Inter-agency Conflict and Provision of Public Goods: Historical Evidence from the Agricultural Land Conservation*

Aparna Howlader†

May 8, 2021

Abstract

Multiple agencies and institutions are responsible for providing public goods under the federal and state governments. This is especially true for environmental services like land conservation that demand numerous layers of institutional involvement. Inter-agency cooperation and coordination are essential to provide these services. However, due to different political, economic, and bureaucratic reasons, agencies may have conflicting interest. 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 conservation policies. The extension services resented the creation of a new local institution in Missouri, named soil conservation districts (SCDs) to provide technical assistance for soil conservation. Using the timing of SCD formation, I show that this noncooperation led to slower growth of SCDs in Missouri, a lower amount of land conservation, and higher erosion in Missouri than in border states where extension services assisted in SCD creation. These results are essential in multiple stakeholder settings to design policies to ensure inter-agency cooperation.

Keywords: Land Conservation, Agricultural History, Political Economy

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

---

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

†Postdoctoral Research Associate, The Eviction Lab, Princeton University; howlader@princeton.edu

1 Introduction

In environmental policy management, federal agencies are interlinked to provide similar services and goods, and are designed to work together for the public. The interrelationship among agencies may significantly affect the success or failure of environmental policies. Public goods provision becomes harder when agencies do not cooperate and coordinate among themselves. Effective inter-agency coordination in federal fiscal decision-making is an important component, especially for environmental services. Inter-agency noncooperation may create long-term disruption in the success of the policy design.

For example, 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.

Economic theory states that competition among institutions to provide similar public goods affects quality, quantity, and welfare. On the one hand, competition may raise the availability of public goods over space. On the other hand, high monopoly power to extract rent may stop new institutions from entering the market, which may undercut public goods (Stigler, 1972). Economic theory is not clear in shedding light on how the direction of competition among agencies and institutions affect provision of public goods. This question is more complicated when institutions are under the federal umbrella, and competition may distort the federal government's impact on institutions and targeted population and landscape. Theoretically, it is also unclear under what conditions existing institutions accept new institutions entering the market (Oates and Schwab, 1988).

Empirically, studies are sparse and limited because we need data for multiple institutions over time and across space. Many institutions are locally formed and endogenous to the system, so it is hard to estimate the effect of competition on institutional formation in these cases. To study the impact of competition on the construction of new local institutions, we need an exogenous setting where policy induces the creation of new institutions. Moreover, we need data for institutions over time. Historical events to create local institutions under federal incentives may help us to understand these dynamics among agencies.

In this paper, I analyzed the delay and performances of public good provision where one federal agency resents the creation and growth of another institutional setting. For this purpose, I took a case study from the historical U.S. agricultural landscape where a new local institution was intended to provide complementary environmental services in the presence of other institutions. Some existing institutions across the Midwest resented this initiative and therefore created barriers. In this paper, I utilized this unique setting by following these two institutions over time and compare their contributions over multiple decades.

Historically, the extension service was primarily responsible for educating farmers on agricultural techniques in the United States. After the period of the Dust Bowl, it was clear that an educational effort was not enough and farmers needed technical assistance from the federal government. Farmers need to design their farm plans and see how to take care of the land in the short and long run in order to receive the benefits of soil conservation on their farms.

Towards this aim, the 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. Farmers all over the United States started to create SCDs from 1937 and this process was fast in the Great Plains and in 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). In this paper, I examined the implications of the extension service in forming SCDs in Missouri and draw comparisons with border states to understand the repercussions of this interagency conflict.

I used fallow land data from the USDA agricultural census as my environmental outcome and construct a database for the timing of SCDs by county in seven states around Missouri. I used data from historical sources to collect information on the formation of SCDs with reference to seven states: Illinois, Tennessee, Oklahoma, Kansas, Nebraska, Iowa, and Missouri. These states have borders with Missouri and created SCDs without any particular resentment from the extension service. 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 environmental quality data in the long run from the Environmental Quality Incentive Program (EQIP). Using spatial and temporal variation in the analysis of resentment, and utilizing the dataset across space and time, I analyzed the implications of the efforts from the extension service.

Methodologically, I used the difference-in-difference model to compare Missouri and other states across the border to determine variation created by the political resentment. Results indicate that competition and barriers were harmful for soil conservation. Fallow land and soil conserving grass plantations were lower in the areas compared to other states. In addition, erosion was higher in those 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. In 1982, Missouri was the second-highest eroded state in the country.

Over time, the farm bureau and extension service in Missouri also 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 service 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 service.

These results are essential to understand the inter-agency relationship and their effects. Workload and responsibilities need to be clearly defined and divided. This paper belongs to the institutional economics literature that shows how inter-agency competition is essential, and also mainly refers to three strata of literature: agricultural institutions, environmental economics, and fiscal federalism.

First, the historical low level of cooperation between USDA forest service and 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. Also, there are studies showing the evolution and structure of environmental agencies by examining state wildlife agencies (LUECK and PARKER, 2015).

Next, studies in the literature also maintain that the local government and jurisdiction are important in fiscal policies. In that regard, I propose the implication of a historical event to understand the result of competition in the long run. Key issues in the literature on environmental fiscal federalism have arisen around spillovers across local government (Oates, 2008; Happaerts, Schunz, and Bruyninckx, 2012; Cameron and Simeon, 2002).

Last, 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). With reference to this aspect, in this paper, I show a 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 and a plan is necessary to maintain the relationship among institutions. Without a systematic division of organizational responsibilities and coordination, policy failure is a given.

In that line, USDA agencies work at different layers. The Produce Marketing Association (PMA), Farm Service Agency, Extension Service, Natural Resource Conservation Service (previously known as Soil Conservation Service) all work to support farmers. The USDA also has some agencies for money transfer, education transfer, and conservation transfer.

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.

2.1 Missouri Farm Bureau and Extension Service

The University of Missouri Extension has its roots in the federal acts that enabled the university to deliver the practical benefits of education and scientific research to people in order 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 with the provision that proceeds from the sale of those lands would be used 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. Over 300 farmers attended this two-day meeting in Slater, Missouri, on March 24 and 25. It was immediately apparent how much influence counties could have on improving agriculture. Thirteen county farm bureaus had already formed in Missouri by this inaugural state convention. The Pettis County Farm Bureau was established in 1912 and sent 34 delegates to the convention. The University of Missouri currently conducts research to aid agricultural producers and ensure a safe food supply at research farms and centers worldwide.

In the early years, farm bureau advisors hired by county farm bureaus were the precursors to today's agricultural extension agents, assisting farmers and ranchers with production and management advice. Although formal financial ties between county farm bureaus and extension agents had been long ago dissolved, farm bureau members continued to play active roles on Extension and 4-H youth councils.

The Missouri Farm Bureau has grown to more than 130,000 members. In the halls of Congress and the General Assembly, the farm bureau continues to be the voice of agriculture, helping farmers and ranchers do the job of producing food for the world. Members enjoy insurance coverage from what is now the largest insurer for farmers and ranchers in the state. The organization's clout allows it to provide discounts for members on cars, trucks, hotel stays, and many other items.

Initially, the extension program concentrated on working with farmers and their families, which comprised the majority of the nation's population, to improve their quality of life and living standards. Extension workers demonstrated how to produce more and better varieties of agricultural commodities, benefit from better nutrition, clothing, and housing; and work together to bring about major improvements, such as electric cooperatives.

In 1955, state legislation required counties to establish county extension councils to advise the University of Missouri on educational programming needs. Today, some 1,600 elected, appointed, and delegated citizens volunteer their time and effort to assess local educational needs and work with extension faculty to deliver and evaluate the programs. Appropriations from county commissions provide operating funds for county extension offices and secretarial support.

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 decline in 1931-1933. Land utilization policies (such as regarding the purchase of submarginal, eroded farmland) were a vital component of the Agricultural Adjustment Act of the New Deal in 1933. The initial plan to conserve soil had two main 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 at which 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 farmland management. Eventually, different states started to adopt the law beginning in 1937.[1] 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 SCS of the USDA (with technical assistance), b) the Extension Service

[1] 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.

