Bureaucratic Relationship and Provision of Public Goods: The Consequences of Agency Conflict on Agricultural Land Conservation*

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Abstract

Numerous layers of institutional involvement are necessary to provide public goods and services, and multiple agencies are generally involved to complete such tasks. Inter-agency cooperation and coordination are essential to provide these goods and services. However, federal agencies may have conflicting interests, and understanding the consequences of such conflict is important to design public policy. I exploit a unique situation created by the Missouri Farm Bureau and Extension Service in the mid-20th century and show how inter-agency conflict may undermine the benefits of agricultural land conservation services by the federal government. The extension services in Missouri resented the creation of a new institution, soil conservation districts (SCDs), to provide technical assistance for soil conservation. Using the spatial and temporal variation in the conflict, and employing a difference-in-difference strategy, I show that this noncooperation led to slower growth of SCDs in Missouri, a lower amount of land conservation, and higher erosion in Missouri compared to the border states. The complementarity between services from the Extension Service and the Soil Conservation Districts drives the main results.

Keywords: Land Conservation, Agricultural History, Political Economy

JEL Codes: N52, N92, Q15, Q18, Q57

*I thank the National Archives at College Park, for giving me access to the annual reports of the Soil Conservation Districts. All remaining errors are my own.

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1 Introduction

Governments usually have multiple layers of bureaucratic agencies to administer particular public policies. Even minor progress in policy implementation significantly depends on the relationship among affiliated federal and state agencies. Economic theory asserts that competition among agencies and institutions to provide similar public goods affects quality, quantity, and welfare (Stigler, 1972). While some argue that agency conflict is a barrier to policy success (Weiss, 1987), others contend that conflict may provide substantial political, social welfare, and legitimacy benefits (Farber and O'Connell, 2017). This question is even more complicated when institutions are under the singular federal umbrella, and thus, competition may distort the federal government's impact on targeted population and landscape. Economic theory is not clear in shedding light on how the direction of competition and cooperation among agencies affects the provision of public goods. Theoretically, it is also unclear under what conditions existing institutions accept new institutions to help providing the public goods (Oates and Schwab, 1988).

Despite the potential social benefit and loss from agency relationships, theoretical and empirical literature on conflict and cooperation among federal agencies is very limited. Previous studies have primarily focused on administrative delays (Hyde, 1960). Studies in institutional economics also deal with the formation of agencies and use political economy models to understand the provision of public goods (Lueck and Parker, 2015). Due to the lack of empirical evidence on how conflict and cooperation affect outcomes, we have very little understanding of the importance of agency relationships in public policy. Empirical studies are sparse and limited because we need data on multiple agencies over time and across space. Many institutions are locally formed and endogenous to the system, so it is hard to estimate the effects of conflict on institutional formation in these cases. To study the impact of conflict on the construction of new local institutions, we also need an exogenous setting where policy induces the creation of new institutions.

In this paper, I use an historical event where federal government passed a law to create a new local institution in 1937 to conserve natural resources, and several other existing federal agencies resented the creation. Using this law, I analyze the delay and performances of public goods provision where one federal agency resents the creation and growth of another federal agency. I utilized this unique setting by following these two agencies over time, creating a novel primary database, and comparing their contributions over multiple decades. The relationship between these two agencies is horizontal: while one educates farmers on agricultural productivity, the other gives useful technical advice on soil conservation. The complementary in these two services is important to think of in asserting the behavioral policy implications (Brynjolfsson and Milgrom, 2013).

Historically, the agricultural extension service was primarily responsible for educating farmers on agricultural techniques in the United States. After the period of the Dust Bowl in 1930s, it was clear that an educational effort was not enough and that farmers needed technical assistance from the federal government. Farmers need to design their farm plans and see how to take care of the agricultural land in the short and long term to receive the benefits of soil conservation on their farms. Towards this aim, the United States Department of Agriculture (USDA) suggested and guided the establishment of a new institution named soil conservation districts (SCDs) in 1936. SCDs are local institutions where landowners have the power to choose their farm plans, and the USDA was only responsible for giving technical suggestions through soil conservation technicians. Starting in 1937, farmers all over the United States began to create SCDs and this process happened fastest in the Great Plains and the South.

However, in some Midwestern states where extension services were vital in the farming communities, the extension service resented the idea of a new local institution to work with farmers. In extreme cases, states like Missouri did not allow these new local institutions until the 1970s (Helms, 1986). We can see this from Figure-1, where only Missouri was still lacking in SCD activities in 1960s. In this paper, I examined the implications of the conflict created by the extension service in forming SCDs in Missouri and draw comparisons with border states to understand the repercussions of this inter-agency conflict.

The correlation between inter-agency relationships and the provision of public goods has been addressed by a number of theories. In this section, I briefly describe how complementaries of public services affect the relationship and outcome. The extension service's maximization functions include farm profit and mostly consider immediate agricultural profitability. Soil conservation districts' functions include farm profit and benefits but are mostly related to soil conservation and climate resilience. The extension service did not have the knowledge and power to demonstrate soil conservation activities to farmers. In the case examined in this paper, the extension service never provided technical assistance on a farm-by-farm basis, so the SCD was a new service to the public that was important for farmers. Theoretical studies show that this complementarity adversely affects public goods provision (Brynjolfsson and Milgrom, 2013).

This research question requires the compilation of a new database. I used data from historical sources to collect information on the formation of SCDs in Missouri and its border states: Illinois, Tennessee, Oklahoma, Kansas, Nebraska, and Iowa. These border states created SCDs without any particular resentment from the extension service. I used fallow land data from the USDA agricultural census as my environmental outcome. I also collected information on the total soil conserving grass areas from the agricultural census, total conservation needs data from the Conservation Needs Inventory database, and the long-term environmental quality data from the Environmental Quality Incentive Program (EQIP). Using spatial and temporal variation of conflict, and utilizing the dataset across space and time, I analyzed the implications of the efforts from the extension service.

Methodologically, I use the difference-in-difference model to compare Missouri and other states across the border to determine variation created by the political resentment. I use the spatial variation across states where the extension service had varying relationships with the SCD. I use the temporal variation generated by the timing of the formation of SCDs. I use a generalized difference-in-difference model to study how the agency conflict affected the targeted conservation activities in Missouri compared to the border states. I also show how the conflict affects the agricultural yield, if any. At the end, I show how this conflict may persistently affect agricultural land erosion in the long-run. I use pre-policy period data to show the pre-trend.

Results indicate that competition and barriers were harmful to soil conservation. Fallow land and soil conserving grass plantations were lower in Missouri compared to other states. In addition, erosion was higher in the Missouri counties with inter-agency conflict. Results further show that fallow land decreased more in the Missouri counties where SCDs could not support farmers. I also found that other grasses were lower in Missouri compared to nearby states. In 1982, Missouri was the second-highest eroded state in the country.

Over time, the farm bureau and extension service in Missouri started to work together with SCDs to provide farmers with soil conservation service. When we look at long-term data from the EQIP, the difference in Missouri in soil conservation is covered by the service. Removing the conflict was thus important to provide services to the farmers.

Next, I also digitized and used Oklahoma's extension service data to show how cooperation can lead to a higher level of environmental services. I show the activities in Oklahoma, where the extension services cooperated with the soil conservation service by providing complementary services such as education, meeting, training, and bulletins. I used the Oklahoma experience to understand what services from the Extension Service were beneficial to conservation activities.

These results are essential to understand the inter-agency relationship and their effects. Workload and responsibilities need to be clearly defined and divided across agencies. Potential threats from existing agencies need to be studied and analyzed to create an essential smooth transition. Without a clear understanding of inter-agency conflict and its potential consequences, we may have a substantial loss in the provision of public goods.

This paper belongs to multiple strata of literature in both economics and political science. First, the historically low level of cooperation between the USDA Forest Service and the U.S. National Parks has been studied in Grumbine, 1991. It is a core topic in integrated environmental planning management (Margerum, 1997). Political scientists have long been concerned about the tension between institutional fragmentation and policy coordination in the United States (Thomas, 2002). From this perspective, I provide a unique example in the Midwestern agricultural landscape by using soil conservation data. In addition to the studies on agriculture, previous research also focus on the evolution and structure of environmental agencies by examining state wildlife agencies (Lueck and Parker, 2015).

This paper also makes several contributions to the literature related to common-pool resource management. I show how the strengthening of relationship among agencies may be effective in providing public goods and services. Early studies on institutional mechanisms state how public policy should be designed to provide efficient public goods (Samuelson, 1954). The continuous decline of natural grazing systems in the West has generated an intellectual debate around the effective management of natural resources (Gordon, 1954; Hardin, 1968; Gilles and Jamtgaard, 1981). Other early neoclassical economics studies also find that bargaining and property rights can mitigate the problem of overuse and exploitation of natural resources (Coase, 1960).[1] I contribute to this literature by showing a new dimension related to inter-agency conflict that may slow down communities to cooperate to manage farmland and to define property rights through coordinated farmland conservation plans.

Next, studies in the literature also maintain that local government and jurisdiction are important in fiscal policies. In that regard, I study the implication of an historical event to understand the result of competition on environmental outcomes. Key issues in the literature on environmental fiscal federalism have arisen around spillovers across local government (Oates, 2008; Happaerts, Schunz, and Bruyninckx, 2012; Cameron

[1] Property rights are the social institutions that define the range of privileges granted to individuals to specific assets, such as parcels of land or water. For example, the Coasian bargaining theorem states how well-defined property rights can sustain the system. Transaction cost theory suggests that institutional settings may help to reduce the transaction cost and make the contract work (Williamson, 1979, Ayres, Edwards, and Libecap, 2017). Because of their important social role, the survey of economics and economic history states how arrangements of property rights affect wasteful resource management through the establishment of local institutions (North, 1991; North, 1984).

and Simeon, 2002).

