Individual Level and Farm Level Homesteading Characteristics

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Abstract

The Homestead Act of 1862 is widely regarded to be one of the most influential land laws in American history. It provided for nearly all the land west of Ohio to be available to setters at a price so inexpensive as to be nearly free, fundamentally reshaping the demographic and agricultural makeup of the American West. Previously, however, the vast majority of economic and historical research on the Homestead Act has been conducted at the county level. County-level data obscures much information about individual settler and individual land characteristics, which influence the choices made by farmers. This paper uses multiple individual-level data sources to lay the groundwork for understanding who acquired land through homesteading, direct purchase, military warrants, railroad grants, pre-emption, and resale, what type of land each chose, and how they farmed it. This paper will allow researchers to assess whether individuals selecting into different methods of land acquisition and the land they chose differed along a multitude of observable characteristics. I find that land characteristics at the plot level are statistically significant predictors of how the land was privatized. Likewise, land and demographic characteristics are generally statistically significant predictors of the type of agricultural production on the farm. Reselling land could be highly profitable for farmers, with an average price of approximately $7 per acre, after excluding right-tail outliers and including input costs like fencing. This figure represents a minimum return of more than 7 times because land was initially purchased for at most $1.25 per acre. However, about 20% of farmers lost money on their resold farm.

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1 Introduction

Shortly before the Civil War, Senator Henry Clay said in a speech to Congress: "No subject which has presented itself to the present, or perhaps any preceding congress, is of greater magnitude than that of the public lands." To Americans of the time, the importance of deciding how to dispose of federal lands cannot be overstated, and today the disposal of public lands in the 1800's stretches a long arm over the balance of partisan power in Congress, accumulated wealth inequality, ecological events, and agricultural policy. The Homestead Act alone granted more than 10% of the land in the United States to individuals to be farmed. Likewise, the federal government sold 12% of the land area in the country to individuals, speculators, and land companies. A further 5% was granted to individuals as payment for military service.

The primary purpose of this paper is to better understand and provide evidence for whether county-level analysis is sufficient to assess the causal impacts of land law decisions. In order to fully assess the impact of the different methods of land disposal by the federal government and their long-term impact on the United States, we need to first understand who acquired the land and the characteristics of the land acquired. For example, if we observe that land that was initially homesteaded is less economically developed today, is that a result of the method of acquisition (homesteading), or a result of the type of land that was homesteaded, or a result of demographic characteristics of settlers that selected into homesteading? A fuller understanding of who acquired land and what land was acquired can inform our research questions about the economic impact of public land law. This paper will allow researchers to assess whether land disposed of by the federal government under various mechanisms - and the people who acquired it - differed along a multitude of observable individual-level characteristics, and how this land was farmed and resold. These various mechanisms of land acquisition include the Homestead Act, direct purchase of land from the federal government, the Morrill Act, railroad grants, military warrants, and the Pre-Emption Act.

I assess how land, individuals, and farm outputs vary using descriptive evidence. First, I provide descriptive statistics, figures, and maps to explore how the land market operated in the last half of the 1800's in Kansas. Second, I predict which demographic and land characteristics at the individual level are the best predictors of the method of land acquisition from the federal government. Third, I use a Cox proportional hazards model to determine which individual-level covariates predict how quickly land was acquired from the federal government. Fourth, I demonstrate which demographic and land characteristics at the individual level predict different types of farming investments and outputs, such as the number of bushels of wheat produced and the value of the fences and buildings on the land.

Finally, I explore the land resale market using a novel dataset of resale deeds in Kansas. The resale market is an under-developed area of research. I show that in this dataset, the resale market was a larger and more active element of the total land market than was land acquired from the federal government. I provide descriptive evidence about what land was resold most often and for the most money, and I use a Cox proportional hazards model demonstrate which demographic and land characteristics at the individual level predict how quickly the land was resold. Combined, this descriptive evidence explains how different farm investment decisions interacted with different land acquisition decisions. Did homesteaders grow more or fewer crops than purchasers? Did they use more or less hired labor? Addressing these questions will give us a fuller picture of land acquisition decisions in the Midwest. Since the federal government theoretically had a goal of encouraging small farms in this time period using these land disposal policies, it is necessary to understand how different mechanisms of land disposal related to farming at the time.

I find that both demographic and land characteristics at the individual level are significant predictors of how the land was privatized, including wealth, the market access, the miles to the nearest land office, and the latitude and longitude of the farm. Likewise, demographic characteristics are generally significant predictors of the type of agricultural production on the farm. Specifically, demographic characteristics like wealth and family variables including family size, number of children, and the age of the children are significant predictors of the types of crops and livestock produced on the farm.

Further, I find that reselling land could be highly profitable for farmers, with the average revenue being approximately $7 per acre, after excluding right-tail outliers and including input costs like fencing. This figure represents a minimum return of more than 7 times because land was initially purchased for at most $1.25 per acre. However, about 20% of farmers lost money on their resold farm.

I use five main individual-level data sources: 1) the Bureau of Land Management tract books, which record individual purchase and homestead decisions, 2) the United States Population Censuses for 1860,

1870, and 1880, which record individual demographic characteristics, 3) the individual Kansas Agricultural Census for 1860, 1870, and 1880, which details individual farm production, 4) historical land characteristics at the farm level, including soil quality, slope, and precipitation, and 5) historical resale deeds of land at the individual farm level. Much of these data are newly digitized for this project. Using individual-level microdata is necessary to understand how farmers made decisions because decisions are made at the individual level, not the county level.

This paper contextualizes the results of previous economic work on homesteading and other types of public land acquisition. Previous research has focused on comparing outcomes on homesteaded land and purchased land at an aggregate level. I expand on this research in two ways. First, I expand the land laws studied to include more ways to acquire land in order to more fully understand the heterogeneity in land acquisition decisions and their impact on future outcomes. Second, I use individual-level microdata to explore selection of both land and settlers into different methods of acquiring land. Using aggregate-level data implicitly assumes there is no unobserved selection into any type of land acquisition at the individual level, and I test that assumption using microdata. If we do not observe much difference between the individuals and land that was acquired using different methods, it will lend much support to previous research which has been based on the implicit assumption that these groups are fundamentally similar. If, however, we observe large differences between, for example, purchasers and homesteaders or homesteaded land and purchased land, it will cast doubt onto the conclusions of such previous research. Importantly, if differences exist, this paper will enable researchers to determine along which characteristics purchasers and homesteaders differ, thus allowing them to make informed decisions about their control variables.

1.1 Importance of Microdata

Previous research on historical land acquisition has relied almost exclusively on aggregate-level data (county or Census tract). For example, several papers make use of the fraction of homesteaded land in the county as the independent variable which predicts outcome variables such as average economic development, average future wealth, or most common industry type in the county. While this approach has the advantage of observing a large geographical area, it is impossible to control for individual settler or land characteristics at the farm level, meaning that research strategies using this approach must make the assumption that there exists no unobservable selection into homesteading or any other method of land acquisition that might impact the outcome variable. However, since the up-front costs of different methods of land acquisition varied greatly, this assumption is likely to be violated in many cases. If it is violated, ascribing different economic outcomes to the initial decision to homestead or purchase land may be misleading because the observed differences could be caused by different settler or land characteristics at the individual level (which could not be picked up by county-level analysis).

More generally, the use of county-level data means that neither historical nor economic research into homesteading has been able to fully describe the basic demographic characteristics of farmers and how those characteristics compare to other land owners in the American West. Likewise, this research has not been able to describe the characteristics of the land. For example, was homesteaded land of better or worse quality than purchased land? This basic question and similar ones cannot be answered except using individual-level microdata.

Such questions are important for several reasons. First, land disposal was hugely influential with consequences for land distribution stretching to today. However, without microdata, we cannot determine the demographics of the settlers receiving land under each Act, and thus cannot determine who land disposal benefited and who it hurt. Our understanding of these important Acts is limited by not being able to address basic questions such as who homesteaded and what land they selected. These are fundamental questions we need to answer before asking more typical economic questions such as how the Homestead Act impacted economic growth. Without a baseline understanding of the demographics, our understanding of more complex questions will be flawed.

Second, without individual-level settler and land quality data, we cannot explore any heterogeneity in economic outcomes from different methods of federal land disposal. Instead, we have to assume that individuals acquiring land where all impacted with the same magnitude and with the same sign. For example, we are unable to explore the differential outcomes for men and women homesteaders, but instead must assume that they had the same outcomes. Finally, many questions about the Homestead Act simply cannot be well

answered without individual-level data. Using county-level data, we cannot answer even simple descriptive questions such as whether homesteaded land had more or less water access than purchased land. Answering this question at the county-level would be unreasonable, as it would require assuming that water access is evenly distributed throughout the county, which is highly unlikely.

Lastly, without individual-level data, much information about the process of homesteading itself is obscured. Land acquisition is an individual-level decision. Previous economic work in this area has rarely explored abandoned homesteads or commuted homesteads, largely because these data are not available at the county level. However, abandoned and commuted homesteads jointly make up more than 50% of all homesteads, so their exclusion limits our understanding of how settlers employed the Homestead Act and made decisions about land acquisition.

While economic historians generally focus on land acquisition in the "West," this paper exclusively considers Kansas, a Midwestern state, to be able to use an intensive rather than extensive approach. Because of this, it complements county-level papers considering land acquisition which focus on acquisition on the extensive margin. However, some of its results may not be generalizable to the more arid far West. This paper focuses exclusively on eastern Kansas; the results may not be generalizable to the ranches of the West, but are likely to be applicable to Nebraska, Iowa, Missouri, and other crop farming areas. By focusing on one area which comprised many different types of land acquisition, I am able to extensively study that area and generate a greater depth of understanding of the decision-making process. In addition, Kansas conducted a state-level agricultural census in 1860, 1870, and 1880. This census reports individual-level data on farm production and value, such as the number of bushels of wheat grown on the farm. These data allow for a better understanding of how the process of farming worked and enable comparisons of farm production between homesteads, purchased farms, pre-empted land, and other types of farms at the individual level. Kansas was a state heavily impacted by public land disposal, making it an ideal case study.