(with educational programs), and c) the Work Projects Administration (with financial aid). The United States currently has more than 3000 SCDs; for the most part, SCDs coincide with county administrative borders.

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

2.3 Missouri Extension Service and SCD Formation

Conservation districts were affected 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 was not common in the Great Plains, but it became an issue in some midwestern states. In Missouri, the battle was ugly.

Missouri had passed a law in 1943 after one unsuccessful attempt in 1939. It did not give the SCD regulatory authority though, as was suggested by the model federal law. Bringing federal technicians in to help farmers was also challenging. The Missouri Extension Service also tried to form a more organized competitive program to assist farmers named the "balanced farming plan." That plan has a monetary cost for farmers, so it has not been successful. Moreover, the extension service employees did not have the training to work on farmers' farm plans like the USDA SCS technicians.

The extension service was accused of distributing flyers before voting for some SCDs and push farmers and landowners for not voting for a SCD. The result of such conflict was that conservation district formation and conservation work in Missouri lagged behind much of the rest of the nation. 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. Many states assigned a soil conservation specialist at the state level to provide statewide scholarship.

3 Theories Linking Inter-agency Relationship and Public Goods

The correlation between inter-agency relationship and the provision of public goods has been addressed by a number of theories. In this section, I briefly describe this literature and explain how complementaries of public services affect the relationship and outcome. This subset of theories informs my interpretation of how inter-agency relationships affected land conservation and environmental quality in the Midwest.

An old stratum of literature suggests that organizational competition can be good for the outcome under certain conditions. This literature focuses on the rise in quality. In addition, in dynamic settings, this means more investment and specialization. Furthermore, entry barriers created by organizations may alter the process. A number of different industrial organization models feature how entry barriers can be created and exploited. Also, studies in industrial organization literature show the importance of complementary in services from organization perspective (Brynjolfsson and Milgrom, 2013).

In this line, having a set of complementary capabilities is important to think about the implications of inter-agency conflict. 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, and thus negatively affected the outcome.

Competition could have a positive effect if the extension service and the SCD were substitutes. The extension service's maximization functions include farm profit and mostly consider immediate profitability. Soil conservation districts' functions include farm profit and benefits but are mostly related to community resilience under climate shock. These two will be equal only if the extension service has the knowledge and power to demonstrate soil conservation activities to farmers. The environmental benefit is low as the extension service is not a substitute for the SCD as the two entities are specialized in different areas. The optimal expenditure of the extension service to stop the SCD is determined by the relative weights of these variables. We cannot empirically examine this as data on the pressure are not available. However, some narrative is available and shown in this paper.

4 Data Construction and Summary Statistics

I took resentment against new SCDs in the extension service as an example to understand how existing agricultural institutions may or may not help the new institutional formation and 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. 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. Third, I used an agricultural census to generate agrarian characteristics.

4.1 SCD Formation Timing

I gathered SCD formation timing for Missouri and border states from historical reports, which is illustrated in the histogram. We can see that Missouri took until 1996 to be under coverage (Figure 1). Historical maps were also collected from the national archives. We can see that in 1962 only Missouri was not under a SCD.

I collected information on SCD formation timing by state from historical documents. These data are by county and show the year for which any county started to have an SCD after the referendum. We used this timing variable to create treatment years. My treatment status involves all counties in Missouri. I used all the border states as control areas.

4.2 Agricultural Statistics

I gathered agricultural census data from 1925 to 1987 and constructed a county-level database for fallow land, yield, farmland value, and revenue. I used data from 1925 to 1987 on fallow land, other soil conserving grasses, tenancy, and farm size. 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 figure appendix. 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 better fallow land than Iowa, Illinois, and Kansas.

We see from Figure-6 that soil conserving grasses like hay, alfalfa distribution. The figure also shows that Missouri's soil conserving areas are decreasing compared to other areas.

Moreover, Figure-7 illustrates that there is no visible effect on yield.

4.3 Conservation Needs Inventory

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

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

We can see from Figure-9 that CNI and erosion in Missouri before and after the formation of SCDs in 1960 are different across counties. Counties that had SCDs before

1960 already had control over erosion compared to counties that formed SCDs later.

4.4 Compare with Oklahoma's Success

To demonstrate the importance of interagency relationships, I also showed the success of soil conservation in Oklahoma achieved through the relationship between the extension service and the SCD. 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 due to the success of the relationship and data availability, although the same is true for Kansas. I collected information about Oklahoma's educational services through the extension service from the National Archives at College Park in the form of panel data.

4.5 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 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.

We can see from Figure-12 that Missouri and other midwestern states have a much lower adoption of EQIP compared to Kansas and Nebraska.

5 Empirical Method

This section explains the strategy for generating the causal impact of the extension service. I used a difference-in-difference approach exploiting two sources of variation. The county is the unit of observation. I implemented a generalized DID where multiple time periods and groups are in action.

5.1 Difference-in-Difference Method

With these data, I used the difference-in-difference method to compare outcomes across states, depending on the strength of the extension services. The research questions are as follows: 1) how do the budgets of extension services change if they resent the formation of a new institution? and 2) how do county-level farmland value and yield change in this competition? In previous research, I studied the formation and implication of SCDs in the Great Plains (Howlader, 2020; in review). I now would like to 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.

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

I utilized a border discontinuity model to show the persistence of the competition on landscape.

Where c indexes the county, t indexes time. d_t is a "post" dummy and equal to 1 if after the policy. $Post_t$ 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 extension service. In my preferred specification, this will include a vector of covariates.

5.2 Identification Strategy

A parallel trend is the main identification behind difference-in-difference model. This means that if there was no policy, then treatment and county groups followed the same trend. This trend is represented visually in the figure. We see that the states in the treatment and control groups have a parallel trend before the policy. 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 1925, 1930, and 1934 data to establish this result.

5.3 Persistent Effect: Correlation

After establishing the causal effect of interagency 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.

6 Results

6.1 Main Results

In this section, I present the results of the ATE from the regression 1. 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 environmental goods and 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.

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. Table 3 reports the average treatment effect on yield. Missouri's yield is not significantly lower than comparable states. This low provision of environmental goods had a persistent effect on Missouri. In the 1980s, one of the highest levels of eroded areas was in Missouri.

6.2 Effect on Erosion

Table 4 presents the results of using CNI, showing that areas with a SCD from earlier periods had a slightly lower erosion. We can also see that the proportion of land needing conservation treatment is lower in the areas that already had a SCD.

6.3 Long-term Consequences

Given the nature of the problem and data limitation, 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 from water pollution data. This may be partly caused by the fact that farmers were not familiar with soil conservation techniques, and may also 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 now at EQIP and CRP data, we see that Missouri has been catching up in later times. The extension service has one candidate in the SCDs and they work together with the farmers.

7 Current Relationship between Extension Service and Conservation Districts

The extension service allowed the SCD to form and operate after 1962. Still, there was persistent resentment and no help from their part. The extension service has a member now in the SCD committee. This ended in 1996. After that period, the situation began to improve. I collected information on EQIP acres for midwestern states. The graph shows that the situation is not worse when compared to other midwestern states.

8 Lessons from Oklahoma Success

For contrasting purposes, we can consider a state where the extension service was actually facilitating the SCD within the context of interagency cooperation. The focus will be on Oklahoma 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 meetings, training schools, tours, newspapers, and radio programs, and that many farmers attended these events. In areas where these educational services were extensive, farmers were also 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.

9 Conclusion

In this paper, I examined the phenomenon of noncooperation among federal agencies and how it may damage conservation management. By means of a unique case study in the context of midwestern agriculture, I showed that noncooperation leads to less agricultural land conservation.

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.