Finally, this paper also belongs to the growing economic history literature. Previous research has shown how the persistent and immediate effects of historical events help in both the long run and short-run (Howlader, 2019, Hornbeck, 2012). Concerning this, I show an historical event in the Midwest and its long-term effect.

2 Historical Background

The environmental decision-making process typically involves multiple organizations. For example, the management of river pollution, air pollution, water, and natural resources all require cooperation among institutions to align with different state, local, and federal stakeholders. Collaboration among agencies is essential for success in policy implementation, and a plan is necessary to maintain the relationship among agencies.

The US Department of Agriculture (USDA), in that line, has multiple layers and agencies to administer policies at federal, state, and local levels. The Produce Marketing Association (PMA), Farm Service Agency, Extension Service, and the Natural Resource Conservation Service (previously known as Soil Conservation Service) all work to support farmers to increase productivity and environmental benefits. While all serving farmers, these agencies do differ in activities related to money transfer, education transfer, and health benefit transfer.

There are multiple agencies under the USDA that were particularly designed to provide environmental goods. Land conservation processes, activities, and organizations in the United States can be traced back to Yellowstone National Park, established in 1871. These early efforts were, however, motivated by both wildlife and nature conservation. The conservation of working land (or soil conservation) first came into the national discussion in 1914 with the introduction of the Smith-Lever Act. This Act gave power to land-grant universities to disseminate knowledge of farmland conservation through the publication of bulletins and reports by the Agricultural Extension Service. However, soil conservation had a negligible impact on this service. However, in 1936 the USDA passed a law to create local institutions named Soil Conservation Districts to transfer technical services related to soil conservation. In some Midwestern states, the Extension Service resented the creation of this new agency under the USDA. Missouri did not allow SCD formation until late 1960s.

2.1 Missouri Farm Bureau and Extension Service

The University of Missouri Extension Service has its roots in the federal acts that enabled the university to deliver the practical benefits of education and scientific research to people to improve their economic prospects and quality of life. The Morrill Act of 1862 established the University of Missouri as a land-grant university. The Act gave grants of land to states to establish public colleges or universities, and to educate citizens in agriculture, home economics, mechanical arts, and other practical professions. In 1887, the Hatch Act established agricultural experiment stations at land-grant universities.

The Smith-Lever Act of 1914 established the Cooperative Agricultural Extension Service, a partnership among federal, state, and county governments allowing universities to extend their programs to all people and not just to students. In 1915, the first meeting of the Missouri Association of Farm Bureau Counties formed the first state farm bureau in the United States. The University of Missouri still conducts research to aid farmers and ensure a safe food supply and resilient agricultural ecosystem. The extension program works with farmers and their families to improve their quality of life and living standards.

2.2 Soil Conservation Districts

In the 1930s, the events of the Dust Bowl influenced farmers to prioritize soil conservation activities. The chief USDA soil scientist, Hugh Bennett (1928), suggested that taking marginal land out of production would offer a two-pronged solution to control production and soil erosion. Under Bennett's leadership, the USDA conducted a detailed soil survey to understand the implications of the decline in topsoil in 1931-1933. Land utilization policies (such as regarding the purchase of submarginal, eroded farmland) were a vital component of the Agricultural Adjustment Act (AAA) of 1933 (part of the New Deal). The initial plan to conserve soil had two primary focus areas: a) to buy submarginal land (set-aside program) and b) to show farmers soil conservation techniques through demonstration plots.

In the first couple of years, the USDA realized that a crucial line of communication between farmers and the Soil Conservation Service was missing. Therefore, to encourage farmers to be more concerned about their soil, the USDA proposed establishing local institutions in each community, where farmers could create a group, develop management plans—with the help of Soil Conservation Service (SCS) technicians—, and employ technicians in the fields. The federal government would be responsible for providing the technical and financial aid necessary for this farmland management. Eventually, different states started to adopt the law beginning in 1937.[2] The creation of the SCDs was democratic and referendum-based; only landowners were eligible to vote for the SCDs. Three external institutions were involved in the process of helping the SCD farmers: a) The Soil Conservation Service (SCS) of the USDA (with technical assistance), b) the Extension Service (with educational programs), and c) the Work Projects Administration (with financial aid). The United States currently has more than 3000 SCDs, which for the most part, coincide with county administrative borders.

SCDs were supposed to provide technical assistance and cash subsidies, in contrast to the information or education services that the extension service had produced since 1914. SCDs are still the primary local units to disseminate knowledge of soil conservation techniques. The primary purpose of SCDs is to design conservation surveys of farm plots, assign and suggest essential conservation techniques (for both short- and long-term use) based on the surveyed soil type, and help with structural conservation techniques. SCDs are responsible for monitoring the arrangement of soil conservation, teaching farmers how to undertake technical decisions, and coordinating with farmers

[2]1On April 27, 1935, Congress passed Public Law 74-46, in which it recognized that "the wastage of soil and moisture resources on farm, grazing, and forest lands . . . is a menace to the national welfare," and it directed the Secretary of Agriculture to establish the Soil Conservation Service (SCS) as a permanent agency in the USDA. The Department published a model state law in May 1936, which would authorize farmers to organize soil conservation districts.

for ongoing and future planning.

2.3 Missouri Extension Service and SCD Formation

Conservation districts were impacted in Missouri by other USDA agencies, especially by the extension service. The conflict began in 1936, when Secretary Wallace determined that AAA and SCS would handle subsidies for conservation. Resentment regarding SCD formation was not common in other regions, such as the Great Plains, but it became an issue in some Midwestern states. While most states were able to reconcile their differences, in Missouri the battle proved difficult to resolve.

Missouri finally passed a law in 1943 about SCD formation, after one unsuccessful attempt in 1939. However, the law did not give the SCD regulatory authority, as was suggested by the model federal law. Bringing federal technicians in to help farmers also proved to be challenging. The Missouri Extension Service tried to form a more organized competitive program to assist farmers, named the "balanced farming plan." That plan was not successful, for among other reasons, it imposed a monetary cost on farmers for participating. Moreover, the extension service employees, unlike the USDA SCS technicians, did not have the training to work on farmers' farm plans.

The extension service was accused of distributing flyers before voting for some SCDs and pushed farmers and landowners not to vote for an SCD implementation. The result of such conflict was that conservation district formation and conservation work in Missouri lagged behind many other states. According to Childs and Headley (1982), the real loser was the public in Missouri (Childs and Headley, 1982).

In many other states, the extension service provided a great deal of leadership and educational support in the formation and operation of districts. In this paper, I utilize the conflict between the Extension Service and the Soil Conservation Districts to study the immediate and long-term consequences of the conflict on public goods.

3 Data Construction and Summary Statistics

I took resentment against new SCDs created by the extension service in Missouri as an example to understand how existing agricultural institutions may or may not help the new institutional formation and provide benefits for farmers. For this purpose, I collected information on the formation of SCDs, as well as before-after agricultural and environmental statistics to compare the outcome across space. There are three primary sources of data. First, I used the timing of SCDs from historical reports. Second, I used archival data to create a conservation needs database. Finally, I used an agricultural census to generate agrarian characteristics. For narrative purposes to contrast with conflict, I also collected and digitized Oklahoma's extension service activities, as an example where cooperation between the extension service and the soil conservation districts were strong.

3.1 SCD Formation Timing

I used all the border states as control areas to compare with Missouri. Figure-1 shows that, as of the 1960's, Missouri was the only Midwestern state that did not have robust SCD activities. I gathered data on timing of SCD formation for Missouri and border states from historical reports, which is illustrated in the histograms presented in Figure-2 and Figure-3. We can see that Missouri took until 1996 to be under full coverage. All these maps and formation year were collected from the National Archives.

I collected information on SCD formation timing by state from historical documents. It is a county-level database and show the year (after its referendum) for which any county started to have an SCD. I used this timing variable to create treatment years for every county, and my treatment status involves all counties in Missouri.

3.2 Agricultural Statistics

I gathered agricultural census data from 1925 to 1987 and constructed a county-level database for fallow land, other soil conserving grasses, crop yield, farmland value, and agricultural revenue. The dependent variable from the agricultural census includes total fallow land, total soil conserving land, and total corn yield. The control variables in the regression include farm size and percentage of tenants.

Summary statistics for these variables are presented in the data and figures. We can see from Figure-5 how fallow land is temporally different across the Midwestern states. We see that Kansas, Nebraska, and Oklahoma have much higher growth in acres under fallow land than Iowa, Illinois, and Kansas. We also see from Figure-6 that soil conserving grasses like hay, alfalfa distribution. The figure shows that Missouri's soil conserving areas are decreasing compared to other states. Moreover, Figure-7 illustrates that there is no visible effect on yield.

3.3 Conservation Needs Inventory

In the 1960s, there was a conservation needs inventory (CNI) survey that showed the amount of an area under erosion which needed to be treated. I collected and digitized these data for Missouri from the CNI reports referring to all Missouri counties.

I used the Conservation Needs Inventory database for Missouri from 1959, and this dataset provides information on the total eroded land that needs conservation treatment. The United States does not have a conservation database for every year. Because these data were only available for one year, it was only possible to explore the correlation in treatment and control counties.

We can see from Figure-9, using CNI data, the erosion in Missouri before and after the formation of SCDs. Counties that had SCDs before 1960 already had better control over erosion compared to counties that formed SCDs later.