1.2 Related Literature

Paul Gates is regarded as the foremost scholar of public land law for his work throughout the middle of the twentieth century. Gates was a historian who collected detailed, if not exhaustive, data on the subject. He authored multiple papers on various aspects of homesteading including land speculation (1936) and flexibility (1977), and a comprehensive book titled *History of Public Land Law Development* (1968).

In general, the previous economic literature on public land disposal has been focused on the Homestead Act and has had two commonalities. First, much of it been focused on the long-term causal impacts on homesteading on outcomes, such as economic development into the twenty-first century. Second, it has largely been conducted at an aggregate level. The primary purpose of this paper is to better understand and provide evidence for whether aggregate-level analysis is sufficient to assess the causal impacts of homesteading. In that way, this paper contextualizes the results of previous economic work on homesteading.

Hansen and Libecap (2004), Leonard and Allen (2021), Smith (2020), and Mattheis and Raz (2021) all examine how the Homestead Act impacted long-term outcomes. Hansen and Libecap demonstrate how the small size of homesteaded farms contributed to the Dust Bowl at the county level. Smith, meanwhile, focuses on the impact of land concentration on long-run economic development, where land granted on the Homestead Act is less concentrated than land sold by railroads. He finds that historical land concentration generated more tenant farmers which lowered economic development, meaning that homesteaded land is less economically developed today, but that this result is not a mechanism of the Homestead Act itself.

Leonard and Allen and Mattheis and Raz examine how the Homestead Act impacted modern economic development. Both find that the Homestead Act reduced economic development by the twenty-first century. In contrast to Smith, Leonard and Allen find that the method of acquisition - homesteading itself - caused lower income per acre in the average county in 2010, which they do not find is attributable to "land quality, title characteristics or unobserved differences in settlers." Mattheis and Raz use a regression discontinuity design based on the treaty signed with the Osage tribe in Kansas to find that the Homestead Act reduced economic development by 1990 at the census block level. Mattheis and Raz additionally use a county-level IV as a robustness check and point to the divergence starting in 1910, based on homesteaded areas being slower to transition out of agriculture. The paper lays out a conceptual framework for understanding homesteading might interact with agricultural productivity.

Allen (1991) and Allen (2021) describe the purpose of homesteading from the point of view of the United

States government. Both papers argue that the benefit to the federal government of essentially giving away land was to secure property rights quickly and decrease the cost of military defense for America on land that was already claimed by native people.

Anderson and Hill (1990) develop a theoretical model to demonstrate that different federal land policies created incentives to put land acquired by each method into production at different times. Their model predicts that homesteaders would develop the land before speculators who purchased the land, and they test the implications of their model with aggregated data.

2 Placing Midwestern Land Acquisition in the Greater Historical Context

2.1 Native American Land Rights

No discussion of the US presence in the West can be begun without a discussion of the activity of the people already living there. When Kansas was opened for settlement in 1854, the federal government acknowledged that it legally owned little to no land in Kansas and therefore did not allow sale or pre-emption. However, it opened the land for settlement all the same and did little to stop colonists from moving onto Native land.

In the early 1800's, the United States government had relocated Native Americans from the eastern part of the country to Kansas, meaning that there were many separate tribes living in Kansas when the federal government opened it for settlement. This complicated land acquisition in Kansas because not every tribe had the same method of land sale.

2.2 Land Acquisition Methods

At the beginning of the nineteenth century, the federal government of the United States owned nearly all land west of Ohio. There existed competing views in Congress on how to privatize the land: Federalists favored selling the land to pay the country's debts, while others favored giving the land to settlers to consolidate the United States' hold on the West and to encourage agricultural expansion.

In what Gates terms "an incongruous land system," multiple methods of public land disposal were employed by the federal government in the nineteenth century, and many of these methods overlapped and contradicted each other. Methods included granting land to railroads to subsidize construction, granting land to states to fund land grant colleges, direct cash sales to individual settlers, direct cash sale to large-scale speculators, auctions, the Timber Culture Act for logging, the Homestead Act for farming, the Mining Act, military warrants to pay current and past soldiers, the Graduation Act to reduce the price of land based on time on the market, and pre-emption. Some elements of the land laws were not uniformly enforced: for example, by the time the Homestead Act was passed, land was not legally allowed to be purchased from the federal government on credit (only cash sales), but there are occasional instances in the data in which credit was used. I will discuss the most notable methods of land acquisition in turn.

2.2.1 A Brief History of Homesteading

Among methods of public land disposal in the nineteenth century, the most famous is the Homestead Act of 1862, largely because of its economically intriguing premise of distributing essentially free land. The effect of this type of property right has inspired such paper titles as "No Such Thing as Free Land" and "Giving Away an Empire." Property rights are a major focus of economic research, and disposing of three million plots of land for nearly free presents an opportunity to study the bounds of the effects of property rights.

Under the Homestead Acts, beginning in 1862 and later amended in 1866, 1873, 1904, 1909, 1916, and 1930, about three million 80-acre to 640-acre plots of in the western part of the United States and in the South were given out to be farmed. This amount totals more than 270 million acres, or about 11% of the land area in the United States. The original typical size of a homesteaded parcel is 160 acres and is equivalent to an area of land one-half mile on each side and called a quarter-section. In the 1860's, the Jeffersonian ideal of America as a country of small farmers was still influential, and part of the purpose of the original Homestead Act was to decrease the accumulation of land by land "speculators, land companies, timbermen, and livestock interests," in order to reserve land for farmers. The Homestead Act of 1862 allowed applications

by anyone of at least age 21, who was the head of a household, and who had never "borne arms against the United States Government," including women and immigrants who had applied for citizenship. In 1866, the Act was expanded to explicitly include people of color.

After filing the initial homestead application, a settler had three choices: prove, commute, or abandon. Proving a homestead required three steps: 1) filing an application, 2) improving the land, and 3) applying for a patent (deed to the land). Improving the land was defined as living on the land, building a house and other buildings, and cultivating and farming the land for a minimum of five years of residence. A prospective homesteader was required to locate a piece of land and then go the local land office to file a claim to homestead. The fee for the application was 10 dollars (approximately 285 dollars today). At the local land office, the registrar entered the application in a tract book and the documents were sent to the General Land Office in Washington, D.C., where an individual record file was created. The prospective homesteader then had between five and seven years to farm and make improvements to the land in order to prove a successful homestead. At the end of that time, the homesteader returned to the local land office with two witnesses and applied for the title of the land. The cost of this was 4 dollars (approximately 120 dollars today). The application for the title of the land was also entered in the tract book and then sent to Washington, D.C., where the General Land Office recorded the information and mailed a patent to the homesteader.

Nationwide, historians estimate only about 55 percent of homesteads were successfully proved. Abandoned homestead land was returned to the federal government. It was common for the same piece of land to have been attempted to have been homesteaded multiple times by different people before anyone was successful.

Besides proving the homestead or abandoning it, homesteaders had a third choice after filing the initial application: they could commute their homestead. This involved essentially buying it outright after filing the initial application. Starting six months after filing the initial application, the homesteader could pay the full purchase price (1.25 dollars per acre) to get the title immediately. Notably, commuting was more expensive than purchasing land directly from the federal government without filing the homestead application first: commuting cost the full purchase price plus the initial 10 dollars for the application. Once they had legal ownership of the land, they could sell it or mortgage it like any other possession. Before proving or commuting a homestead, the land was still owned by the federal government and the settler was unable to sell or mortgage it. If a settler in the process of homesteading land decided they wanted to move or sell the land, their best option was to commute the homestead if they could afford to do so. Gates indicates that the vast majority of commuted homesteads stem from settlers who either had an offer to buy the land before they filed the original homestead application (dummy entrymen) or had an offer to buy the land at the time of commutation (Gates (1968)). This makes sense, because if the settler simply wanted to continue residence on the land, they could do so for free, instead of paying 1.25 dollars per acre to commute. Therefore, in the aggregate, at the time of commutation, homestead entries that were commuted were likely different than homestead entries that were later proved. Historians indicate that commuting was common in the far West because of water rights: settlers would homestead a piece of land with water access and then commute and resell it to individuals looking to control water access. However, this was less important in eastern Kansas (discussed below), and commuting was less common here than it is estimated to be in other areas. Figure 1 details the three homesteading options (proving, commuting, and abandoning).

As economic historians have noted previously, despite the low cost of land provided by the Homestead Act or by military grants, starting a farm was by no means inexpensive. The Homestead Act did not provide settlers with free land: the land itself still cost 14 dollars, and the homesteader required all the same machinery, implements, materials, and animals that any other farmer of the period would require.

The Homestead Act was amended several times. Amendments in 1904 and 1909 enlarged the total amount of land granted by an original homestead to 320 acres because the land in the Great Plains was more arid and therefore more difficult to farm than that of the Midwest. Similarly, in 1916, the Stock-Raising Homestead Act expanded the amount of land to 640 acres in order to allow for ranching. However, this sample focuses exclusively on Kansas from 1860 to 1890, where 160 was a sufficient size to create a successful farm and when the Homestead Act had not been expanded to cover larger parcels. Homesteads in this sample are nearly all 160 acres or 80 acres.