10 Figures

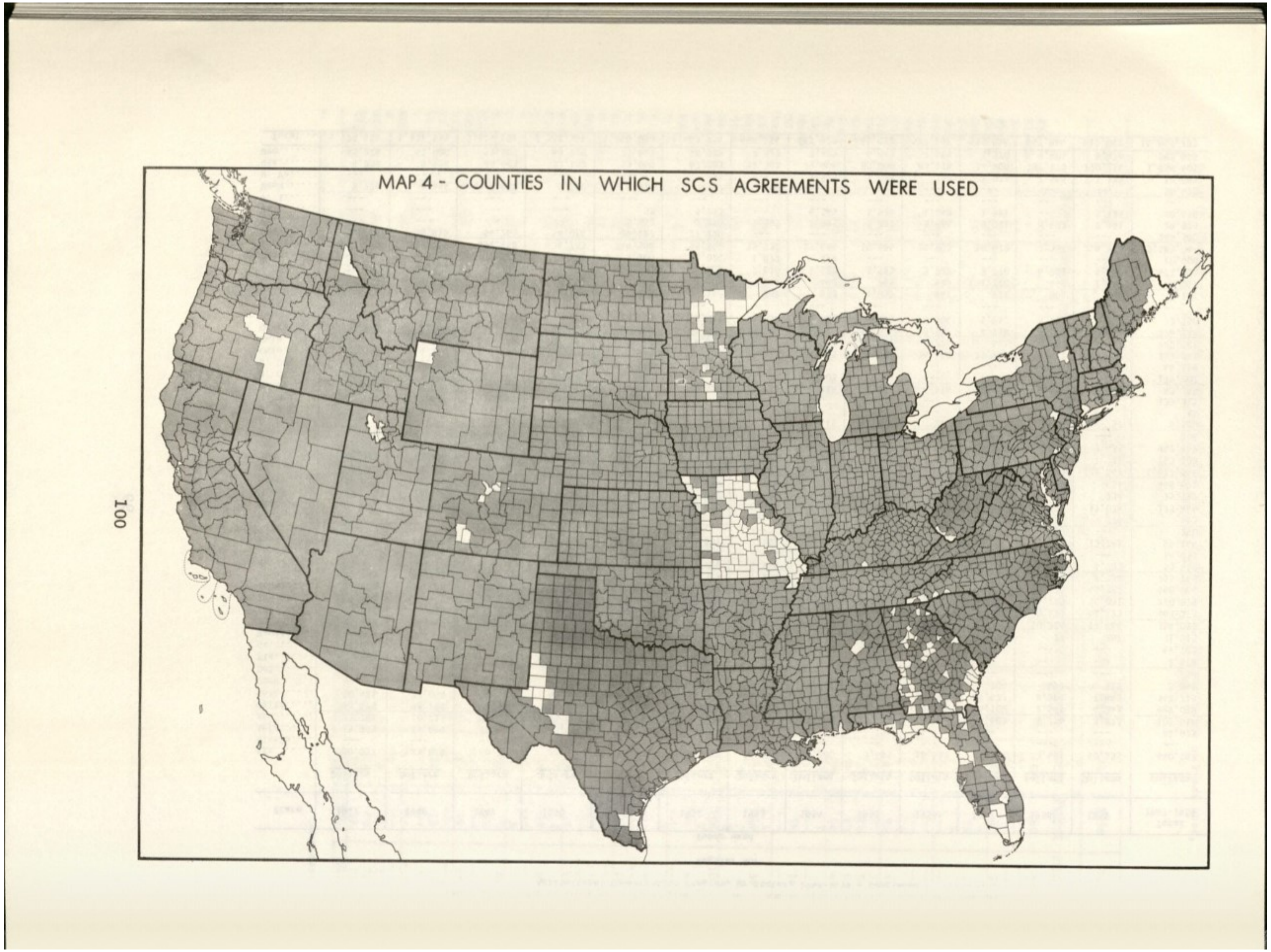

Figure (1) Data Extracted from the National Archives at College Park. Map shows areas under SCD activities in 1960s. Only Missouri did not allow SCD mostly to work on agricultural land by that time.

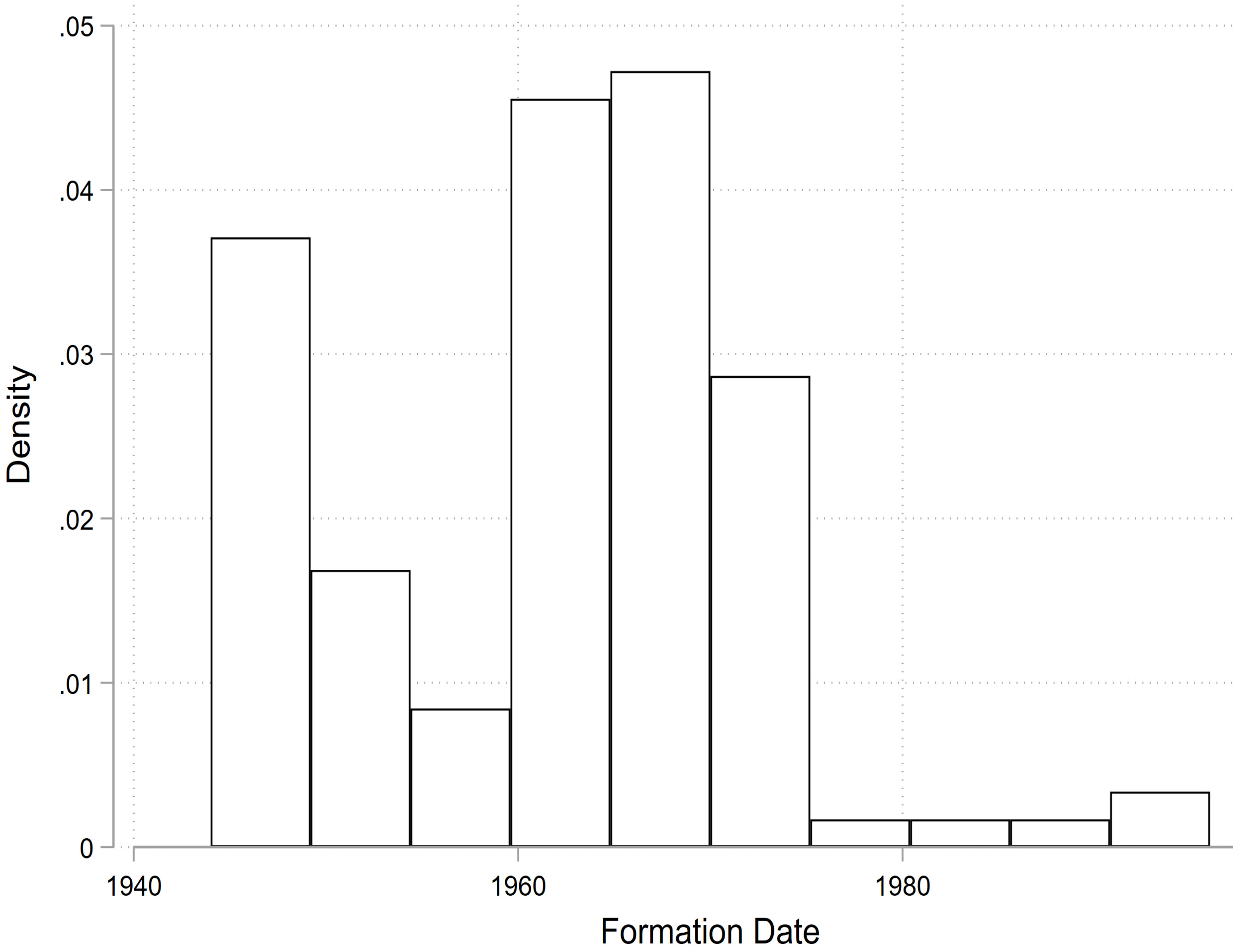

Figure (2) Formation Date of Missouri SCDs. The last SCD was created in 1996. SCDs mostly started to operate after 1962.