3.4 Compare with Oklahoma's Success

To demonstrate the importance of inter-agency relationships, I also showed the success of soil conservation in Oklahoma achieved through an intimate relationship between the extension service and the SCDs. I collected information on education provided by the extension service and conservation technical assistance provided by the SCD. These two agencies provided conservation goods to Oklahoma farmers who have sustainable farming in the long run.

I used the state of Oklahoma both due to the success of the relationships between SCD and the extension service there and its data availability (although the same is true for other states, such as Kansas). I collected information about Oklahoma's educational services through the extension service from the National Archives at College Park.

3.5 Present Data on Conservation

Because it is also important to understand what happened after the extension service accepted the SCD as an institution, I performed some correlation analysis with Environmental Quality Incentive Program (EQIP) data by county across five states for the years 2002-2016. The data are provided by the USDA; specifically county-level data with acres under EQIP and a total number of contracts by county. This is the current structure of soil conservation activities in the USA.

We can see from Figure-12 that Missouri and other Midwestern states have a much lower adoption of EQIP compared to Kansas and Nebraska. Given the structure of the program, we cannot perform a causal identification, but these results are important to understand the long-term persistent effects of noncooperation among agencies.

4 Empirical Method

This section explains the empirical strategy to study the causal impact of the non- cooperation between two agencies: the extension service and the soil conservation districts in Missouri. I used a difference-in-difference approach exploiting two sources of variation. The county is the unit of observation. I implemented a generalized difference-in-difference (DID) model, where multiple time periods and groups are in action. The border states of Missouri are my control group.

4.1 Difference-in-Difference Method

With these data, I used the difference-in-difference method to compare outcomes across states. The research questions are as follows: 1) did the inter-agency relationship affect conservation services? and 2) how do county-level farmland value and yield change because of this conflict? In previous research, I studied the formation and implication of SCDs in the Great Plains (Howlader, 2020; in review). I extend this research to the Midwestern states where the extension service played an important role in the formation of new SCDs.

I followed a difference-in-difference model to estimate the effects of the resistance from the extension service.

$$y_{c,t} = \alpha_c + \beta \text{year dummy}_t + \gamma \text{Treatment}_c + \delta \text{Treatment}_c * D_t + \sigma X_c + \epsilon_{c,t} \tag{1}$$

where c indexes the county, t indexes time. d_t is a "post" dummy and equal to 1 if after the policy, and $Post_t$ equals 1 if after the formation. The policy dummy is an interaction of the treatment dummy and the post period dummy, and equals 1 if the county is in Missouri after the policy. The impact coefficient will capture the impact of the resentment from the extension service on the conservation activities. In my preferred specification, this will include a vector of covariates including tenancy, farm size etc.

4.2 Identification Strategy

A parallel trend between treatment and control group is the main identification behind difference-in-difference model. This means that if there was no resentment from the extension services in Missouri, then treatment and county groups would have followed the same trend. This trend is represented visually in Figure 7. We see that the states in the treatment and control groups have a parallel trend before the resentment started in 1936. To construct the control group, I used all states bordering Missouri.

The DID results can be interpreted as the causal effect of the extension service under the assumption that, in the absence of the policy, the change in outcomes would not be systematically different. In other words, there need to be parallel trends in the outcome variables. I used agricultural census data to establish this result.

4.3 Persistent Effect: Correlation

After establishing the causal effect of inter-agency conflict on environmental amenity, I move on to establish the persistent effect of this relationship on erosion and other long-term variables. Given the data limitation, it is only possible to perform a correlation and time series analysis without any causal identification. For this part of the analysis, I mostly depend on correlation among variables and graphical demonstration.

5 Results

5.1 Main Results

In this section, I present the results of the average treatment effect from the regression. I begin by estimating a specification where the treatment group is Missouri and the control group includes the other states. Table 1 illustrates these results.

Column 1 shows that the treatment group has lower amount of conservation activities, shown as: acres of fallow land. The policy on average decreases the area under fallow by around 9000 acres in any county. This core treatment effect is stable for different specifications in column 2 and column 3. Fallow land is a popular and common way to conserve land after cultivation, and this variable has been widely used as a conservation variable in previous literature (Hansen and Libecap, 2004). From these results, it is clear that inter-agency conflict on average decreased conservation acres, and has a significant effect on landscape.

We also estimated the impact on total soil conserving land as shown in Table 2. The policy on average decreases the area under soil conserving grasses by around 7000 acres in any county, but the results are not significantly lower compared to the adjacent border states. The soil conserving grasses variable has been extracted from the agricultural census and is a compilation of variables such as hay, pastureland etc. The primary effect of inter-agency conflict is around the conservation areas that is on cropland. The other soil conserving areas, for which financial incentives were available, was not primarily affected.

This low provision of environmental goods had a persistent effect on Missouri. In the 1980s, Missouri had one of the highest levels of eroded areas was of any state. Missouri had been one of the states that has been successful to keep high yield across the 60s and 70s but the environmental effect came to be visible in later erosion surveys.

Next, I perform a number of falsification exercise. First, I consider whether there exists a relationship between contemporary crop yield and SCD activities. Agroecological literature shows that there is no immediate relationship between SCD activities and crop yield. Table 3 shows the results. Column 1 presents the estimates using no control variables. Column 2 uses county-level controls. Column 3 presents estimates with state-year control variables. We see that the estimates are statistically insignificant indicating that the SCD activities do not have any immediate effect on crop yield.

These results show that the inter-agency conflict did decrease the targeted conservation activities. The slow growth of the environmental services ensures that the complementary in the services provided by the two agencies are important to think about while designing the policy.

5.2 Effect on Erosion

Table 4 presents the results of using erosion data from the Conservation Needs Inventory, showing that areas with an SCD from earlier periods had slightly lower erosion. We can also see that the proportion of land needing conservation treatment is lower in the areas that already had an SCD. We cannot do a more straightforward causal analysis since we only have CNI data for one year. We see that the areas who have an SCD before the survey period had a lower proportion of area in erosion, and had a higher need for conservation. This is indicative to the fact that these areas did not invest in conservation techniques and may have a persistent negative effect on land.

These results ensure that the inter-agency conflict had a negative and persistent effect on the landscape. Noncooperation and the failure to create SCDs have led to permanent damage across agricultural land, and this effect is especially concentrated in areas in Missouri where the conflict was long lasting.

5.3 Long-term Consequences

Given the nature of the problem and the data limitations, it is not possible to conduct a county-by-county analysis on the long-term effect of this competition. However, from the soil erosion data collected in 1982, we can see that Missouri had the second highest erosion rate in the whole country, in addition to a high pollution rate we can see from the water pollution data. This may be partly caused by the fact that farmers were not familiar with soil conservation techniques, and may show that norm and knowledge matters in the long-term adoption. After the formation of SCDs, it takes time to become familiar with the new methods.

Looking at the conservation data from EQIP, we see that Missouri has recently made improvements. Currently, the extension service has one member in the SCDs committee and they work together with the farmers.

6 Current Relationship between Extension Service and Conservation Districts

The extension service allowed the SCDs to form and operate after 1962. Still, there was persistent resentment and offered no significant help with the implementation. However, the extension service now has a member in the SCD committee. This resentment ended in 1996 after the Farm Bill. After that period, the situation began to improve. I collected information on EQIP acres for Midwestern states. The graph shows that the conservation activities are now comparable to other nearby states.

7 Lessons from Oklahoma Success

To offer a contrasting example, I consider Oklahoma, a state where the extension service was actually facilitating the SCD within the context of inter-agency cooperation. I chose Oklahoma primarily due to data availability.

The Oklahoma extension service has assisted the SCD from the beginning by providing educational service to farmers, as shown in Table 5. We see the main ways that the Oklahoma extension service provided education was by conducting meetings, leading training schools and tours, and by publicizing the program in newspapers and on radio programs, and that many farmers participated in these events. In areas where these educational services were extensive, farmers were receiving more benefits from conservation. Moreover, the table highlights a strong variation in education services to reach more farmers, which was also increasing over time. This cooperation made Oklahoma's conservation story one of the most successful ones in the United States.