Notably, before 1934, farmers could generally freely graze livestock on unclaimed public land, railroad land, and unfenced Native American reservations. In 1934, the Taylor Grazing Act largely curbed this use

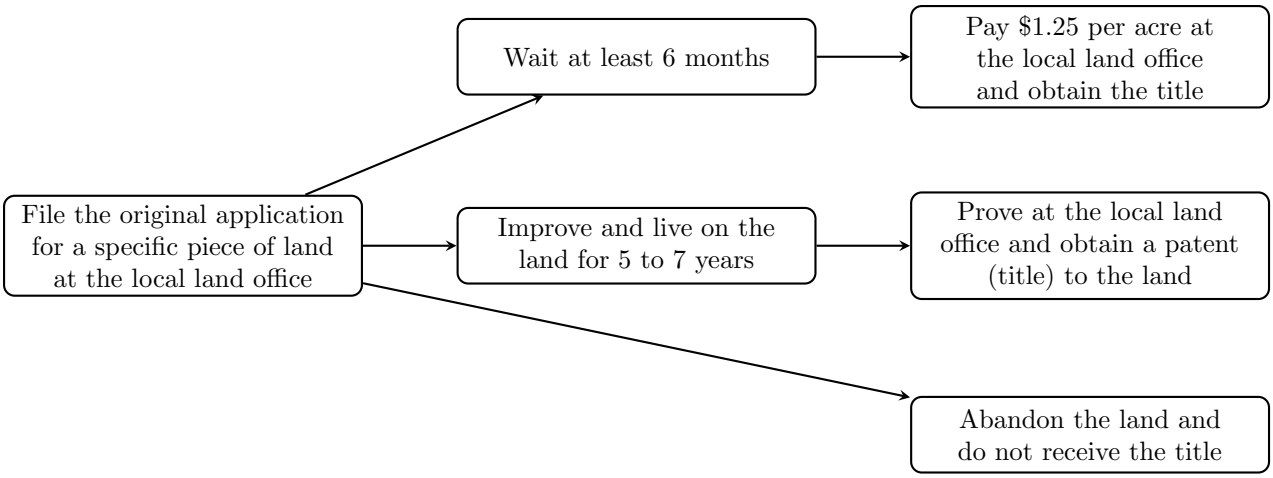

Figure 1: Timeline of Homesteading Options

to prevent overgrazing, and as a result, homesteading is regarded to have essentially ended (Gates (1968)). Homesteading had already significantly declined by 1934, and the Taylor Grazing Act made homesteading much less advantageous, since farmers could no longer graze their livestock on nearby government land at no cost. The federal government officially ended homesteading in the Continental United States in 1976, and in Alaska in 1986.

2.2.2 Purchasing Land from the Federal Government

The Homestead Act was "superimposed on a public land system" which was already in place with "high minimum prices prescribed by the law" (Gates (1968)). Purchasing 160 acres at 1.25 dollars per acre cost settlers 200 dollars, compared to 14 dollars to acquire the same amount of land through homesteading.

Under the 1820 Land Act, Congress reduced the minimum price of public land sold by the federal government from 2 dollars per acre to 1.25 dollars per acre and reduced the minimum size of a tract purchased from 160 acres to 80 acres. Note that these reductions applied to land purchased directly from the federal government only and did not impact land disposed of using other Acts. Land was either sold at auction or through private entry, and it could be sold for higher than 1.25 dollars per acre. In 1889, cash sale purchases of federal government land were limited to 320 acres to deter land speculation.

The Graduation Act of 1854 complicated the purchase of federal land by introducing differentiated pricing for land based on how long the land had been on the market after it had been surveyed by the government for sale. Public land that had remained unsold for 10 to 15 years was priced at 1 dollar per acre; if it remained unsold for 15 to 20 years, it was priced at 75 cents per acre, at 50 cents per acre if unsold for 20 to 25 years, at 25 cents per acre if unsold for 25 to 30 years, and at 12.5 cents per acre if unsold for more than 30 years. This Act excluded mineral land (held at 1.25 dollars per acre) and land reserved for railroads and canals. A report presented to Congress in 1854 shows approximately 19 million acres of land in the country that were priced at 1 dollar per acre under the Graduation Act, 16 million acres priced at 75 cents, 12 million acres priced at 50 cents, 6 million acres priced at 25 cents, and 25 million acres priced at 12.5 cents (Gates (1968)).

The Graduation Act was a forerunner to the Homestead Act a decade later, but the Graduation Act did not end with the passage of the Homestead Act. Purchasing 160 acres at 12.5 cents per acre was only slightly more expensive than homesteading 160 acres: purchasing cost 20 dollars, while homesteading cost 14 dollars. However, in the last half of the 1800's, most public land sold at 1.25 dollars per acre, and the Graduation Act was essentially non-binding in eastern Kansas.

While land was sold directly for cash from the land office, it could also be sold by the federal government at auction. Despite the fact that the purpose of the auction from the point of view of the federal government was to gather the most revenue possible for each piece of land, in practice, settlers and speculators in an area colluded to keep land prices land prices at the minimum price per acre. Settlers and speculators "learned

who [their] competitors were, visited them before sales opened ... and agreed with them that they would not bid against one another." This is supported in the data: the vast majority of land sold – either through auctions or through private treaty – at the minimum price 1.25 dollars per acre. Likewise, despite the fact that the Graduation Act reduced the price of land based on how long the land had been on the market, in practice, essentially no land in the sample sold below 1.25 dollars per acre.

2.2.3 Railroad Grants

While some federal legislation by 1862 was decreasing the price of land, other federal legislation was increasing it. In order to incentivize railroad construction, the federal government and the state governments granted vast amounts of land to railroads, which in turn sold this land to settlers. The railroads received all the odd-numbered sections for a distance of 6 to 40 miles on either side of the right-of-way of the tracks. Additionally, occasionally the federal government granted the railroad land unrelated to the tracks. Granted land was sold by the railroads to settlers and speculators at a rate "roughly based on [the] distance from the line" (Gates(1968)). The even-numbered sections of land were kept by the federal government to be sold to settlers and speculators at a minimum rate of 2.50 dollars per acre. This price was twice the minimum in other, non-railroad areas. Therefore, in some areas, the minimum price that public land could be sold for was higher than 1.25 dollars per acre. That was still, however, the price at which the majority sold. Further, like the auctions of public land, very little of the even-numbered sections held by the federal government sold for above 2.50 dollars per acre in this sample.

The checkerboard pattern created by the railroad grants in theory might make an regression discontinuity design. However, comprehensive individual-level data on who the railroads sold their land to is not available, making individual-level comparison between railroad land and government land difficult. Additionally, determining exactly which sections were granted to the railroads can be difficult because the width varied by and within railroad. The width of each grant can be calculated from the original tract books but not from the BLM digitized database of land acquisitions (discussed below). However, this paper has digitized a selection of land sold by the railroads to settlers and speculators at the individual level, allowing better understanding of how railroad grants impacted land acquisition.

2.2.4 Military Warrants

The federal government paid (Union) soldiers from the Civil War and retroactively paid soldiers of previous wars in land grants. Widows and heirs of deceased soldiers were also able to claim this land. Additionally, military warrants were often traded and sold, sometimes illegally. Historians estimate that military claims were rife with fraud because of this trading and because widows and heirs of soldiers from wars several decades previously were eligible to claim these warrants. Certainly not all individuals claiming military warrants were veterans.

A great deal of land was claimed under military warrants, making it a notable method of land acquisition that has been largely overlooked by economic historians. In my sample, military warrants account for approximately 30% of the acres acquired, and nationwide military warrants comprises 20% of land acquisitions. Like homesteading, it was a "free" method of acquiring land, allowing us to evaluate the bounds of the impact of property rights.

2.2.5 Pre-emption

Pre-emption was a forerunner to the Homestead Act, but it did not end with the passage of the Homestead Act. The Pre-emption Act was passed in 1841. Pre-emption allowed settlers who had previously moved onto land to retroactively claim and purchase it, essentially "pre-empting" another settler's right to purchase it. Pre-emption allowed settlers currently living on the land, even if they had not paid for it, the right of first refusal to purchase. Without pre-emption, one settler could move onto land, start a farm, and have invested several years of work and infrastructure into the farm, and then another settler could pay the minimum price to the federal government (and none to the first settler living on the farm) and get the already-started farm because the first settler had not legally purchased the land. Pre-emption prevented this process.

While pre-emption was extremely politically contentious at the time, by the 1860's, it was uncommon in eastern Kansas and represents only about 10% of land in the sample.

2.3 Speculation

In the early nineteenth century, large-scale land speculation was prominent. Here, I define speculation as acquiring land for resale. In the 1830's and 1840's, speculative companies such as the American Land Company regularly bought areas of land in excess of 200,000 acres, including purchasing whole counties at time. Many wealthy speculative individuals bought upwards of 10,000 acres in one purchase (Gates (1968)). Land speculators were interested in the mining, timber, and water opportunities in the West. Large-scale land speculators and land companies bought up huge areas of land when it was initially put up for sale by the federal government. Sometimes these speculators improved the land somewhat, but their goal was to resell it to late-coming settlers at a high markup. Often, land companies held onto the land for years without improving it at all: land was expected to always increase in value, even without improvements, as the West began to "fill up" (Gates (1968)). These large-scale land speculators wanted to obtain large amounts of land, and the only way to legally obtain that much land was through purchasing it (not homesteading, military warrants, etc.).

However, by 1860, purchases of this scale no longer occurred, and speculation took a different form. After 1862, there were only 1,786 single purchases of over 1000 acres out of 186,000 cash sales in the whole country. In the late 1800's, instead of this type of single-purchase large speculation, there was a significant amount of small-scale speculation. Small-scale land speculators were individual farmers and settlers who moved to and settled the area. According to Gates, early settlers to an area often acquired one or two additional quarter-sections more than they wanted for themselves with the idea of saving these additional quarter-sections for their late-coming family members or selling them to later settlers. These small-scale land speculator-farmers might improve the land to make it more attractive to resell to other settlers. One might assume that the most valuable sections of land were generally claimed early and late-coming settlers often had to buy land from individuals or companies, not acquire it from the government, if they wanted prime quarter-sections. Additionally, some settlers might use a business model of acquiring land, starting a farm on it for a year or so, reselling it to new settlers, and immediately restarting the process on a new piece of land. Since there was a small maximum amount of land that any one individual or family could homestead, if settlers wanted to try their hand at land speculation by acquiring land beyond that amount, they had to purchase it.

Additionally, historians believe that in the last half of the 1800's, large investors in land used a different method instead of single-purchase land acquisition. Speculators would hire "dummy entrymen" to buy or homestead small plots of land and then quickly resell to them to the speculator. Historians note that this was an important way of securing water rights and developing large ranches in the far West. However, our quantitative understanding of the uses of dummy entrymen is severely limited by the lack of a comprehensive record of land resale in the West, so it is not actually clear how prevalent this method was. This paper casts some light on this issue by considering resale at an individual level.