Figure (3) Formation Date of all SCDs in the sample, Missouri and border states. The last SCDs were created in Missouri

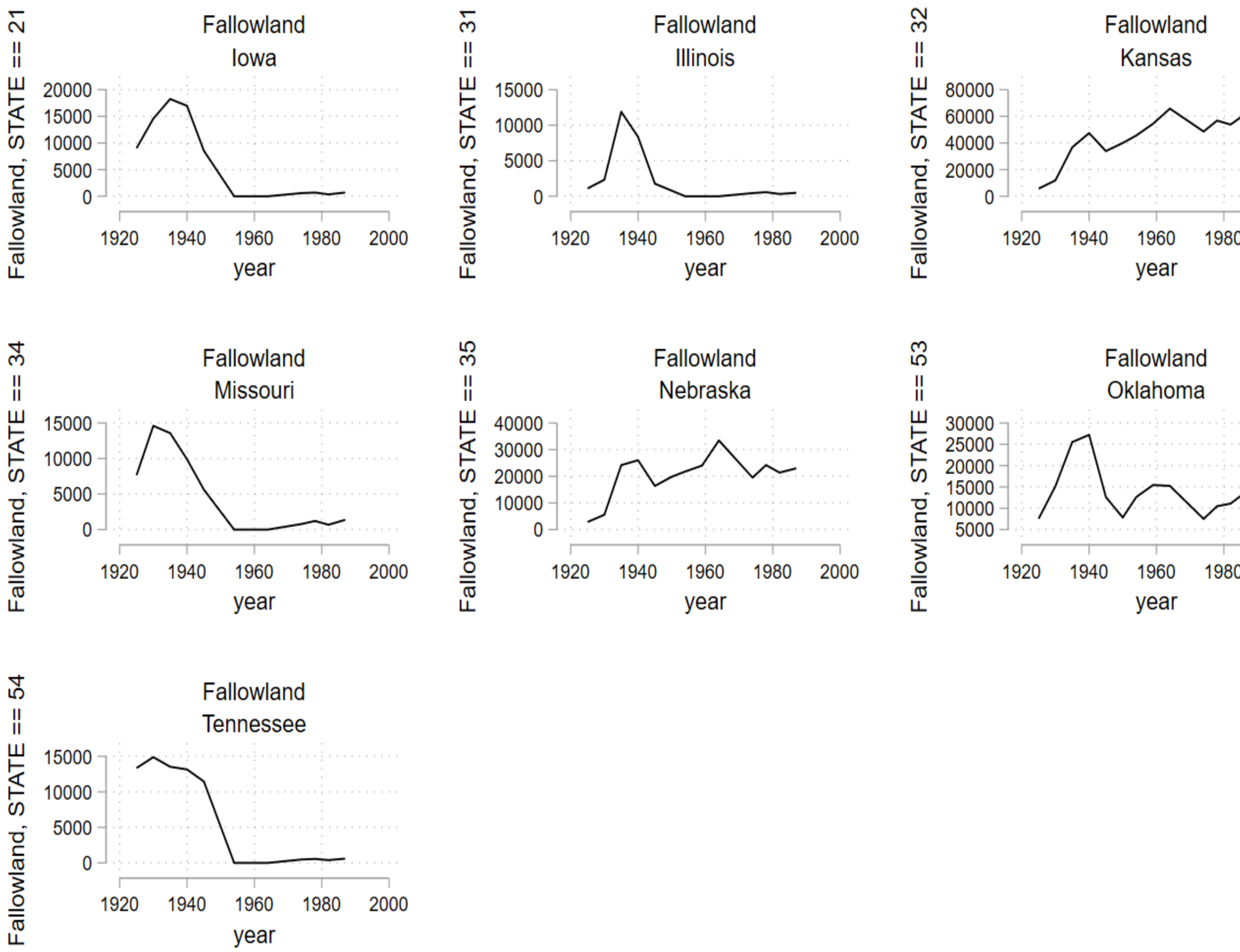

Figure (4) I extracted this data from Census of Agriculture. I show fallow land over time, across states. We see that Missouri has a decreasing amount of fallow land compared to other states

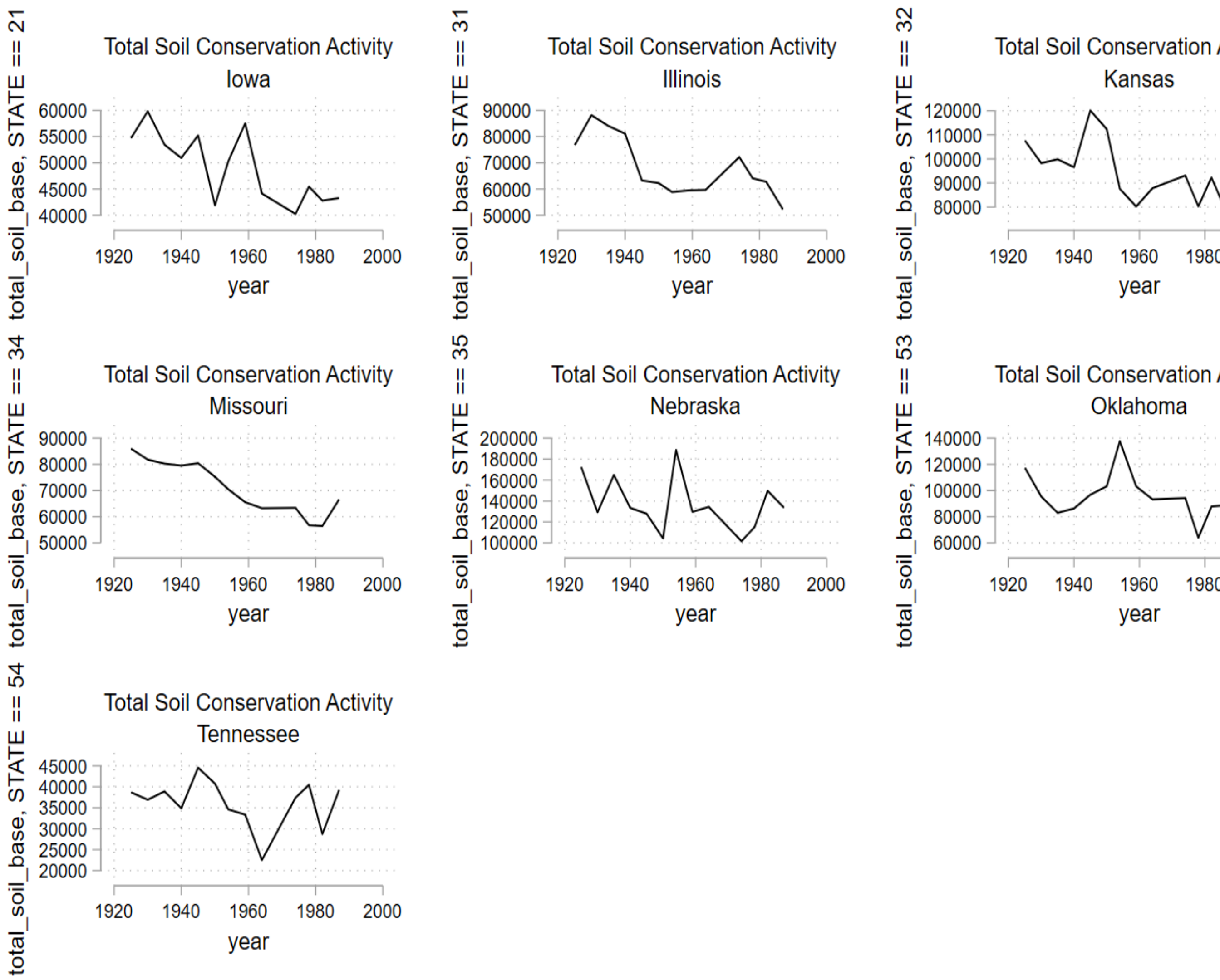

Figure (5) I extracted this data from Census of Agriculture. I show land under soil conserving grasses over time, across states. We see that Missouri has a decreasing amount of soil conserving land compared to other states

