federal level, a technical committee issues recommendations to a decision-making committee on whether or not rates should be accepted based on the evidence available. Releasing this information would allow for greater public understanding of the quality of evidence used to support alternative rates, as well as provide insight into what if any rates the FSA is approving in the absence of good evidence.

Additionally, if the FSA's goal is to keep SRR rates competitive for both general and continuous acreage, then the FSA should update its county CRP rates every year regardless of whether or not that year has a general sign-up. While the FSA has held a general sign-up for years 2020-23, future years may not hold a general sign-up, especially if the CRP cap were to be lowered in the 2023 farm bill or if CRP enrollment approaches the current limit. While this paper suggests that continuous acres are less sensitive to rate changes, these rates are still consequential for the costs of enrolling continuous acreages on non-sign-up years.

When speaking to future farm bills, this paper helps demonstrate the considerable complexity of the county rate system and suggests that equivalent environmental benefits can lead to very different payment amounts. Future papers and policy makers should address how the SRR system could be transformed to more equalize payment for environmental benefits and disentangle them from county-level markets. Rate reform could drastically simplify the bureaucratic cost and complexity of the current process, eliminate several channels of discretion, and decrease the cost-per-benefit of CRP acres (Kirwan et al., 2005).

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