While speculation may have had an effect on speculators' relative probabilities of purchasing and homesteading land, it may also have had an effect on non-speculator settlers' acquisition decisions. Among settlers, speculation was extremely unpopular. Speculation was considered to blight "the growth and prosperity of those sections of the country" because speculators "were regarded as intruders who would seriously retard the growth of the area for years by withholding land from development while they waited for its value to rise" (Gates (1968)). The presence of significant amounts of land speculation in an area may have impacted a settler's willingness to acquire land. If speculation nearby made land less desirable, settlers may have had a lower willingness to pay for the land.

According to historians, improved land sold for approximately 5 times the government minimum of 1.25 dollars per acre. Historians write that the most valuable sections of land were generally claimed early, and late-coming settlers often had to buy land from individuals or companies, not acquire it from the government, if they wanted prime quarter-sections. Since there was a small maximum amount of land that any one individual or family could homestead, if settlers wanted to try their hand at land speculation by acquiring land beyond that amount, they had to purchase it. This small-scale land speculation was a potential reason to purchase land instead of homesteading it.

The role of speculation in land acquisition was important, but it is difficult to reduce to a simple paradigm to fit into an economic model and data on speculation has been elusive. Speculation interacts with all the types of land acquisition listed above and changes incentives, but it has not been fully explored by previous economic or historical research. This paper provides important descriptive evidence of the land resale market

in Kansas at the individual-level to direct future research questions in this area.

2.4 Overview

From the preceding sections, two things should be clear. First, land acquisition in the Midwest and far West was complex and difficult to reduce to a convenient paradigm for economic research. Second, there are many basic elements related to land acquisition about which we do not have much quantitative evidence. Though the majority of previous literature has been focused on the Homestead Act, the decision-making process of acquiring land was much more complicated than simply deciding to homestead or purchase a plot. This paper seeks to rectify both issues by 1) including more types of land disposal; 2) examining the demographic and agricultural characteristics of the different types of land acquisition methods outlined above; and 3) exploring the resale market for land in Kansas.

3 Data

I use five main individual-level data sources: 1) the Bureau of Land Management tract books, which record individual purchase and homestead decisions, 2) the United States Population Census, which records individual demographic characteristics, 3) the individual Kansas Agricultural Census, which details individual farm production, 4) historical land characteristics at the farm level, including soil quality, slope, and precipitation, and 5) historical resale deeds of land at the individual farm level.

Using individual-level farm data as opposed to the county-level farm data generally used in the previous literature allows me to estimate the heterogeneity in the production and investment decisions of farmers and how those decisions differ between settlers who selected into different types of land acquisition methods. Linking to the individual United States Population Census allows for many more individual demographic controls than any previous literature in the area.

This project uses both data covering the entirety of Kansas and data focusing on specific counties (Figure 4). These counties were selected because they all lie in the eastern part of Kansas, east of the hundredth meridian, the dividing line between land suitable for small farms and arid land suitable for ranching and large farms. While these counties have similar longitudes, they span the latitudes of Kansas, allowing me to keep the aridity similar but still retain variation.

3.1 Bureau of Land Management Tract Books

The Bureau of Land Management (BLM) recorded all initial acquisition of land from the federal government, including direct cash purchases, scrip warrants for military service, land granted to the railroads and land grant colleges, pre-empted land, and homesteads. The acquisitions in the tract books contain only new, unbroken land sold, not land already acquired that changed hands. The level of observation is the farm.

While the BLM has an online digitized database of much of these data freely available, the database does not include several types of land acquisition. Notably, it only includes successfully proved homesteads. The BLM database does not include abandoned homesteads, and it groups commuted homesteads with direct cash purchases, with no way to differentiate the two in the database. Since historians estimate that approximately forty-five percent of homesteads were abandoned and that commuting was extremely common, this omission significantly hinders our understanding of how homesteading worked and biases our estimates that use these data. Using these data compares successful homesteads to purchased farms which may or may not have been successful, and neglects approximately fifty percent of the homesteads all together.

However, the BLM also keeps the original scanned tract books used at each land office in Kansas to record the acquisition of land. The tract books record all land acquisitions at the individual level, including successful and unsuccessful homestead claims, with the original date filed, the date the patent was applied for, the date the patent was acquired, the name of the owner, the size of the acreage, the price per acre, the total price paid, the Act it was filed under, and the state, county, county-section, township-range (PLSS), section, and quarter-section[1].

[1] A township-range is 36 square miles, with 36 sections in it. Each of these sections can be sub-divided, and a quarter-section is 160 acres. Sections 16 and 36 were reserved for future sales to support schools.

Using tract book data as opposed to the BLM database allows for the exploration of the impacts of and the mechanisms behind the separate paths taken by homesteaders: proving, commuting, and abandoning. This ability gives a much more complete understanding of the Homestead Act.

3.2 United States Population Census

I match the land acquisition data detailed above to the 1860, 1870, and 1880 identified United States Federal Population Censuses in order to include demographic characteristics at the individual level, such as gender, race, place of origin, literacy, and age. This matching allows for the analysis of individual-level demographic variables which may influence selection into land acquisition methods. Using demographic characteristics at the county level means that the researcher must make the assumption that individuals who selected each type of land acquisition did not differ in any demographic characteristics which might influence the outcome variable. However, since purchasing cost ten times as much per acre as homesteading, and wealth may be correlated with any number of observable outcomes, this assumption is likely to be violated.

Matching to individual-level demographic data allows us to identify whether or not their is selection into different land acquisition methods based on observable demographic characteristics. This allows researchers to better assess whether or not county-level data can capture their parameters of interest. If I find very little selection into different land acquisition methods on observable characteristics, this lends a good deal of support to the previous literature that uses county-level data to assess the impact of the Homestead Act.

This paper represents the first time that a significant number of BLM land acquisition data have been matched to the 1860 and 1870 Population Censuses - the Censuses conducted at the time that land was being homesteaded for the first time - at the individual level. Mattheis and Raz (2021) have linked to latter Censuses to understand homesteaders' outcomes, but not to the early Censuses, which allows investigation of the mechanisms behind the decision to homestead. This matching allows us to answer basic but important questions such as "What are the differences in the distribution of wealth *before* acquiring land between settlers choosing different land acquisition methods?" Many questions of these type have not been able to be answered before, even by historians, because of the limitations of county-level data. Answering them fills a significant hole in the literature and gives us a greater insight into the characteristics and motivations of these settlers, which guides more complex economic and historical research.

3.3 Historical Land Characteristics

I match to a variety of historical land characteristics at the aliquot level. This matching is necessary to understand how land acquired by each method - cash purchase, military warrant, railroads, pre-emption, proved, abanoned, and commuted homesteads, and schools - differs.

3.3.1 Water

In order to determine whether each aliquot in Kansas contained a water source, I define water as streams, rivers, ponds, lakes, swamps, and marshes, and waterfalls. I use historical county plat maps obtained through the Kansas Historical Society. It is necessary to use historical water maps, as the location of water may change over time. These maps, which date from between 1900 to 1906, were drawn to the scale of half-an-inch to the mile, which allows for detailed depictions of small streams, ponds, rivers, and swamps. The water maps are divided by township-range and section, which allows determination of each quarter-section. Therefore, using the township range, section, and quarter-section information from all of the Kansas farms in the dataset, I manually matched each farm to the corresponding quarter-section on the water maps. This matching is direct because both datasets use PLSS and does not require geospacial conversion. Each individual farm in the dataset is thereby determined to either have a water source ($Water_i = 1$) or not have a water source ($Water_i = 0$). While I include all types of water, the vast majority of all water access in these data is in the form of streams.

While water rights were hard-fought over in the arid West, 70 percent of land in my sample of eastern Kansas has water access, making water rights a much less contentious issue and changing incentives. Gates hypothesizes that access to water was a differentiating factor between purchased land and homesteads (Gates (1968)). Particularly in the far West, water rights were important to farmers and cattlemen. Again, however, farmers and cattlemen could obtain the same land (and therefore water rights) through homesteading or

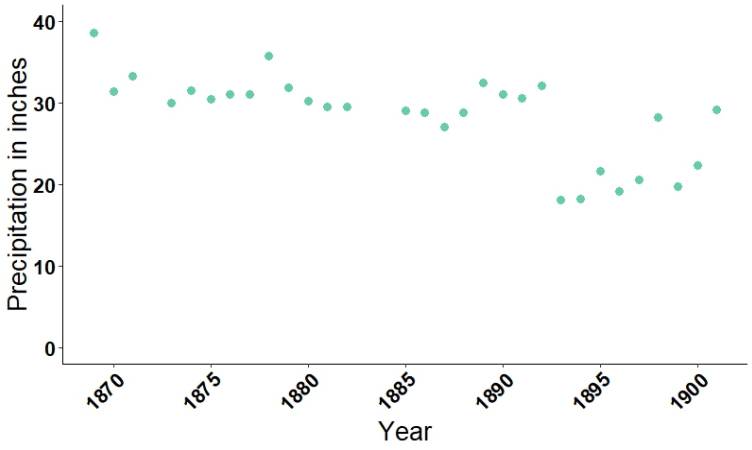

Figure 2: Average Rainfall in Kansas by Year

cash purchases. In fact, ranchers paid their farm hands to homestead land with water on it to obtain the water rights for their ranch (Gates (1968)). However, differences in water rights between purchased and homesteaded land could also reflect different probabilities of farm success on each type of land.

Before 1880, potentially government surveyers could choose to systematically survey more arid lands first, leaving the wetter lands unsurveyed. The wetter lands would be more desirable to settlers, who would be forced to pay government prices to obtain these lands via sale rather than homesteading. This would increase government revenue from land sales, a goal of the federal government. After 1880, however, this potential practice would have been useless to the federal government, as both surveyed and unsurveyed land was available to homesteaders.

3.3.2 Soil Quality, Slope, and Elevation

I include quarter-section level soil quality using the National Commodity Crop Productivity Index from the Soil Survey Geographic (SSURGO) database. This dataset classifies 8 soil categories based on their effectiveness for farming. This measure is called the non-irrigated land capability class, where higher numbers indicate "greater limitations and narrower choices for practical use." The USDA classifies soil types 1 through 7 as suitable for grazing and ranching and soil types 1 through 4 as suitable for growing crops. Type 8 is suitable for neither. This method of soil classification was selected because it is based on factors which do not change over time.