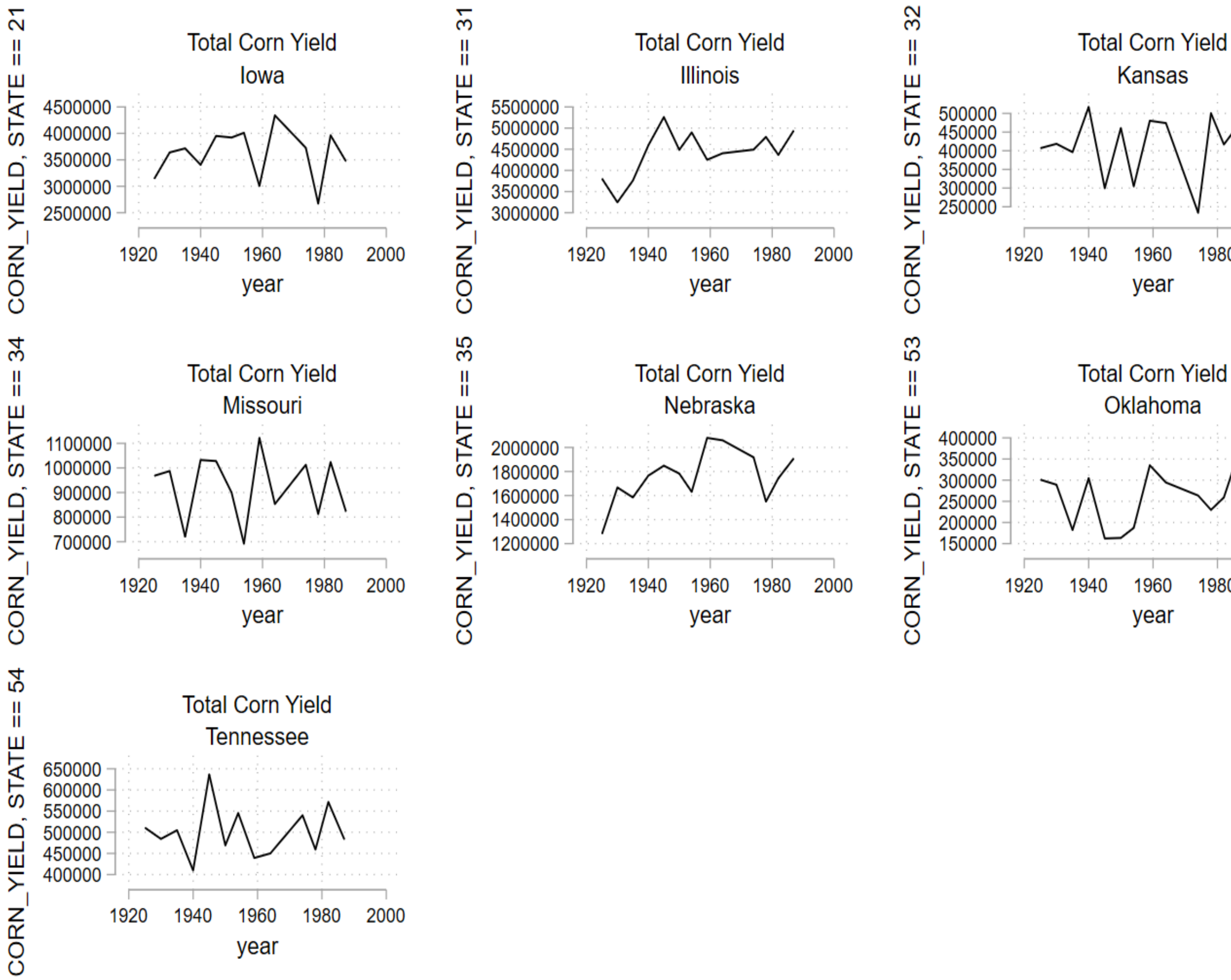

Figure (6) I extracted this data from Census of Agriculture. I show corn yield over time, across states.

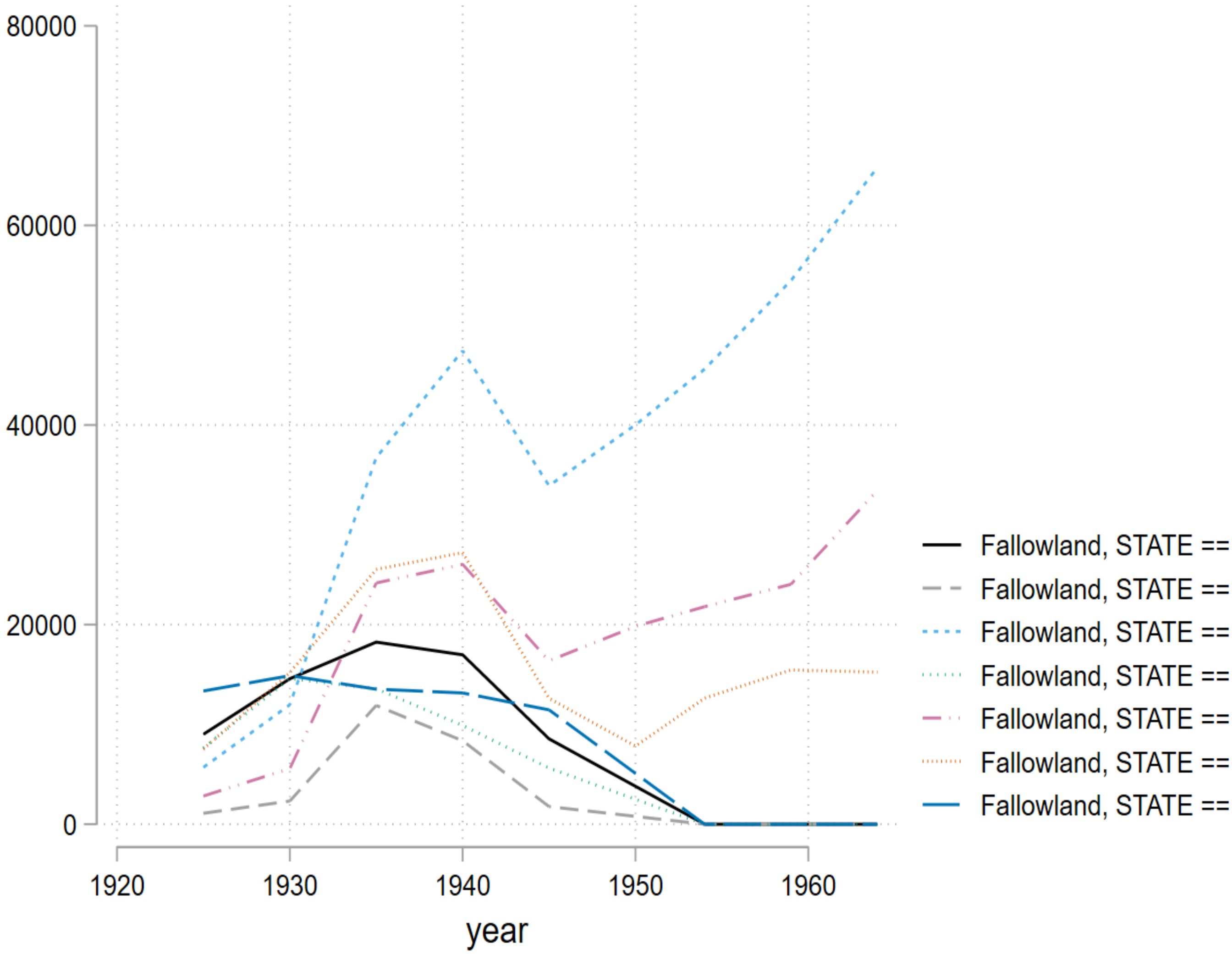

Figure (7) I extracted this data from Census of Agriculture. I show fallow land over time, across states. We see that Missouri has a decreasing amount of fallow land compared to other states. Before the SCD policy, states were on parallel trend.