8 Conclusion

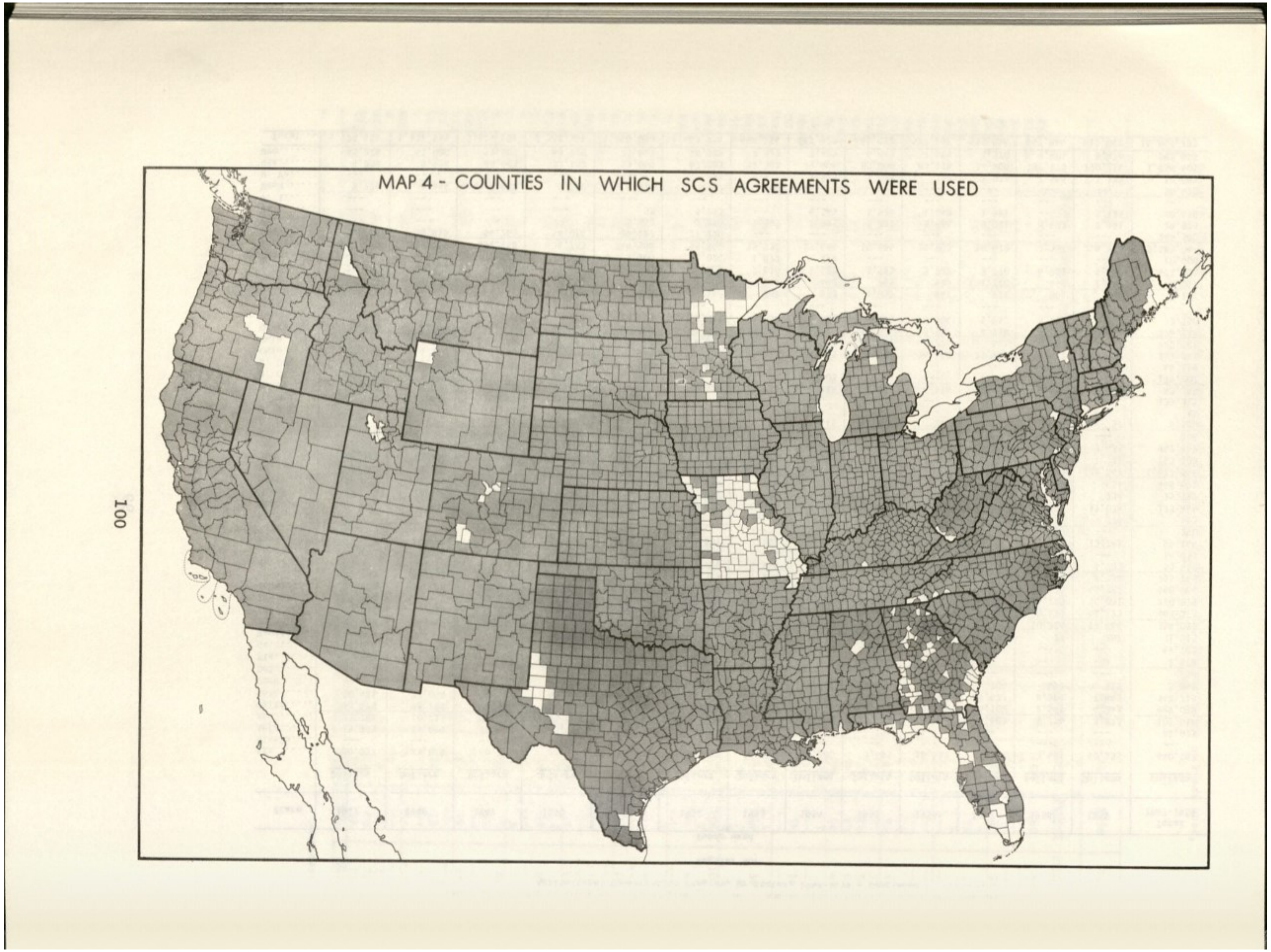
Economists and social scientists have shown that relationship among agencies can have important economic and political impacts. This paper contributes to the literature in political economy by understanding the extent to which historical inter-agency conflict affects environmental benefit. The results show that counties that were exposed to the conflict may have higher erosion and lower conservation activities.

In this paper, I examined the phenomenon of noncooperation among federal agencies and how this noncooperation may damage conservation management in the long term. By means of a unique case study in the context of Midwestern agriculture, I showed that noncooperation leads to less agricultural land conservation. Like other federal organizations, the U. S. Department of Agriculture (USDA) has multiple agencies and institutions to work on agricultural land management, where both noncooperation and coordination failure may create severe damage. This problem is even more serious at the international level where multiple agencies and stakeholders are working to provide conservation services across countries. Understanding the failure in coordination and quantifying the damage is essential to design future policies that may involve multiple agencies.

These results have implications for policy formation as they enhance our understanding of what may cause resentment and what can help to solve issues with incentives. It is important to follow up with existing institutions in order to determine their views on new agencies. This paper also sheds light on agricultural political institutions and the power play among them, thus showing how agricultural institutions may create a barrier to progress if there is not enough coordination.

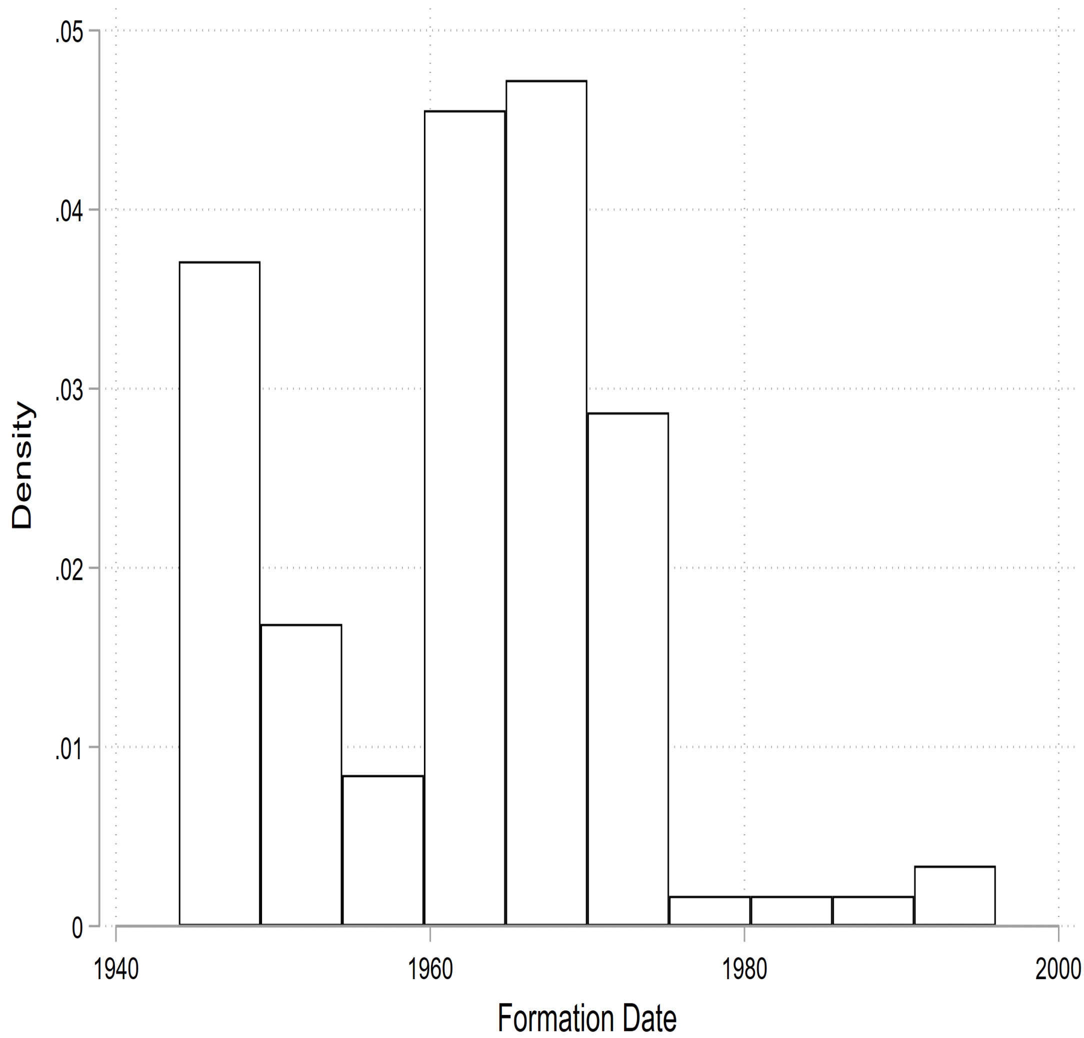
9 Figures

Figure (1) USDA Conservation Activities, 1964



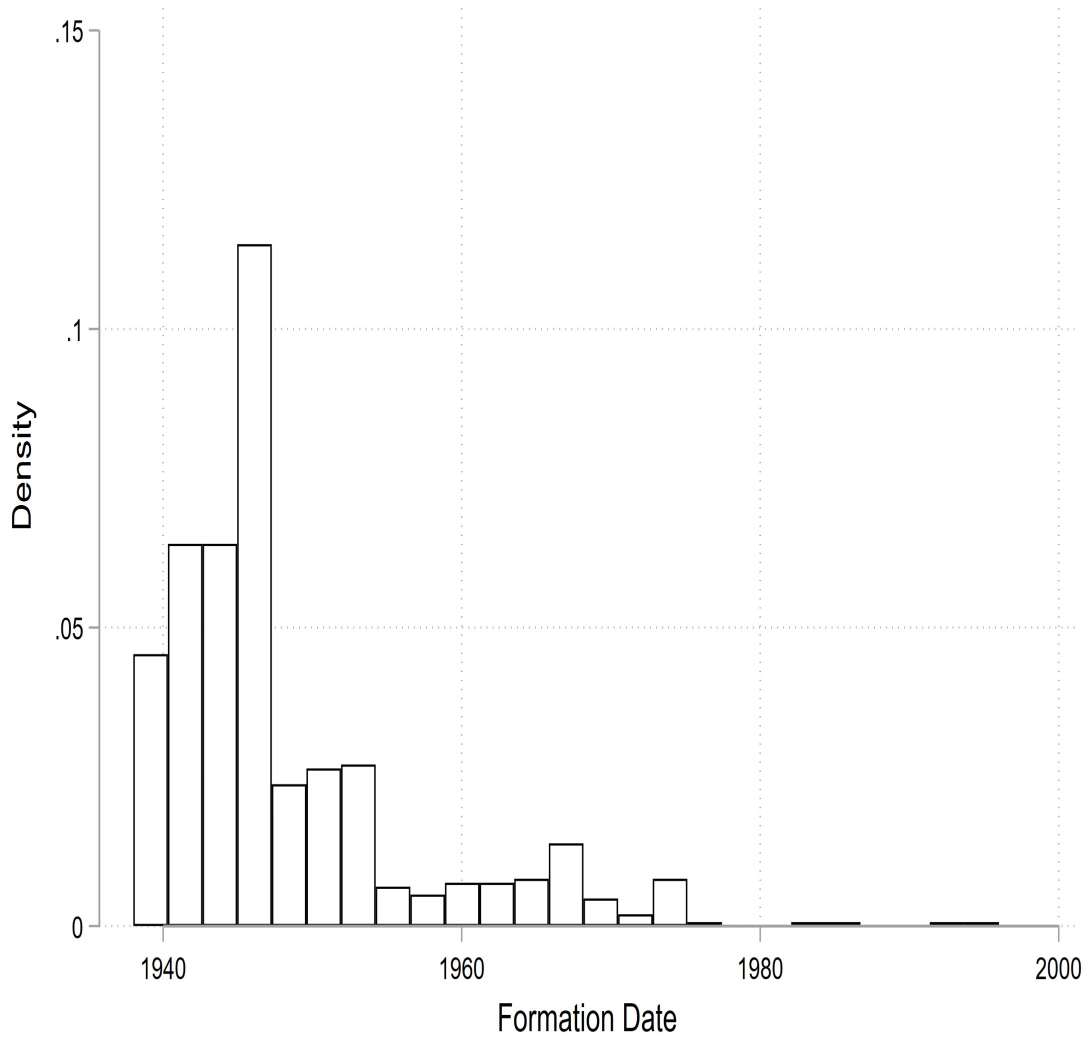
Data Extracted from the National Archives at College Park. Map shows areas under SCD activities in 1960s. Only Missouri did not allow SCD to work on most of its agricultural land by that time.