The SSURGO geomorphological data are obtained from the National Research Conservation Service, a branch of the USDA. The elevation is measured in meters above sea level, and I use the average elevation in the aliquot. The slope is calculated by the highest elevation in the aliquot minus the lowest elevation in the aliquot.

3.3.3 Precipitation

For precipitation level, I use the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information. Because precipitation data is only available for one weather station in Kansas before 1872 and because I need to exploit spacial variation in precipitation data, I use the average precipitation level for each township-range from 1880 to 1900. After 1880, precipitation data are much more available and cover a much larger percentage of Kansas.

I assume that the precipitation in each township-range does not vary significantly by year and that therefore the average level of precipitation in an area from 1880 to 1900 is a good approximation of the level from 1856 to 1880. This assumption is supported by the available historical data: the level of precipitation remains quite constant over the available period, as shown by the yearly average in Figure 2.

3.3.4 Towns and Land Offices

Towns represent differing access to markets. I obtained historical population data for Kansas towns in every decade from the U.S. Population Censuses of 1850 to 1880. The Kansas Historical Society has the date of incorporation of 624 towns. Over half of the towns were under 250 people. I obtained the latitude and longitude of these towns from Open Data Soft's database of U.S. Zip Codes Latitude and Longitude. This database contains 43,191 cities in the United States, including the city name, state, zip code, and the latitude and longitude of each city to 6 decimal places.

Because I am interested in how settlers acquired land, I am only concerned with towns that were incorporated when the settlers bought or homesteaded land nearby. I use the date of incorporation for this. Then, for each decennial Population Census, I extract the population of the town. For each farmstead, I calculate the distance between the centroid of the farm and the nearest town at the time of acquisition. The number of towns in Kansas increased dramatically from 1860 to 1870.

The BLM provided the source for the local land office data. The land office was where the settlers acquired the land. Kansas contained between 12 and 16 local land offices in this period of time. I determine the date each land office was opened by the date of the first entry recorded in that office and the date each was closed by the date of the last entry recorded in that office. Each of the local land offices was located in a town, and I obtained the latitude and longitude of these towns to determine the distance of each farm to the nearest land office in operation at the time of acquisition.

3.3.5 Credit Constraints

This project has digitized information from the Merchants and Bankers' Almanacs from the available years (1863-1865, 1873-1883, and 1885). These Almanacs record information about the location, capital, and circulation of each bank in Kansas in the year. While the deed records (below) give a better indication of how many farms were mortgaged and at what terms, these bank data indicate how easy it was for farmers go obtain a loan to purchase land or equipment and livestock. Historians write that it was highly difficult for most farmers in this time period to obtain loans from banks because banks were less regulated than they are today and therefore would only lend to individuals with whom the banker was personally familiar. Therefore, the distance from the farm to the bank may provide a proxy for how likely the farmer was to regularly come to the bank town and therefore how likely they were to obtain a loan from the bank.

State banks could offer credit to buy land. After the National Banking Act of 1862, federal banks could not offer loans with land as collateral. All banks could offer loans for farming tools and improvements.

3.4 Kansas Agricultural Census

The Kansas Agricultural Censuses of 1860, 1870, and 1880 are state-level censuses, separate from the U.S. Agricultural Census. This is notable because the Kansas Agricultural Census was conducted at the individual farm level, with the name of each farm owner, whereas the federal published agricultural censuses are county-level. Using these individual-level data allows us to answer questions such as "Were homesteaders more or less productive than purchasers?"

The Kansas Agricultural Censuses contain a large number of variables, including: name, township, county, the exact date that the census was taken, enumerator, acres of land on the farm (subdivided into improved and unimproved acres), farm value (including land, fences and buildings), farm machinery value, livestock value, wages for farm labor in the year, bushels of different types of crops produced, lumber, honey, and number of different types of livestock.

The 1880 Census includes many more variables than the 1860 and 1870 Censuses, notably both inputs and outputs into the production function. The 1880 Census includes the acres planted for each type of crop and the bushels produced of each type, as well as the fertilizer, labor, and machinery costs.

This project has digitized four counties from the 1860, 1870, and 1880 Kansas Agricultural Censuses: Brown County (observations), Bourbon County (observations), Woodson County (observations), and Allen County (observations). I am then able to obtain the value of the crops produced on each farm by multiplying the number of bushels of each crop by the currency price per bushel in that year in Kansas [21].

The Census took place in June through August of the census year, and the crop data reflect the previous year's harvest. Notably, of farmers who acquired land prior to the census year, only relatively successful

farmers were included in the Census because the farmers who were unsuccessful would have resold or abandoned their land. Therefore, I examine farms acquired in 1859 and 1860, 1869 and 1870, and 1879 and 1880 and farms acquired outside of those periods separately.

3.5 Kansas Resale Deeds

The Kansas Historical Society has available all resale deeds of land in 34 (of 105) counties, beginning at the original resale from the first owner who acquired it from the federal government and stretching into the twentieth century. The level of observation is the farm. To be usable for statistical analysis, specific pieces of information are extracted from each of these deeds: the names of the buyer and seller, the exact location of the land, the number of acres, the sale price, any lending terms, and the date of sale. These deeds also contain much of the land sold by the railroads to private individuals.

To my knowledge, these deeds have never been used for any type of research because of their difficulty of use. This project has digitized the resale deeds, mortgages, and sheriffs warrants (repossession by the county for not paying taxes) for four counties: Brown County (observations), Bourbon County (observations), Woodson County (observations), and Allen County (observations), covering the period up to 1895.

Resale deed matching creates a chain, where each farm may be bought and sold several times throughout the period. Additionally, each sale may break up a farm into smaller pieces to be sold separately, or it may combine two or more land holdings to be sold together. In this way, the chains can come together and split apart.

These data allow us to understand the path of farm consolidation in the late nineteenth century and how it related to land acquisition. While all this land was initially acquired from the federal government, a hugely significant part of the land market in this period was the resale market. Historians estimate that resale could be highly profitable for settlers and that the resale market comprised a larger share of the land market than did land acquired from the federal government. These deeds allow for a much greater understanding of the market for land in Kansas.

3.6 Matching Method

In order to provide a unique matching between all the data sources, this project uses a multi-step approach. First, tract book records (land acquisition records) were converted to geospatial data (latitude-longitude). The smallest unit of measure for the tract book data is the aliquot in the township-range (PLSS), which gives geospacial data to a precision of 18 decimal places. This level of precision is necessary for measuring the distance between quarter-section farms, many of which have a midpoint of half a mile apart. I used Earth Point to convert the township-range data to geospacial data.

Second, the tract book data were matched to historical land characteristics using the latitude and longitude. Because of the precision of the geospacial conversion, 100% of the tract book observations match to unique values of the land characteristics data. Therefore, matching the tract books to historical land characteristics does not decrease the number of observations. Water data were matched directly, without needing to convert to geospacial data, because both data sources use PLSS, and 100% of the tract book observations match to unique values of water access as well.

Third, to match the tract books and historical land characteristics to the resale deeds, the Population Censuses, and the Agricultural Censuses, the project uses a two-stage approach. Importantly, matching between the tract books and either Census or the resale deeds does not necessarily create a one-to-one matching, unlike matching between the tract books and the historical land characteristics. Individual i may acquire two adjacent pieces of land (two tract book observations) but combine them as one farm (one Agricultural Census and one Population Census observation). Matching the tract books to the resale deeds, the Population Censuses, or the Agricultural Censuses decreases the number of observations. The Population Censuses and Agricultural Censuses take place only once every ten years, meaning that settlers who move to the area and acquire land in 1873 but leave by 1878 may not be included in either Census. Because abandoning homesteads was so common, this may represent a relatively large number of individuals. I deal with this issue in two ways.

First, I consider land acquired in and just prior to the Census years separately from land acquired outside that time period. This method removes the issue of selecting on successful farmers, but it greatly reduces

the number of observations. Second, some individuals who owned land only between 1873 and 1878 will still be captured by the Population Censuses: those individuals who do not migrate a significant geographical distance. Some individuals who acquired land in 1873 will have been in Kansas already in 1870 and will remain even after they sell or abandon their farm to be captured by the 1880 Population Census. This is particularly important in light of the fact that matching the tract books to the Population Censuses does not create a one-to-one matching: an individual who acquired land in 1873 may have previously acquired the neighboring aliquot in 1869, and this will be two separate observations in the tract books. This matching implies a selection on less mobile settlers, which may be reflected in fewer migrants from other countries or more agricultural success.

The methodological process of matching the combined tract books and historical land characteristics to either Census is fairly similar. I use the Stata module `matchit`, which joins two datasets based on a string variable which does not necessarily need to be exactly the same: it is a fuzzy matching tool. I create a string variable in the tract book data which combines the name (first, middle, and last), the location (township-range, section, and aliquot), and the year. Similarly, I create a string variable in the Agricultural Census which combines the name (first, middle, and last), the location (township), and the year. Stata's `matchit` module creates a many-to-many matching and assigns each match a similarity score between 0 and 1 based on the similarity of the two string variables. `matchit` automatically drops any matches less than 0.5 and allows the user to create a cutoff above that. I use a cutoff of 0.8. Any cutoff still results in a many-to-many match. To obtain a many-to-one match (several tract book observations matched to up to one Agricultural Census for each Census year), the remaining many-to-many matches are hand-matched by research assistants using the following method.

First, obviously incorrect matches are eliminated from the sorted data. After this process, there will still be a many-to-many matching. Second, for a tract book observation that has more than one Agricultural Census observation per Census year, the best match is selected, based on the name, the dates, the number of farm acres, and the location. This results in a match that matches one tract book observation to one Agricultural Census. However, each Agricultural Census observation can still be matched to multiple tract books. Therefore, each of those matches is evaluated based on how geographically close the multiple tract books observations are to each other: a match between one Agricultural Census and multiple tract books observations is possible, but only when it represents multiple aliquots acquired and farmed together as one farm, which by necessity are geographically close together.