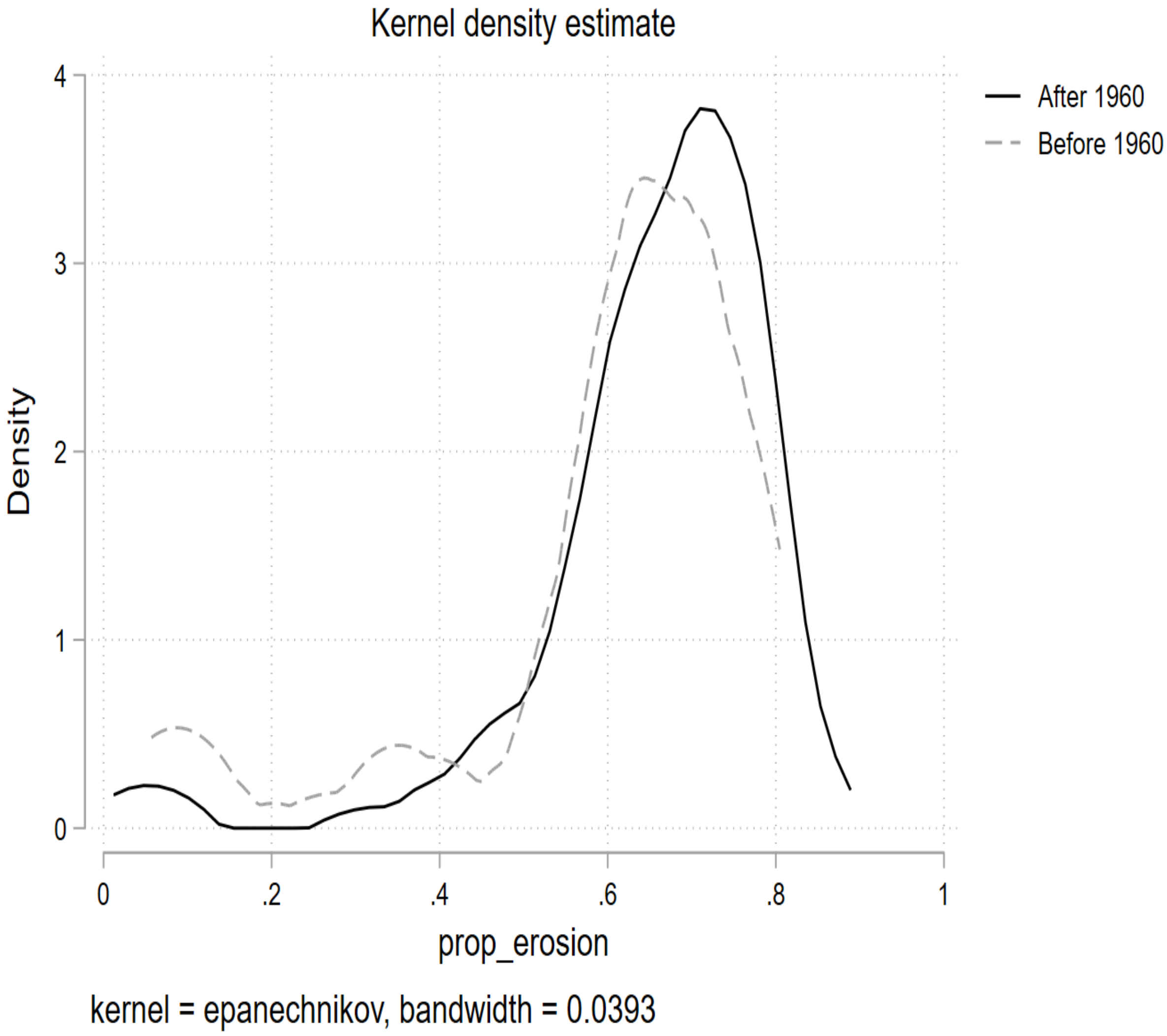

Figure (8) This data is extracted from Conservation Needs Inventory reports for Missouri. The figure shows that counties that had SCDs from earlier period had lower proportion of erosion.

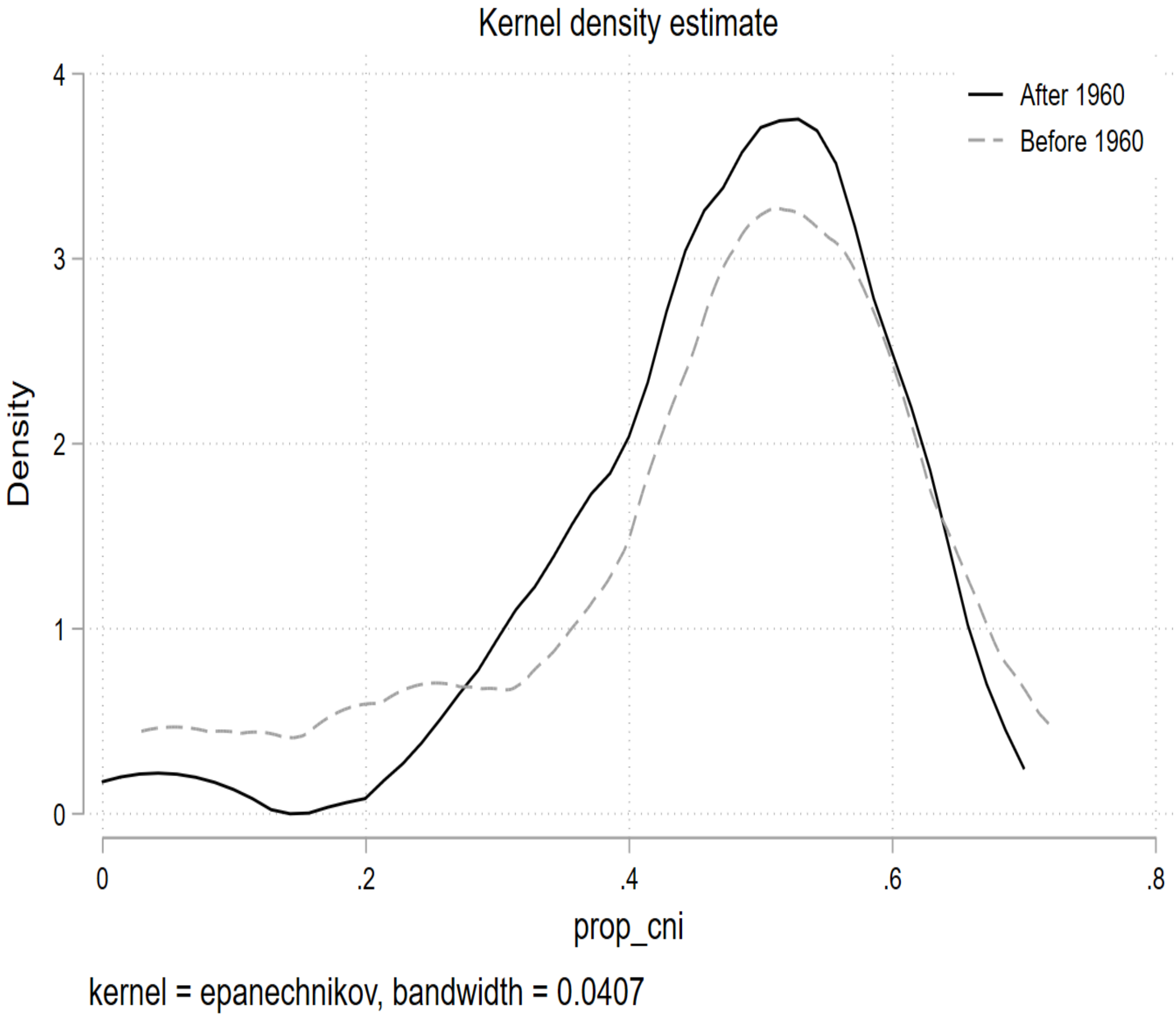

Figure (9) This data is extracted from Conservation Needs Inventory reports. The figure shows that counties that had SCDs from earlier period had lower proportion of land with conservation needs.