Figure (2) Formation Date of Missori Soil Conservation Districts



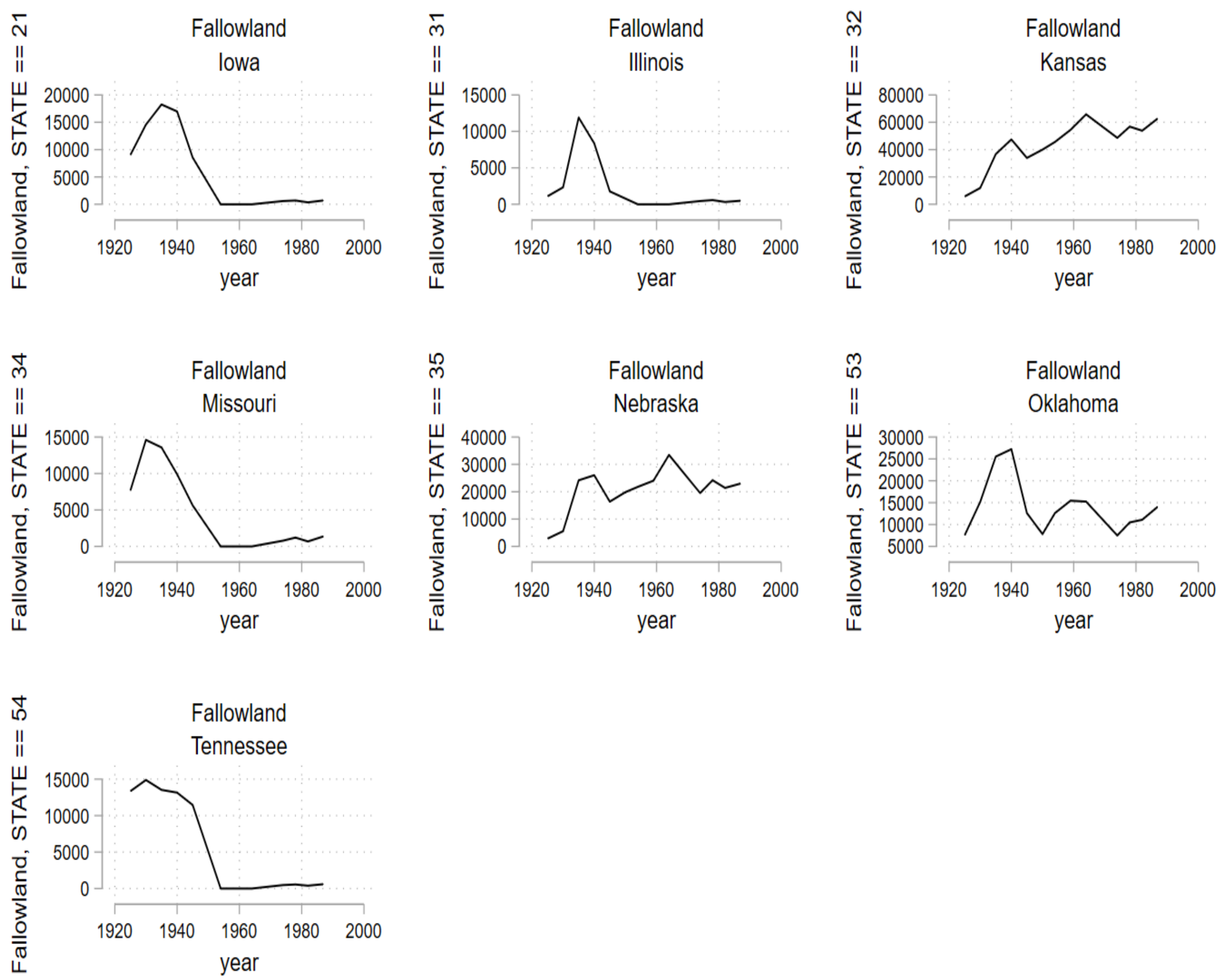
Formation Date of Missouri SCDs. The last SCD was created in 1996. Most SCDs started to operate after 1962.

Figure (3) Formation Date of All Soil Conservation Districts



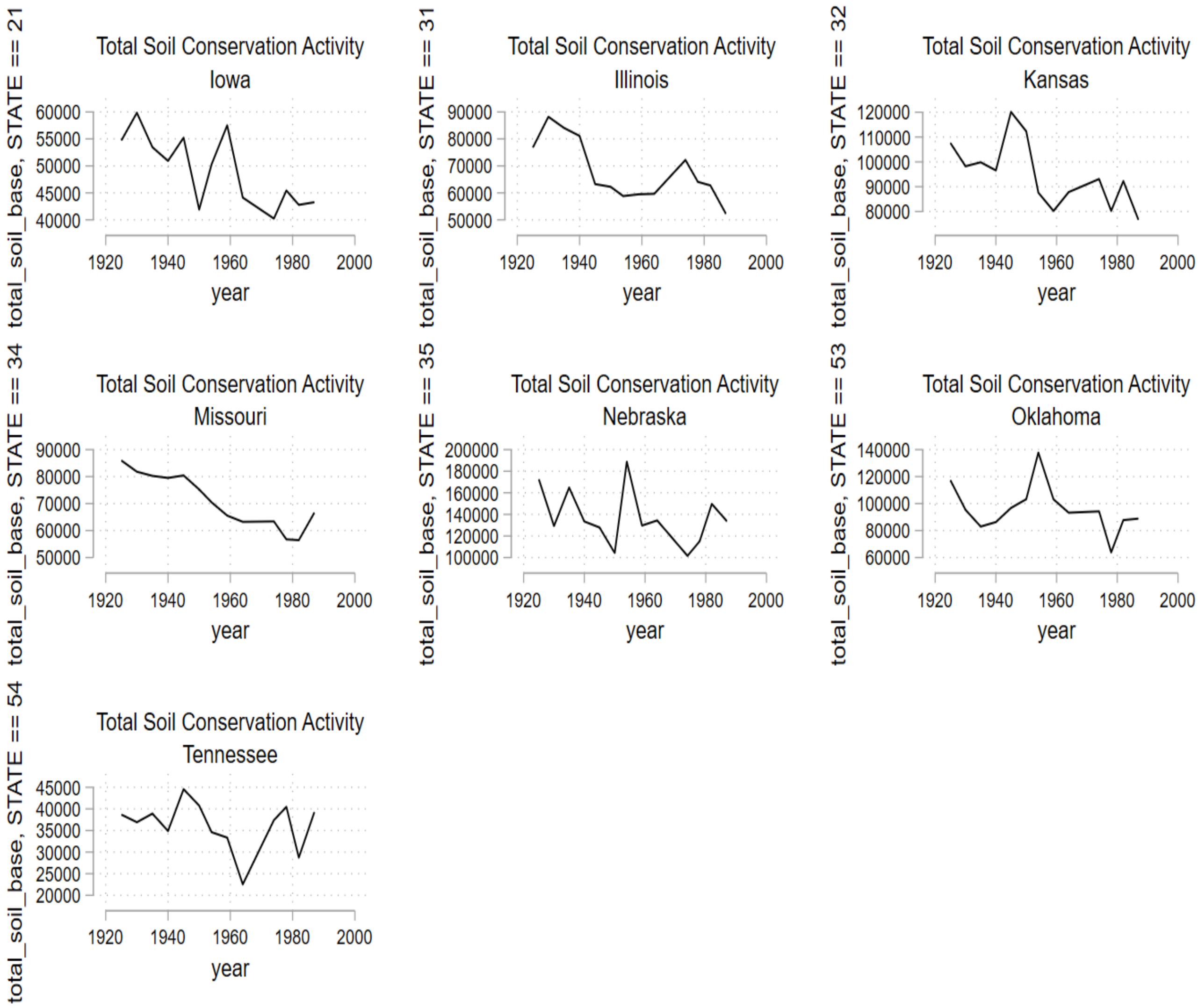
Formation Date of all SCDs in the sample, including Missouri and its border states. The last SCDs were created in Missouri