A similar process is used for matching the tract books to the Population Censuses and to the resale deeds. The resale deeds by definition create a many-to-many match with the tract books because one tract book observation may be split into multiple resale deed and one resale deed may combine multiple original tract books. Additionally, the resale deeds are matched to each other through time to create a chain: all the land was originally acquired from the federal government through the tract books, but it may be resold multiple times throughout the years. The resale deed matching is based on the name (first, middle, and last), exact location (township-range, section, and aliquot are available in both the tract book dataset and the resale deed dataset) and the date (land must be acquired before it can be resold).

Because the data were digitized from handwritten, historical records, hand-matching allows the project to utilize matches that would be difficult for a computer to make. Hand-matching is still regarded to be the gold standard for small datasets in historical data. For example, handwritten h's and k's often look similar in the original records, and the last name "MacConnell" is often digitized as two names: "Mac Connell." Likewise, a "SW" aliquot may be transcribed as a "WS" aliquot. Because there are so many of these types of digitization issues in the data, using hand-matching in the final stage provides a faster and more accurate result.

This method provides a dataset containing X observations, where each observation has values for all variables from every data source. However, some analyses require matches between only a subset of the datasets, and and these analyses use datasets with only those variables to increase the number of observations. In general, matching to the Kansas Agricultural Censuses decreases the number of observations most significantly.

3.7 Maps

Figure 3 shows the counties digitized in this sample. The pink and cross-hatched blue counties have data from both the BLM tract books and the Kansas Agricultural Censuses. Counties marked with a "D" have the resale deeds. Counties in Kansas with agricultural Census data are in pink.

All counties in this sample were taken from the eastern half of Kansas. The one hundredth meridian marks the dividing line between land that is suitable for ranching and land that is suitable for crop farming; all the sample counties for this paper are well within the bounds of land suitable for crop farming. Ranching in the West represents a very different style of farming that is not comparable to crop farming and is out of the scope of this paper.

The counties selected include a good representation of counties that contain mostly purchased land, mostly homesteads, and an even combination of both in a single county. Additionally, the selected counties range from northern to southern Kansas. The counties in the sample were mostly originally settled between 1860 to 1875 (see Figures 13 through 22).

Figure 4 shows the ratio of homesteaded land to purchased land by county in Kansas. The blue counties represent more homesteads and the green counties represent more purchased land. In order to cover all counties in Kansas, these data were obtained from the pre-digitized BLM database; therefore, "homesteads" in this map include only proved homesteads, and "purchased land" includes both direct purchase and commuted homesteads. Homesteads are concentrated in the north and the center of the state, while purchased land is most common in the counties around the edges.

Figures 13 through 22 illustrate Figure 4 more clearly by showing the progression of new homesteads and new cash sales across Kansas from 1863 to 1889. The red lines on the maps represent railroad construction. As the maps progress through time, cash sales follow homesteads west across Kansas. New homesteads push the frontier westward because they are lower cost and therefore lower risk and than cash purchases, and new cash purchases follow behind new homesteads. These maps indicate that purchasers may learn about farming practices and location choice from the homesteaders who precede them. This result raises externalities surrounding the Homestead Act: the Homestead Act did not only create value by granting land to individuals but also by creating information about land.

3.8 Comparative Statics

In this section, I provide summary statistics for the five data sources in order to provide information about land and demographic characteristics that may vary over land acquisition decisions. Table 1 details the number of observations and the mean number of acres of each type of land acquisition decision from the tract books in the sample. It is important to note that the aliquots (observations) are not all the same size. In this sample, they range from less than 10 acres to 640 acres (a full section). Most of the railroad aliquots are full sections; thus the railroad was granted a small number of aliquots but a large number of acres (see Figure 5).

From Table 1, about 54% of homesteads in the sample are eventually successfully proved, while another 38% are abandoned and 8% are commuted. Homesteads, cash purchases, and pre-empted entries all are on average a similar acreage. Cash purchases were almost never larger than 160 acres in this sample, even though it was legal. These three methods are the most common ways of individuals acquiring land directly from the federal government. Military warrants have a slightly larger acreage on average.

While there are about 10,000 obervations in the counties in this sample in the tract books (i,e,. 10,000 times land was acquired in these counties from the federal government), this same land was resold more than 22,000 times in the period up to 1896. This result highlights how often land was resold. On average, each observation from the tract book is resold more than twice in the period up to 1896. Table 1 shows that the resale market was a highly significant element of the land market in Kansas in the last half of the 1800's. Only considering land acquired directly from the federal government (contained in the tract books) misses a huge segment of the land market and gives an incomplete picture of how individuals acquired land and what they did with it. Land resale by individuals was in fact a more prominent element of the land market than acquisition from the government. The resale market is discussed more below.

Figure 5 expands on Table 1 by showing the total number of acres acquired by type from the tract books. Figure 5 does not include resale deeds. The greatest number of acres are acquired via the Homestead Act

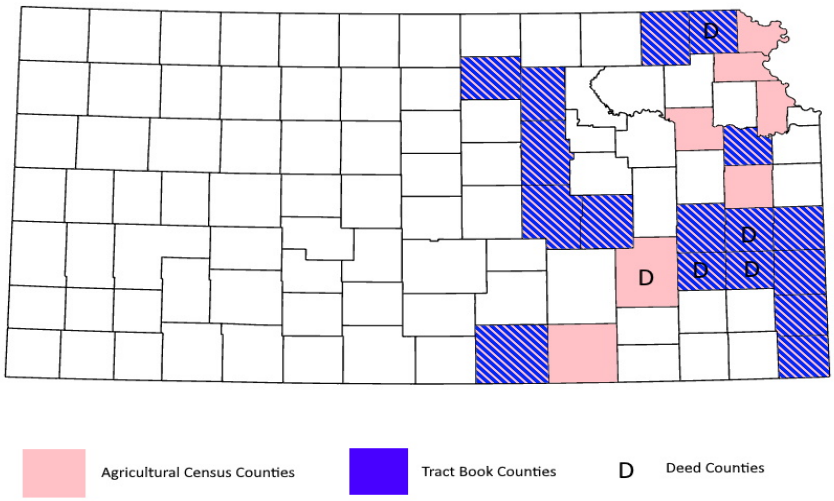

Figure 3: Counties in the sample

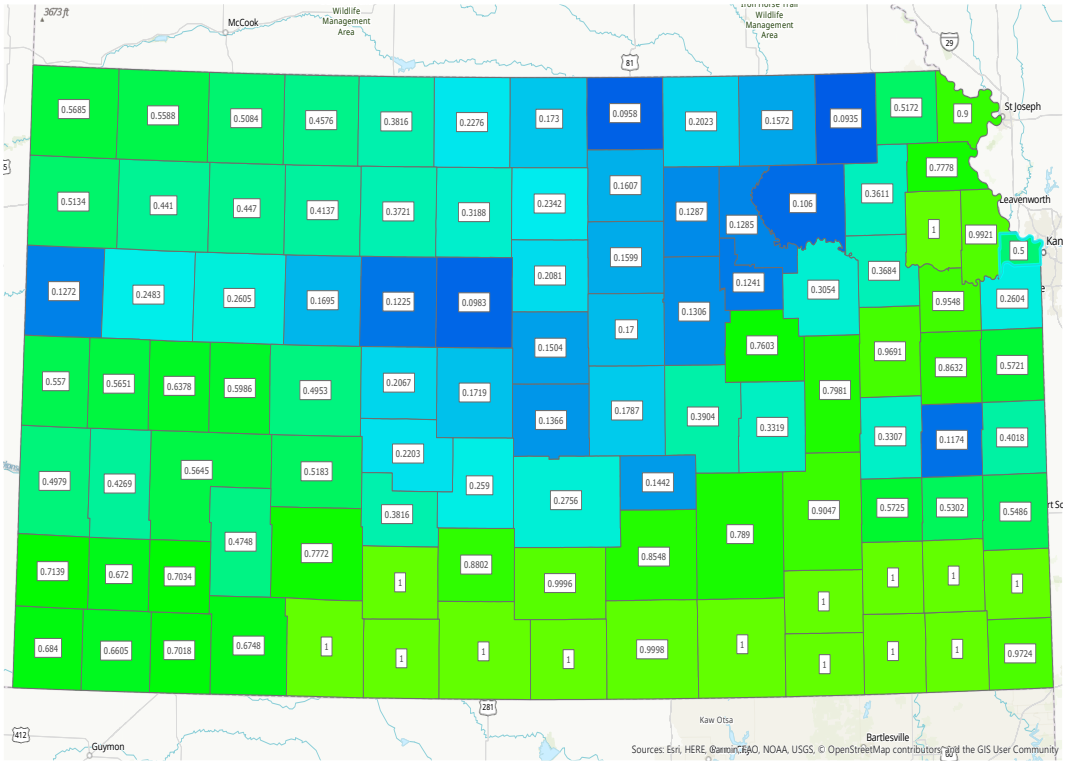

Figure 4: Homesteads (blue) vs. purchased land (green) by county

and military warrants. Purchased land accounts for fewer acres than might be initially expected: it accounts for approximately the same number of acres as do abandoned homesteads.

Table 1: Amount of Land by Type in the Sample

	Number of Observations	Mean Acres per Observation
Cash Purchase	1716	97.3
All Homesteads	2624	99.5
Proved Homesteads	1422	97.8
Abandoned Homesteads	998	105.1
Commuted Homesteads	204	100.8
Pre-emption	604	108.9
Railroad	204	266.6
Native American	87	92.2
Military Warrant	1989	125.4
Land Grant Universities	12	120.8
Total	9860	121.4
Resale	22,758	110.1

Table 2 expands on Table 1 by breaking down the acquisitions by decade. There are a few observations in the 1850's, 1890's, and 1900's, which is why the total number of observations in Table 2 does not add up to the total number of observations in Table 1. Table 2 shows that the vast majority of military warrants were claimed in the 1860's, and the same is true of pre-empted land, while homesteads were claimed in both the 1860's and 1870's. Cash purchases occurred in all three decades.