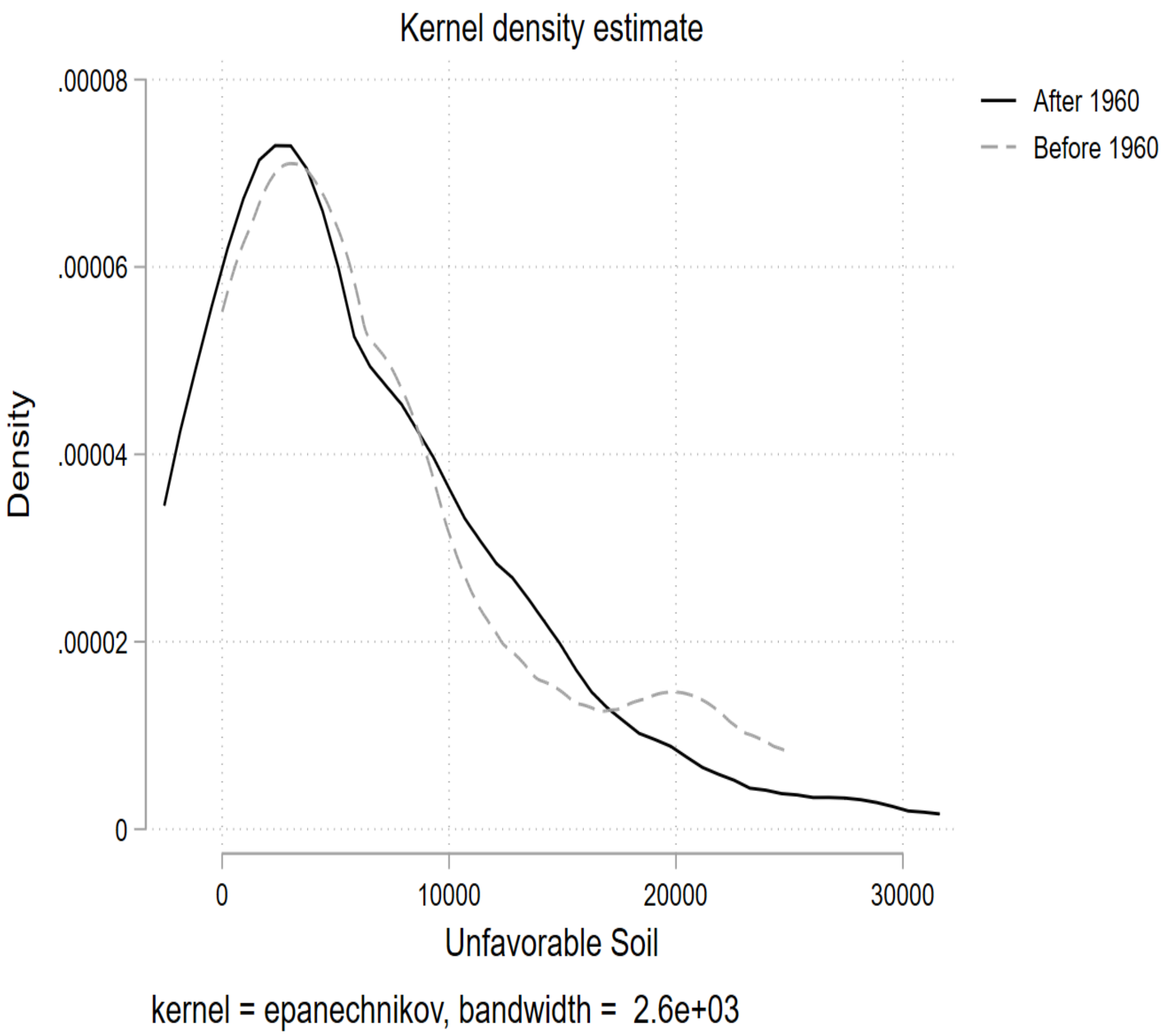

Figure (10) This data is extracted from Conservation Needs Inventory reports. The figure shows that counties that had SCDs from earlier period had similar amount of unfavorable land.

Figure (11) This data has been extracted from USDA EQIP database. EQIP acres on average by state over time. Missouri is one of the lowest adoptor.

11 Tables

	(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)

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			1.438***
			(0.434)
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
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

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			-2.756
			(3.182)
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

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			8.719
			(50.77)
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

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

References

Adesina, Akinwumi A and Moses M Zinnah (1993). “Technology characteristics, farmers’ perceptions and adoption decisions: A Tobit model application in Sierra Leone”. *Agricultural economics* 9.4, pp. 297–311.

Agranoff, Robert (2001). “Managing within the matrix: do collaborative intergovernmental relations exist?” *Publius: The Journal of Federalism* 31.2, pp. 31–56.

Aigbokhaevbo, Violet O (2014). “The" Great Green Wall": Implementation Constraints”. *Environmental Policy and Law* 44.4, p. 375.

Becker, Gary S (1983). “A theory of competition among pressure groups for political influence”. *The quarterly journal of economics* 98.3, pp. 371–400.

Beetz, Alice E (2011). *Agroforestry: Overview*. ATTRA.

Bellefontaine, Ronald, Martial Bernoux, Bernard Bonnet, Antoine Cornet, Christophe Cudennec, Patrick D’Aquino, Isabelle Droy, Sandrine Jauffret, Maya Leroy, Michel Malagnoux, et al. (2011). “The African great green wall project: What advice can scientists provide?: A summary of published results”.

Besley, Timothy and Robin Burgess (2004). “Can labor regulation hinder economic performance? Evidence from India”. *The Quarterly journal of economics* 119.1, pp. 91–134.

Blonigen, Bruce A, Ronald B Davies, Glen R Waddell, and Helen T Naughton (2007). “FDI in space: Spatial autoregressive relationships in foreign direct investment”. *European Economic Review* 51.5, pp. 1303–1325.

Brain, Stephen (2010). “The great Stalin plan for the transformation of nature”. *Environmental History* 15.4, pp. 670–700.

Brynjolfsson, Erik and Paul Milgrom (2013). “Complementarity in Organizations”. *The Handbook of Organizational Economics*, p. 11.

Cai, Meina, Ilia Murtazashvili, and Jennifer Murtazashvili (2020). “The politics of land property rights”. *Journal of Institutional Economics* 16.2, pp. 151–167.

Callaway, Brantly and Pedro HC Sant’Anna (2020). “Difference-in-differences with multiple time periods”. *Journal of Econometrics*.

Cameron, David and Richard Simeon (2002). "Intergovernmental relations in Canada: The emergence of collaborative federalism". *Publius: The Journal of Federalism* 32.2, pp. 49–72.

Cassel, J Frank and John M Wiehe (1980). "Uses of shelterbelts by birds". *Workshop Proceedings, Management of Western forests and Grasslands for Nongame Birds. USDA Forest Service General Technical Report INT-86, Ogden, UT*, pp. 78–87.

Childs, Michael K and JC Headley (1982). "Soil conservation and extension in Missouri: A study of conflict". *Journal of Soil and Water Conservation* 37.4, pp. 200–203.

Ciccone, Antonio and Marek Jarociński (2010). "Determinants of economic growth: will data tell?" *American Economic Journal: Macroeconomics* 2.4, pp. 222–46.

Crandall, Mindy S and Bruce A Weber (2004). "Local social and economic conditions, spatial concentrations of poverty, and poverty dynamics". *American Journal of Agricultural Economics* 86.5, pp. 1276–1281.

Davis, Donald R and David E Weinstein (2002). "Bones, bombs, and break points: the geography of economic activity". *American Economic Review* 92.5, pp. 1269–1289.

Droze, Wilmon Henry (1977). *Trees, prairies, and people: a history of tree planting in the plains states*. Texas Woman's University.

Elkin, Rosetta Sarah (2014). "Planting the Desert: Cultivating Green Wall Infrastructure". *Revising Green Infrastructure*. CRC Press, pp. 324–345.

Freeman, Jody and Jim Rossi (2012). "Improving interagency coordination in shared regulatory space". *Admin. & Reg. L. News* 38, p. 11.

Gardner, Robert (2009). "Trees as technology: planting shelterbelts on the Great Plains". *History and technology* 25.4, pp. 325–341.

Gibbons, Stephen and Henry G Overman (2012). "Mostly pointless spatial econometrics?" *Journal of Regional Science* 52.2, pp. 172–191.

Goodman-Bacon, Andrew (2018). *Difference-in-differences with variation in treatment timing*. Tech. rep. National Bureau of Economic Research.

Grumbine, R Edward (1991). "Cooperation or conflict? Interagency relationships and the future of biodiversity for US parks and forests". *Environmental Management* 15.1, pp. 27–37.