Figure (4) Distribution of Fallowland by State



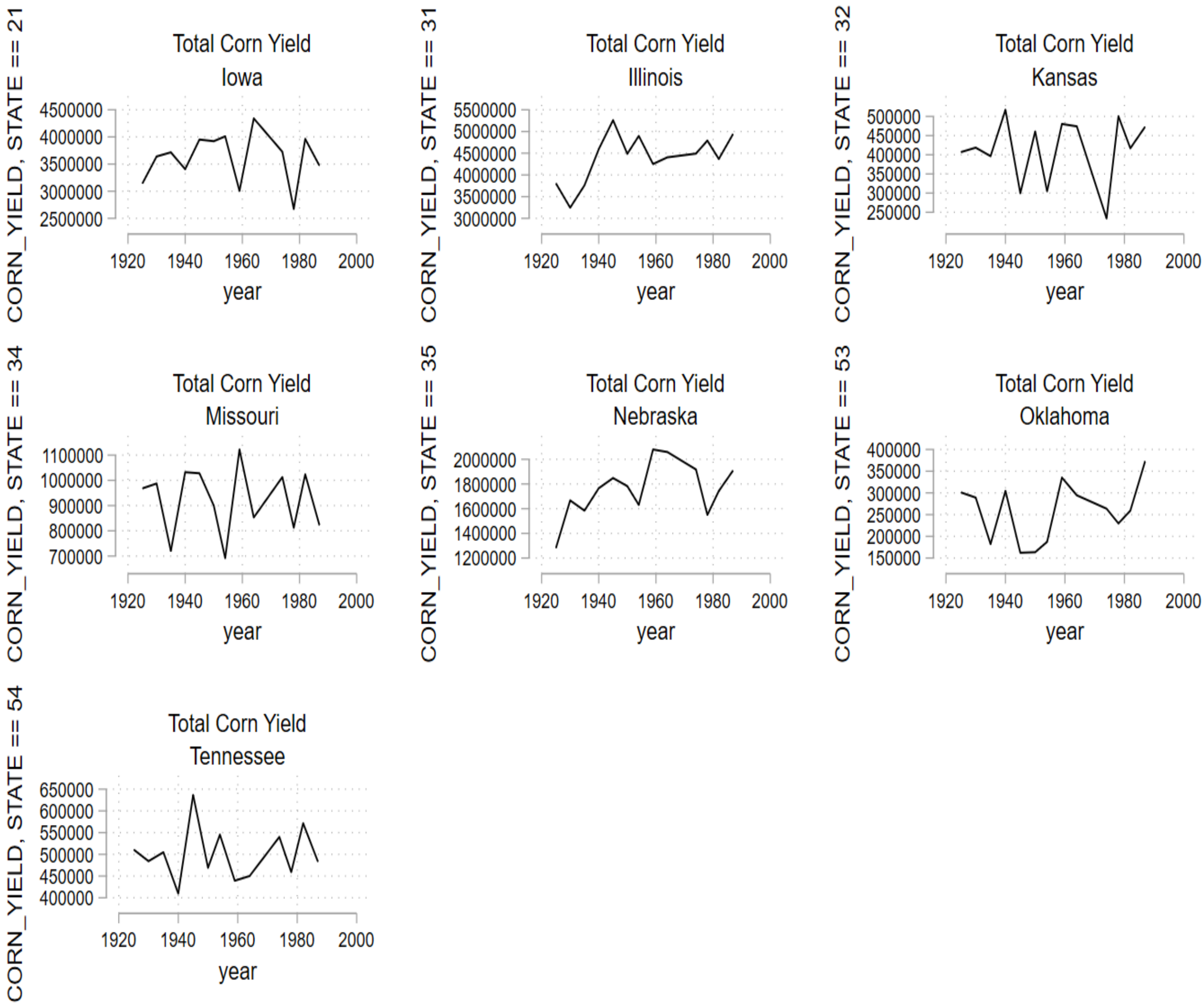
I extracted this data from the Census of Agriculture. I show fallow land over time, across states. We see that Missouri has a decreasing amount of fallow land compared to other states

Figure (5) Distribution of Soil Conserving Grass Areas by State



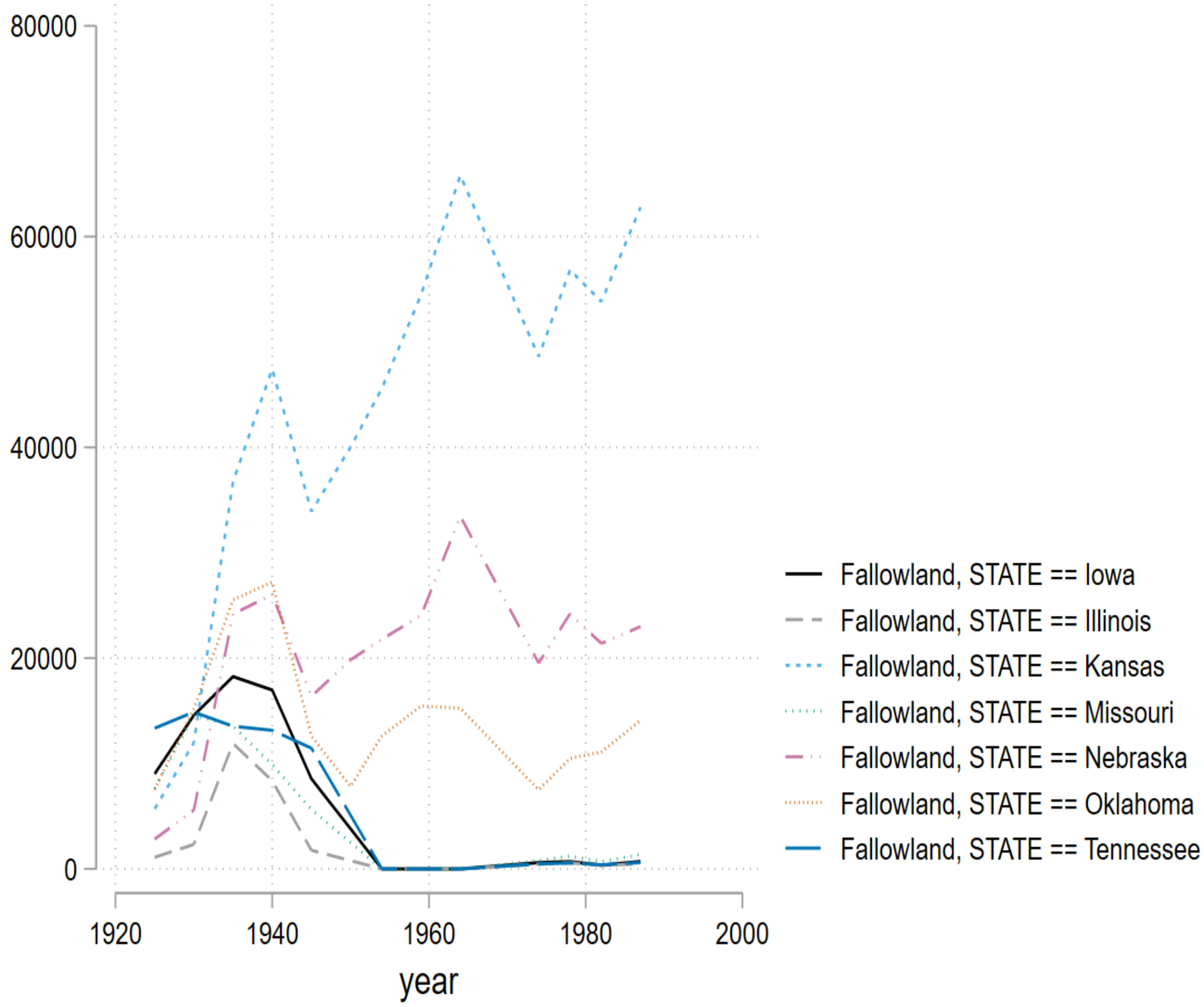
I extracted this data from the Census of Agriculture. I show land under soil conserving grasses over time, across states. We see that Missouri has a decreasing amount of soil conserving land compared to other states