Table 2: Amount of Land by Type in the Sample by Decade

	1860's		1870's		1880's	
	N	Mean Acres	N	Mean Acres	N	Mean Acres
Cash Purchase	511	96.5	388	106.1	146	95.4
All Homesteads	1354	111.8	987	90.7	228	99.5
Proved Homesteads	660	109.3	597	91.3	140	103.4
Abandoned Homesteads	554	112.6	352	89.7	63	87.8
Commuted Homesteads	140	116.1	38	90.8	25	88.8
Pre-emption	542	107.6	9	84.4	0	–
Railroad	197	274.9	7	31.1	0	–
Native American	4	72.5	9	93.3	0	–
Military Warrant	1912	125.4	31	112.8	4	132.7
Land Grant Universities	3	106.7	4	120.0	2	164.5
Total	4523	111.2	1435	104.6	380	125.3
Resale	3408	106.7	6336	110.7	10,840	110.5

Table 3 shows how the most common ways (purchase, homestead, and military warrants) individuals acquired land from the federal government differ in terms of farm production and value. The monetary values in 3 have been normalized to 1870 dollars. While from Table 4, we know that the acreage of purchased land and homesteads are on average the same; however, Table 3 shows that the improved acres (i.e., the acres which are farmed) vary across the type of farm. Likewise, the value of the equipment used on the farm, the value of the livestock, and the assessed value of the farm all vary greatly by land acquisition decision. Military warrants have by far the most valuable machinery, livestock, and farms. In general, purchased farms have the next most valuable machinery, livestock, and farms. The wages paid over the census year also vary widely by type and follow the same pattern of military warrants and purchased farms paying more wages than homesteads.

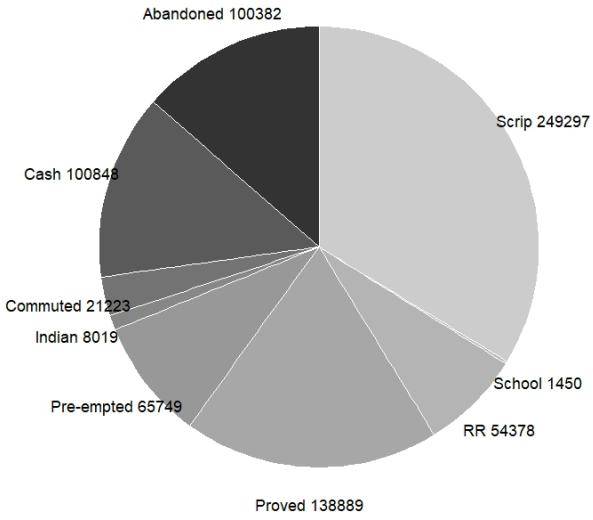

Figure 5: Number of acres from the tract books in sample counties by type

The bottom rows of Table 3 show how the number of bushels of different crops produced vary by land acquisition type. As expected, abandoned farms in general produced fewer bushels of crops than purchased farms, military warrants, or proved homesteads. The Agricultural Census values for commuted land provide some descriptive evidence to support the idea that homesteaders commuted their land in order to resell. Commuted farms on average produce fewer agricultural products (crops and livestock) than any other type of farm except abandoned homesteads. Commuted farms also pay significantly lower wages throughout the year than any other type of farm on average, including abandoned homesteads. However, commuted homesteads have only a slightly lower farm value than purchased land and a higher farm value than proved or abandoned homesteads. Combined, these facts indicate that individuals who commuted their homesteads invested most of their time and money into improving the value of the farm which can be regained when it is sold, and little of their time and money into producing agricultural products which are not sold with the farm.

While Table 3 details how farms differ in terms of agriculture, Table 4 details how the most common types of land acquisition (purchases, homesteads, and military warrants) different across land characteristics. As expected, land acquired using military warrants was acquired earlier than homesteaded land, while homesteaded and purchased land has a similar average acquisition date. These similar average acquisition dates do not take into account the different average latitudes between purchased and homesteaded land: in any year, the purchased land is on average farther east than homesteaded land (see Figures 13 through 22). Soil quality does not vary significantly across different acquisition decisions, but access to water is significantly more common on abandoned homesteads than any other type of farm, and more common on homesteads in general than purchased land or military warrants. This may reflect homesteads preceding purchases in any given area (see Figures 13 through 22). If homesteaders arrived first in an area, they would have had more choices between different plots of land and may have deliberately selected plots with water access, whereas purchasers who came to the area later would have had fewer plots of land with water access to choose from. Commuted homesteads are significantly closer to the nearest town than any other type of farm, but also the farthest from railroads. Purchased land and successfully proved homesteads are very similar with respect to the distance to the nearest town and railroad, but abandoned homesteads are farther from both.

Overall, the land acquired using different methods is fairly similar. However, it should be noted that this land represents only a few counties, and therefore is likely to be similar by definition. The most notable

Table 3: Mean Selected Agricultural Census Values by Type

	Purchase	Prove	Abandon	Commute	Military Warrant
Improved Acres	61.5	50.3	64.4	52.9	83.7
Machinery Value	$130.6	$124.9	$100.0	$106.1	$163.7
Fence Cost	$57.5	$43.9	$143.3	$93.0	$244.6
Fertilizer Cost	$20.0	$23.0	$70.0	$0.0	$35.0
Value of Farm	$2678.6	$1887.0	$2161.2	$2282.9	$4036.0
Wages Paid	$145.3	$100.0	$140.0	$77.5	$201.4
Livestock Value	$854.1	$769.4	$704.0	$400.8	$1301.1
Number of Horses	4.4	3.6	3.9	4.7	3.3
Number of Mules	0.6	0.4	0.4	0.7	0.3
Number of Oxen	0.3	0.4	0.1	0.0	1.1
Number of Cows	13.8	13.9	13.8	15.8	10.7
Number of Sheep	4.9	7.0	1.4	8.1	3.7
Number of Swine	12.3	10.8	11.1	17.8	13.7
Number of Poultry	16.1	13.6	20.2	20.2	7.2
Corn Bushels	890.3	506.7	210.7	457.3	1114.2
Oat Bushels	231.1	210.2	168.8	149.8	239.3
Wheat Bushels	171.5	167.9	110.7	63.0	214.2
Potato Bushels	12.7	11.4	15.1	13.1	5.7
Hay (tons)	9.8	5.4	10.3	7.3	5.2
Observations	910	676	181	104	792

difference in land characteristics is that the presence of water on the farm is not well correlated with the farm's success. For example, on average, abandoned farms are more likely to have water access than any other type of farm. As compared to other land, abandoned homesteads also received the same amount of precipitation and had on average the same soil quality. Homesteads in general were more likely to have water access on average, likely due to the fact that homesteads preceded purchases in any given area. However, military warrants on average are the farms least likely to have access to water.

Another notable difference in land characteristics is in the number of miles the aliquot is located from a railroad. Historians and economic historians have frequently posited that homesteaders were relegated to land far from railroads, while purchasers could acquire more desirable land close to railroads. However, the results in this sample expand on this supposition. Successfully proved homesteads were the same distance to the nearest railroad at the time of their acquisition as purchased land, whereas abandoned and commuted homesteads were about 30 miles farther from railroads than purchased land. It would take about six hours to travel this distance on horseback. This difference would have greatly impacted their market access, though commuted homesteads were on average closer to a town, which may have mitigated their market access problem.

Further, land that was purchased was closer to a significantly larger town than land that was either homesteaded or acquired via a military warrant. The small population of the towns on average near military warrants reflects the fact that military warrants were acquired earlier than other types of farms on average. However, homesteads and purchased land were acquired on average around the same time, with homesteads being slightly later, so the smaller size of the nearby towns for homesteaders reflects a real difference in market access with a significant economic impact. For example, even successful homesteads were located near towns which were on average 80% of the size of towns near purchased farms. Towns near abandoned homesteads were approximately half the size of towns near purchased farms.

Similarly, towns near commuted homesteads and military warrants grew at a much higher rate than towns near purchased land or proved or abandoned homesteads. The high growth rate for towns near military warrants likely reflects the fact that military warrants were acquired on average earlier than other types of farms and Kansas grew more rapidly between 1860 and 1870 than between 1870 and 1880. However, the high growth rate of commuted homesteads is not attributable to this fact. Instead, it likely reflects that homesteads were commuted in order to resell them, and reselling farms was most common and most profitable near growing towns with high market access. Combined, these results may indicate that market access was a significant predictor in the success of farm.

Table 5 shows how different ways of acquiring land differ over observable demographic characteristics from the U.S. Population Censuses of 1860 to 1880. The value of personal property, which represents the individual's liquid assets, and the value of real property, which represents the individual's illiquid assets, both vary significantly by type. Homesteaders who commuted their farm have almost ten times the value of real property than homesteaders who would later abandon their farms did. Note that the measure of personal real property reported in the top half of Table 5 may measure the value before or after acquiring the farm. Despite the fact that military warrants were granted to soldiers, a third of the claimants were women (likely widows), which was a significantly higher percentage of women than any other method of land acquisition. However, there is no difference in the percentage of claimants for military warrants who were married versus the percent married for any other type of land acquisition except abandoning. Homesteaders who abandon their farms are significantly less likely to be married, indicating that starting a farm may not have been manageable with only one adult.