Happaerts, Sander, Simon Schunz, and Hans Bruyninckx (2012). "Federalism and intergovernmental relations: The multi-level politics of climate change policy in Belgium". *Journal of Contemporary European Studies* 20.4, pp. 441–458.

Headley, Joseph Charles (1985). "Soil conservation and cooperative extension". *Agricultural History* 59.2, pp. 290–306.

Helms, Douglas (1986). *For Love of the Land: A History of the National Association of Conservation Districts*.

Holmes, Thomas J and John J Stevens (2004). "Spatial distribution of economic activities in North America". *Handbook of regional and urban economics*. Vol. 4. Elsevier, pp. 2797–2843.

Hoover, Edgar M (1948). *Location of economic activity*. McGraw-Hill Book Company, Inc., New York.

Hornbeck, Richard (2012). "The enduring impact of the American Dust Bowl: Short- and long-run adjustments to environmental catastrophe". *The American Economic Review* 102.4, pp. 1477–1507.

Howlader, Aparna (2019). "Three essays on the relationship between land conservation and economic development". PhD thesis. University of Illinois at Urbana-Champaign.

— (2020). "Understanding the Formation of Local Environmental Institutions: Historical Evidence from the Timing of the Conservation Districts".

Hurt, R Douglas (1981). *The Dust Bowl: An agricultural and social history*. Taylor Trade Publications.

Inman, Robert P and Daniel L Rubinfeld (1997). "Rethinking federalism". *Journal of economic perspectives* 11.4, pp. 43–64.

Jacks, DS (2017). *Data on Real Commodity Prices, 1850—Present*.

Kapucu, Naim (2006). "Interagency communication networks during emergencies: Boundary spanners in multiagency coordination". *The American Review of Public Administration* 36.2, pp. 207–225.

Kraft, Michael E and Denise Scheberle (1998). "Environmental federalism at decade's end: New approaches and strategies". *Publius: The Journal of Federalism* 28.1, pp. 131–146.

Li, Miao-miao, An-tian Liu, Chun-jing Zou, Wen-duo Xu, Hideyuki Shimizu, and Kai-yun Wang (2012). "An overview of the "Three-North" Shelterbelt project in China". *Forestry Studies in China* 14.1, pp. 70–79.

Li, Tianshu (2019). "Protecting the Breadbasket with Trees? The Effect of the Great Plains Shelterbelt Project on Agricultural Production". *American Journal of Agricultural Economics RR*.

Lockeretz, William (1984). "The USA as a developing country: Historical insights into contemporary agricultural development". *Food Policy* 9.2, pp. 157–167.

LUECK, DEAN and DOMINIC PARKER (2015). "THE EVOLUTION AND ORGANIZATION OF ENVIRONMENTAL AGENCIES: FROM GAME LAWS TO HIERARCHICAL BUREAUCRACY".

Lueck, Dean and Gustavo Torrens (2020). "Property rights and domestication". *Journal of Institutional Economics* 16.2, pp. 199–215.

Margerum, Richard D (1997). "Integrated approaches to environmental planning and management". *Journal of Planning Literature* 11.4, pp. 459–475.

McIntosh, C Barron (1975). "Use and abuse of the Timber Culture Act". *Annals of the Association of American Geographers* 65.3, pp. 347–362.

Meneguzzo, Dacia M, Andrew J Lister, and Cody Sullivan (2018). "Summary of findings from the Great Plains Tree and Forest Invasives Initiative". *Gen. Tech. Rep. NRS-GTR-177. Newtown Square, PA: US Department of Agriculture, Forest Service, Northern Research Station. 24 p.* 177, pp. 1–24.

Mercer, D Evan and Subhrendu K Pattanayak (2003). "Agroforestry adoption by smallholders". *Forests in a market economy*. Springer, pp. 283–299.

Mookherjee, Dilip (2006). “Decentralization, hierarchies, and incentives: A mechanism design perspective”. *Journal of Economic Literature* 44.2, pp. 367–390.

Munns, Edward N and Joseph H Stoeckeler (1946). “How are the great plains shelterbelts?” *Journal of Forestry* 44.4, pp. 237–257.

Nair, PK Ramachandran (1993). *An introduction to agroforestry*. Springer Science & Business Media.

Nielson, James (1986). “Interorganizational relations in conservation targeting programs”.

Oates, Wallace E (2008). “On the evolution of fiscal federalism: Theory and institutions”. *National tax journal* 61.2, pp. 313–334.

Oates, Wallace E and Robert M Schwab (1988). “Economic competition among jurisdictions: efficiency enhancing or distortion inducing?” *Journal of public economics* 35.3, pp. 333–354.

Okwi, Paul O, Godfrey Ndeng’e, Patti Kristjanson, Mike Arunga, An Notenbaert, Abisalom Omolo, Norbert Henninger, Todd Benson, Patrick Kariuki, and John Owuor (2007). “Spatial determinants of poverty in rural Kenya”. *Proceedings of the National Academy of Sciences* 104.43, pp. 16769–16774.

Prokopy, Linda S, Kristin Floress, J Gordon Arbuckle, Sarah P Church, FR Eanes, Yuling Gao, Benjamin M Gramig, Pranay Ranjan, and Ajay S Singh (2019). “Adoption of agricultural conservation practices in the United States: Evidence from 35 years of quantitative literature”. *Journal of Soil and Water Conservation* 74.5, pp. 520–534.

Read, Ralph A et al. (1958). “Great Plains shelterbelt in 1954”.

Redding, Stephen J and Matthew A Turner (2015). “Transportation costs and the spatial organization of economic activity”. *Handbook of regional and urban economics*. Vol. 5. Elsevier, pp. 1339–1398.

Reimer, Adam P, Ben M Gramig, and Linda S Prokopy (2013). “Farmers and conservation programs: explaining differences in Environmental Quality Incentives Program applications between states”. *Journal of Soil and Water Conservation* 68.2, pp. 110–119.

Revelli, Federico (2005). "On spatial public finance empirics". *International Tax and Public Finance* 12.4, pp. 475–492.

Rice, Patricia, Anthony J Venables, and Eleonora Patacchini (2006). "Spatial determinants of productivity: analysis for the regions of Great Britain". *Regional science and urban economics* 36.6, pp. 727–752.

Rosenberg, Norman J (1986). "Adaptations to adversity: agriculture, climate and the Great Plains of North America". *Great Plains Quarterly*, pp. 202–217.

Rossi-Hansberg, Esteban (2005). "A spatial theory of trade". *American Economic Review* 95.5, pp. 1464–1491.

Scherr, Sara J (1992). "Not out of the woods yet: challenges for economics research on agroforestry". *American journal of agricultural economics* 74.3, pp. 802–808.

Schoeneberger, Michele M (2009). "Agroforestry: working trees for sequestering carbon on agricultural lands". *Agroforestry systems* 75.1, pp. 27–37.

Segerson, Kathleen (2020). "Local environmental policy in a federal system: An overview". *Agricultural and Resource Economics Review* 49.2, pp. 196–208.

Skidmore, EL and LJ Hagen (1977). "Reducing wind erosion with barriers". *Transactions of the ASAE* 20.5, pp. 911–0915.

Stein, John D and Patrick Charles Kennedy (1972). "Key to shelterbelt insects in the Northern Great Plains".

Stigler, George J (1972). "Economic competition and political competition". *Public Choice*, pp. 91–106.

Stoeckeler, Joseph Henry et al. (1962). "Shelterbelt influence on Great Plains field environment and crops".

Thomas, Craig W (2002). *Bureaucratic landscapes: Interagency cooperation and the preservation of biodiversity*. Mit Press.

Timmins, Christopher (2006). "Estimating spatial differences in the Brazilian cost of living with household location choices". *Journal of Development Economics* 80.1, pp. 59–83.

Woodruff, N P (1977). *How to control wind erosion*. 354. Dept. of Agriculture, Agricultural Research Service: for sale by the Supt …

Young, Anthony et al. (1989). "Agroforestry for soil conservation".