Figure (6) Distribution of Yields by State



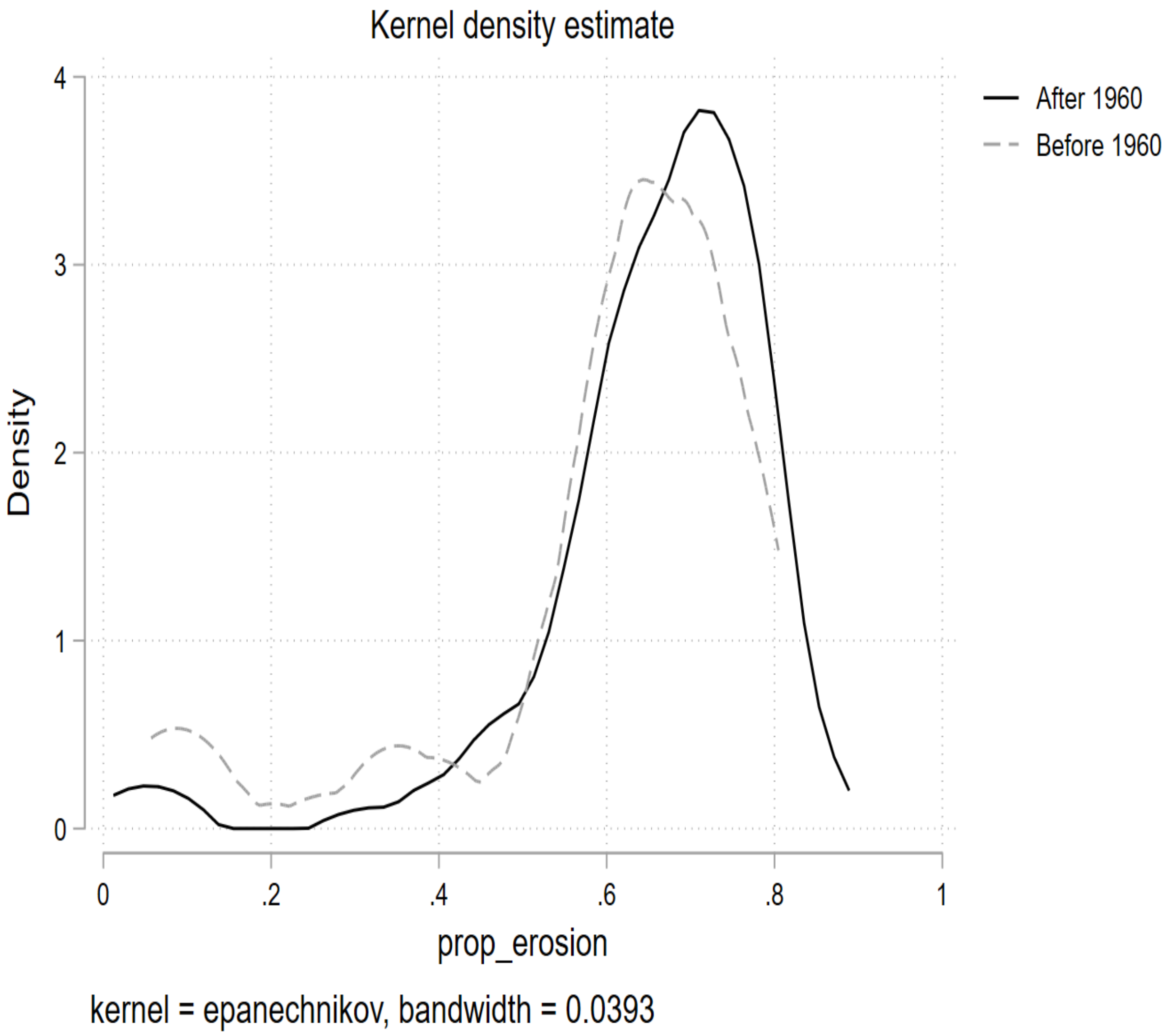
I extracted this data from the Census of Agriculture. I show corn yield over time, across states.

Figure (7) Fallowland by year and states



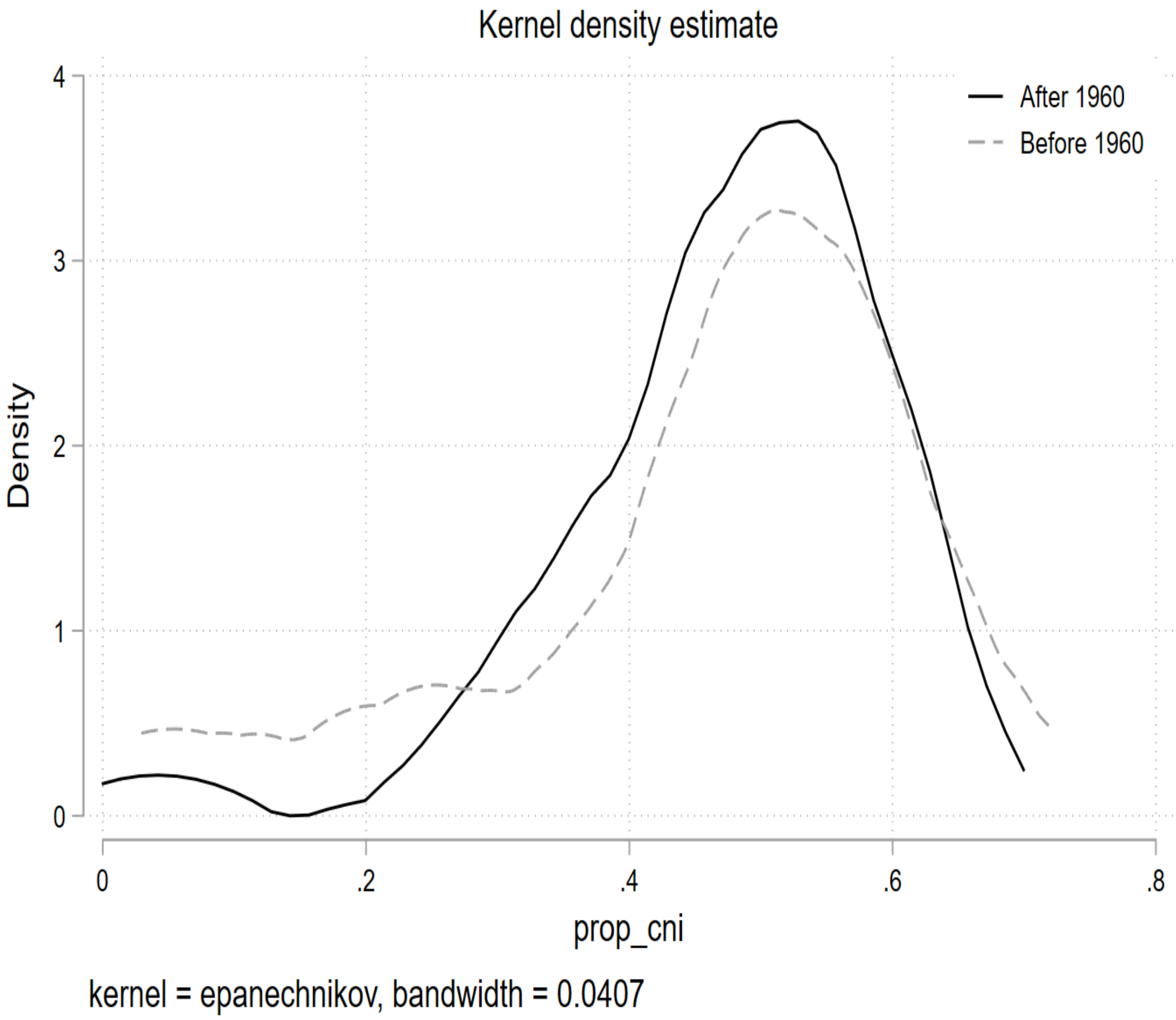
I extracted this data from the Census of Agriculture. I show fallow land over time, across states. We see that Missouri has a decreasing amount of fallow land compared to other states. Before the SCD policy, states were on parallel trend.

Figure (8) Distribution of Proportion of Land Under Erosion in Missouri



This data is extracted from the Conservation Needs Inventory (CNI) reports for Missouri. The figure shows that counties that had SCDs from earlier period had a lower portion of erosion.

Figure (9) Distribution of Conservation Needs Acreage in Missouri



This data is extracted from the Conservation Needs Inventory reports. The figure shows that counties that had SCDs from earlier period had lower proportion of land with conservation needs.

Figure (10) Distribution of Unfavorable Soil in Missouri

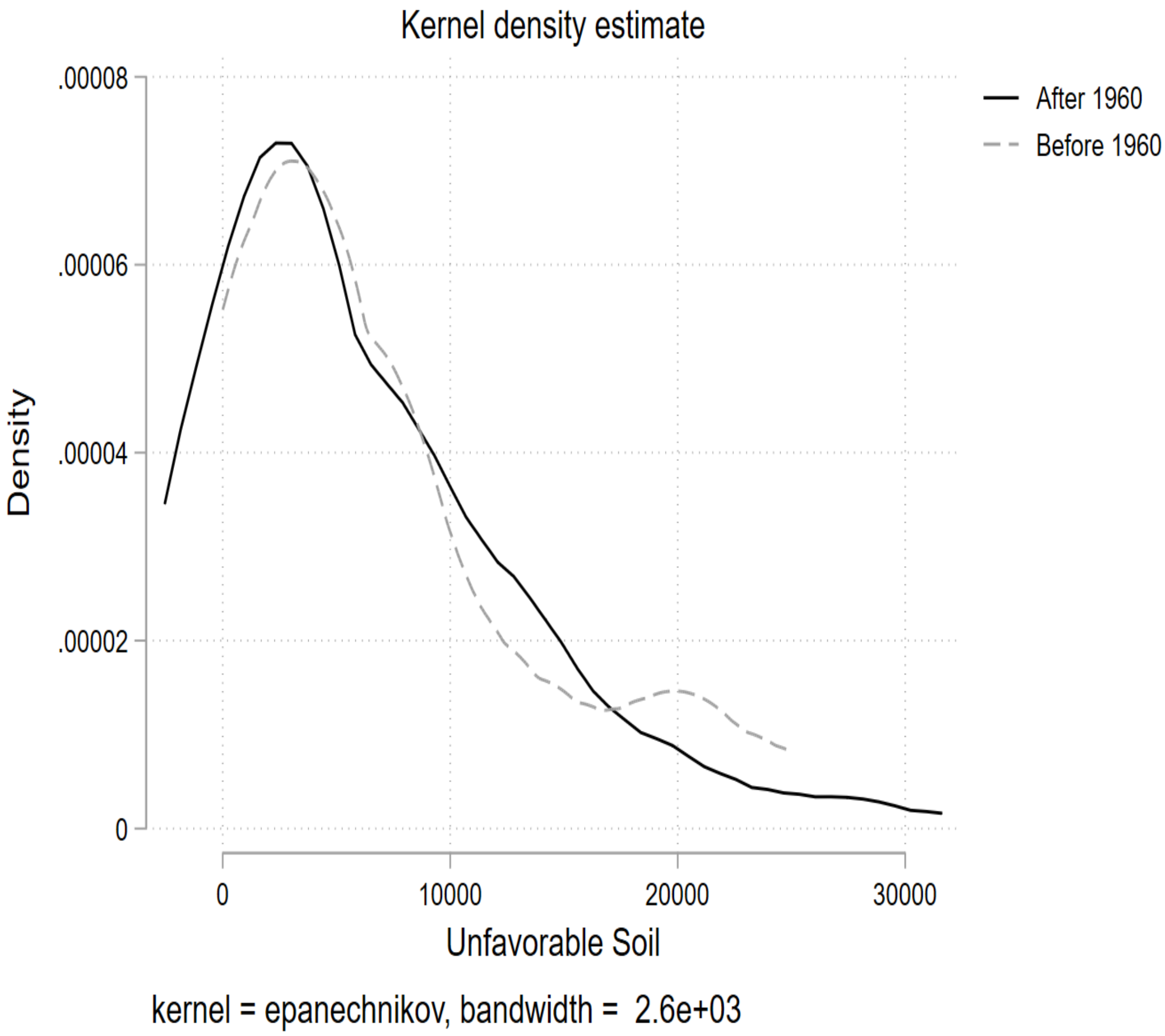


Figure (11) This data is extracted from the Conservation Needs Inventory reports. The figure shows that counties that had SCDs from earlier period had similar amount of unfavorable land.

Figure (12) Current Agricultural Land Conservation

This data has been extracted from the USDA EQIP database. EQIP acres on average by state over time. Missouri is one of the lowest adopters.

(Summary Statistics by States)

	IA	IL	KS	MO	NE	OK	TN	Total
Total population, 1920	30220.7	30642	29206.4	16712	11140.1	46711.2	31311.7	27355.8
	(19613.0)	(37756.0)	(37370.0)	(6808.2)	(5561.8)	(28887.4)	(40503.3)	(30519.2)
TOTFARMNUM	2158	2118.3	1765	2214.8	1377.9	3050	2575.7	2112.1
	(727.4)	(409.4)	(926.8)	(775.8)	(625.8)	(1470.5)	(1637.2)	(1026.0)
TOTFARMAREA	363520	336677.6	492533.3	397920	438167.3	701824	277366.2	398452.7
	(111166.4)	(52605.4)	(191112.3)	(97192.6)	(218954.3)	(299065.8)	(94727.4)	(177604.9)
FarmPop_TenantTot	996.7	967.9	737.2	747.1	630.7	1928	1416.7	1002.9
	(420.4)	(227.9)	(420.2)	(385.0)	(282.9)	(1051.7)	(1509.0)	(783.7)
CORN_ACRE	96472.2	97778.6	50158.9	57754.1	97336.7	45399	25927.7	71076.9
	(48910.3)	(32726.4)	(31864.5)	(44449.4)	(49971.0)	(28086.6)	(13734.7)	(46103.2)
WHEAT_ACRE	22043.8	3536.5	161822.6	17078.1	35523.3	51906.2	2206	39293.0
	(16099.7)	(4800.7)	(134417.3)	(10393.8)	(32746.4)	(72613.3)	(3766.0)	(77087.5)
PEANUT_ACRE	431.3	456.5	120.2	321.1	515.3	58.80	1543.3	549.4
	(235.2)	(332.4)	(102.2)	(379.7)	(366.6)	(67.94)	(2674.2)	(1175.3)

10 Tables

Table (1) Difference in Difference Results for Fallowland

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3
year	34.18**	57.56**	-9.599
	(15.89)	(22.44)	(30.23)
1.cont_post	-42.65	-445.3	-488.1
	(654.4)	(900.9)	(899.9)
1.Treat	5,313***	6,268***	6,052***
	(1,548)	(2,179)	(2,177)
1.cont_post#1.Treat	-8,555***	-9,508***	-9,334***
	(1,034)	(1,485)	(1,484)
TOTPOP		-0.00877	-0.00937
		(0.00783)	(0.00782)
AVG_FARMSIZE		0.000123	0.000113
		(0.000131)	(0.000131)
Percent_Tenant		8.635	9.145
		(25.00)	(24.97)
state_year			Yes
Constant	-53,022*	-98,558**	-99,907**
	(30,810)	(43,517)	(43,467)
Observations	8,346	4,770	4,770
R-squared	0.009	0.012	0.015
Number of FIPS	640	640	640

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel regression to study the effect of conflict on environmental outcome, the area under Fallowland. This table follows regression model (1).
Model 1 does not include any control variable, Model 2 includes county-specific control variables. Model 3 also includes state*year fixed effects.

Table (2) Difference in Difference Results Total Soil Base

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3
year	-354.2***	-119.1	9.568
	(114.2)	(157.8)	(216.8)
1.cont_post	1,842	9,939	10,006
	(4,715)	(6,355)	(6,356)
1.Treat	-7,141	-11,032	-10,685
	(11,768)	(16,100)	(16,106)
1.cont_post#1.Treat	-7,821	-11,596	-11,898
	(7,630)	(10,671)	(10,677)
TOTPOP		-0.0218	-0.0215
		(0.0470)	(0.0470)
AVG_FARMSIZE		0.00263***	0.00265***
		(0.000926)	(0.000926)
Percent_Tenant		4,594***	4,593***
		(182.1)	(182.1)
state_year			Yes
Constant	769,693***	168,308	170,959
	(221,510)	(306,157)	(306,181)
Observations	8,960	5,120	5,120
R-squared	0.003	0.134	0.134
Number of FIPS	640	640	640

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel regression to study the effect of conflict on environmental outcome, the area under Total Soil Conserving Grassland. This table follows regression model (1).

Model 1 does not include any control variable, Model 2 includes county-specific control variables. Model 3 also includes state*year fixed effects.

Table (3) Difference in Difference Results Corn Yield

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3
year	3,800*	4,114	3,705
	(2,182)	(2,528)	(3,473)
1.cont_post	77,254	50,063	49,863
	(88,508)	(102,140)	(102,159)
1.Treat	128,276	198,639	197,760
	(232,473)	(268,007)	(268,090)
1.cont_post#1.Treat	-138,620	-181,997	-181,018
	(144,742)	(168,094)	(168,211)
TOTPOP		1.949***	1.948***
		(0.714)	(0.714)
AVG_FARMSIZE		-0.0190	-0.0191
		(0.0139)	(0.0139)
Percent_Tenant		-35,266***	-35,260***
		(2,750)	(2,750)
state_year			Yes
Constant	-5.658e+06	-4.962e+06	-4.967e+06
	(4.231e+06)	(4.903e+06)	(4.904e+06)
Observations	5,760	4,480	4,480
R-squared	0.003	0.052	0.052
Number of FIPS	640	640	640

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel regression to study the effect of conflict on agricultural outcome, corn yield. This table follows regression model (1).
Model 1 does not include any control variable, Model 2 includes county-specific control variables. Model 3 also includes state*year fixed effects.

Table (4) Difference in Difference Results

	(1)	
	Before 1960	After 1960
noconser_prop	0.0948	0.0978
	(0.0486)	(0.0640)
prop_erosion	0.603	0.657
	(0.188)	(0.142)
prop_cni	0.456	0.475
	(0.166)	(0.119)

Table (5) Educational Service by the Extension Service in Oklahoma

	Year					
	1939	1943	1946	1950	1952	1954
Educational Meetings (No.)	17.79	46.95	34.80	57.80	63.16	85.96
	(16.09)	(47.53)	(39.53)	(55.86)	(60.42)	(62.38)
Educational Meetings (Attendance)	1068.7	2873.3	1396.2	2963.6	2734.3	3836.8
	(2191.5)	(7807.9)	(3066.7)	(3835.4)	(2731.5)	(3318.4)
Tours (No.)	2.158	28.02	7.250	14.38	20.47	67.44
	(2.651)	(153.6)	(9.329)	(14.82)	(20.21)	(188.7)
Tours (Attendance)	169.9	157.8	202.3	793.8	1015.3	1215.1
	(309.0)	(270.9)	(267.0)	(781.0)	(902.6)	(957.1)
Demonstrations (No.)	0.632	14.86	14.50	20.02	38.98	28.26
	(1.212)	(20.34)	(16.15)	(21.52)	(111.4)	(27.22)
Demonstrations (Attendance)	229.3	264.8	283.7	616.1	825.2	688.7
	(936.7)	(778.6)	(767.8)	(1098.7)	(2082.5)	(1069.6)
Training School Meetings (No.)	0	11.38	5.659	9.511	13.42	19.04
	(0)	(37.50)	(11.90)	(16.79)	(18.44)	(21.39)
Training School Meetings (Attendance)	0	115.6	101.9	315.8	442.7	568.1
	(0)	(194.5)	(175.1)	(491.5)	(503.5)	(576.7)
Exhibits (No.)	0.474	2.690	2.114	5.444	6.756	46.78
	(1.020)	(5.611)	(3.134)	(6.910)	(7.918)	(190.6)
Newspaper Articles (No.)	14.89	96.69	123.8	280.7	320.7	401.5
	(18.20)	(162.0)	(109.4)	(238.3)	(322.0)	(367.9)
Radio Programs (No.)	1.579	1.714	1.841	9.156	14.84	23.81
	(4.388)	(7.246)	(7.294)	(37.05)	(44.13)	(52.19)

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