The bottom rows of Table 5 show the value of personal property before the individual acquired land. This value differs greatly by type. This measure by necessity has fewer observations. The most notable element of these bottom rows is that, though experts of the time warned against starting a farm with less than $1000 to buy machinery and livestock, on average, no type of farmer began their farm with that much money. Military warrant claimants had by far the highest value of wealth before acquiring land, even though military warrants were in general claimed earlier; however, even these individuals on average began with about $200 less than had been suggested by experts. As expected, homesteaders in general started with lower wealth than purchasers or military claimants. This result is particularly notable for commuted homesteads. Individuals who would later commute their homesteads started with an even lower value of personal property on average than those who would later abandon their homesteads. In fact, those who would later commute their homestead began with less than $200 on average, the amount they would need

Table 4: Mean Selected Land Characteristics by Type

	Purchase	Prove	Abandon	Commute	Military Warrant
Year Acquired	1868	1868	1869	1874	1862
Water=1	0.39	0.47	0.61	0.41	0.32
Soil	3.1	3.2	3.0	3.2	3.4
Acres	154.37	158.75	151.58	151.03	153.60
Elevation	291.93	291.53	295.78	292.15	289.51
Slope	4.16	3.43	3.42	3.23	3.14
Precipitation (inches)	30.43	29.07	29.79	31.50	32.58
Latitude	37.79	37.90	37.90	37.90	37.90
Longitude	-95.16	-95.18	-95.17	-95.06	-95.00
Town Population	2145.72	1702.83	1279.70	1999.33	655.56
Town Growth	9.49	9.05	9.14	12.16	13.60
Miles to Town	14.6	13.6	17.2	9.1	19.7
Miles to RR	72.1	72.7	106.6	117.0	67.1
Miles to Land Office	26.54	22.76	23.00	18.64	26.51
Observations	1957	989	541	352	1394

Table 5: Mean Selected Demographic Characteristics by Type

	Purchase	Prove	Abandon	Commute	Military Warrant
Age	37.73	39.41	35.92	35.76	38.79
Value of Real Property	$2028.44	$1297.36	$768.84	$6508.58	$3263.91
Value of Personal Property	$807.24	$451.67	$356.23	$609.94	$1107.39
Family Size	4.97	5.22	4.82	4.50	4.96
Married=1	0.74	0.78	0.65	0.73	0.72
Female=1	0.21	0.17	0.22	0.22	0.34
White=1	0.99	0.98	0.99	0.98	0.99
Age of Oldest Child	12.45	12.85	10.36	9.39	11.51
Number of Children	2.41	2.58	1.97	1.97	2.46
Farmer=1	0.79	0.79	0.72	0.71	0.69
Head of House=1	0.70	0.77	0.68	0.59	0.69
Nativity=1	0.89	0.84	0.84	0.84	0.84
Observations	1232	1784	820	191	545
Value of Personal Property Before Acquiring Land	$587.49	$402.11	$236.87	$182.10	$797.41
Observations	375	535	300	62	545

to be able to commute the homestead later. This result may support the idea that farmers commuted their homesteads in order to resell the land: i.e., they commuted the homestead when they already had an offer in hand, and the cost of commutation could be included in the sale price.

Table 6 shows summary statistics for resold land. As is clear from Table 1, resold land accounted for a large part of the land market in this time period, but resold land is an under-explored area of research. The most immediately notable element of Table 6 is that the average price per acre of resold land is $24, as compared with $1.25 per acre for land acquired directly from the federal government via purchase. This dramatic increase in price per acre on average is consistent with historical sources, which indicate that reselling land could be highly profitable for individuals.

Table 6: Resale Land

	Mean	SD	Minimum	Maximum
Price per Acre	$24.45	$454.79	$0	$61,538.46
Acres	110.08	140.21	0.005	7840.00
Soil	3.47	1.07	1.0	6.99
Water=1	0.42	0.49	0	1
Year Sold	1880	7.97	1852	1900
Observations	22,758			

Figures 6 through 12 illustrate this result further. Figure 6 shows the distribution of the resale price per acre for purchased land, commuted and proved homesteads, railroad land, and military warrants. The most notable element of Figure 6 is the extremely long high tail on the resale price per acre for every type of land. However, even excluding the long high tail, the average resale price is still about $8 per acre, which is significantly higher than the initial cost per acre of $1.25. Railroad land has a lower average resale price than the other types of land, likely because it is unimproved (i.e., it does not contain any fences or buildings). On average, farmers resold their land for about $500 total, which represents a huge return on either the $14 it cost to homestead or the $200 it cost to purchase. This is consistent with historians: Prior to 1860, existing farms sold for between $10 and $15 dollars an acre, whereas raw land sold for 1.25 to 2.50 dollars an acre until 1881 (Gates (1968)).

Figure 7 provides a more complete understanding of Figure 6 by showing the relationship between the price per acre of resold land and how long the land was held before it was resold. As expected, there is slight positive association between the number of years held and the resale price per acre; however, the price per acre does not increase very much with the number of years the land was held. The variation of the resale price per acre increases with the years held because most observations are held for 25 years or fewer. The average resale price per acre is about $8 regardless of how long the land is held in this dataset.

Figure 8 expands on Figure 6: Figure 8 shows the distribution of the annualized return for homesteads. This figure takes the return on each homestead and divides it by the number of years it was held before it was resold. About 20% of homesteads are resold for less than the original price of $14. Meanwhile, about another 45% of homesteads are resold for between 20 and 40 times the original price of $14. Some homesteaders were reselling their farm for $3000 total, while others resold the whole 160 acres for $1. Again, there is a long right tail on the return on homesteads, and Figure 8 does not include the cost of durable investments like fences or buildings which are included in the resale price. However, this basic result does indicate the potential high rate of return for reselling land.

Further, Figure 9 expands on Figure 8 by including some input costs from the Kansas agricultural census into the annualized return on investment calculation. The annualized return per acre is calculated by

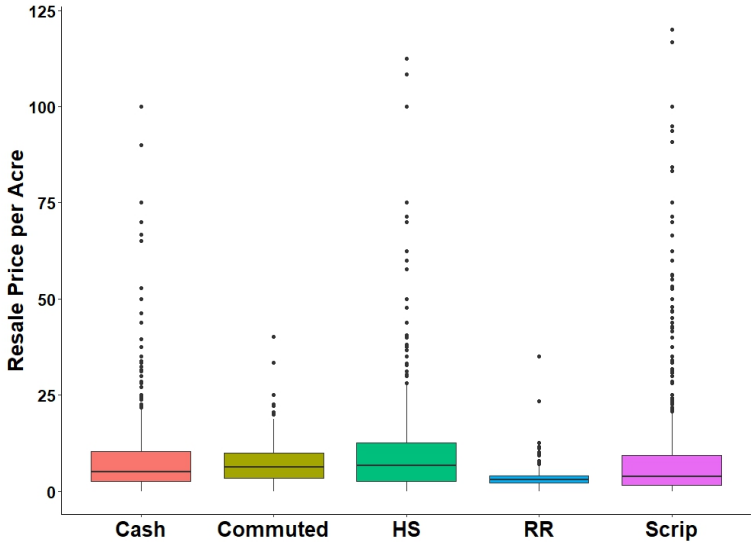

Figure 6: Resale price per acre by type

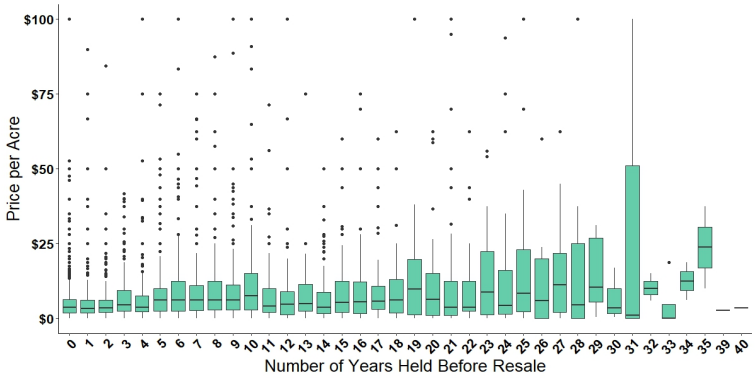

Figure 7: Relationship between resold price per acre and number of years held

$$\frac{\frac{Return}{Acre} = (\frac{ResalePrice}{AcresResold} - \frac{GovernmentPrice}{AcresResold} - \frac{InputCosts}{AcresResold})/(\frac{GovernmentPrice}{AcresResold} + \frac{InputCosts}{AcresResold}) \times 100}{YearsHeld} \quad (1)$$

where the input costs are the cost of fences, the cost of fertilizer, the wages paid, and the cost of materials like fencing. These are calculated from the Kansas agricultural census. While these costs do not necessarily reflect the entirety of the input costs into a farm, Figure 9 reflects an upper bound on the return for resale. Figure 9 shows that despite the long right tail, a significant percentage of farms lose money in their resale. The right tail is mostly comprised of homesteads because of their low cost of acquisition. However, even other types of farms, such as purchased land and military warrants, could be sold for a high return.

Figure 10 expands on the distribution of resold acres from Table 6. In this sample, the average number of acres resold at one time was 110 acres, and Figure 10 shows that about 75% of the time, the entire farm was resold at once. However, reselling half of the farm or a quarter of the farm was also common.

Figure 11 illustrates that the majority of individuals resold only one piece of land in this sample; however, there is again a long right tail. A few individuals were reselling many pieces of land. This is consistent with historians' accounts, which indicate that there were several "sharks" in most counties who specialized in reselling land. However, most resale was conducted by individuals who were not full-time speculators and who sold only a few pieces of land.

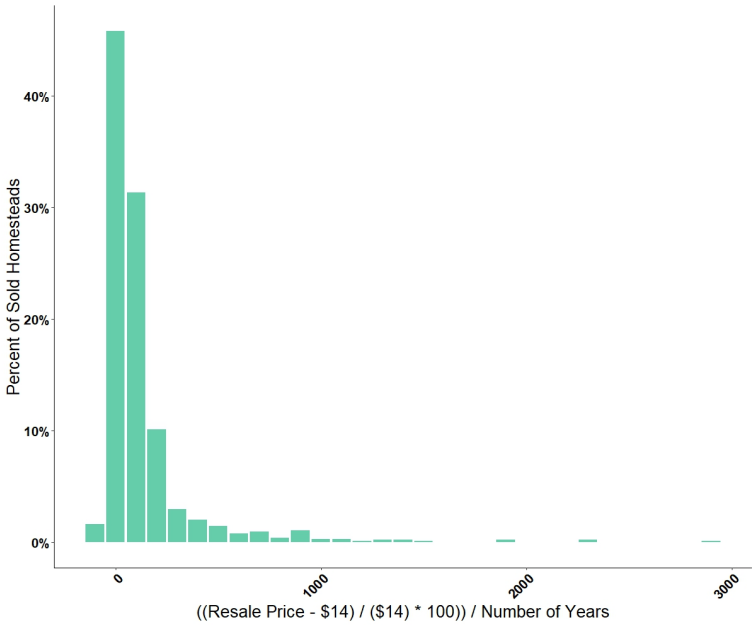

Figure 8: Annualized return on investment for homesteads

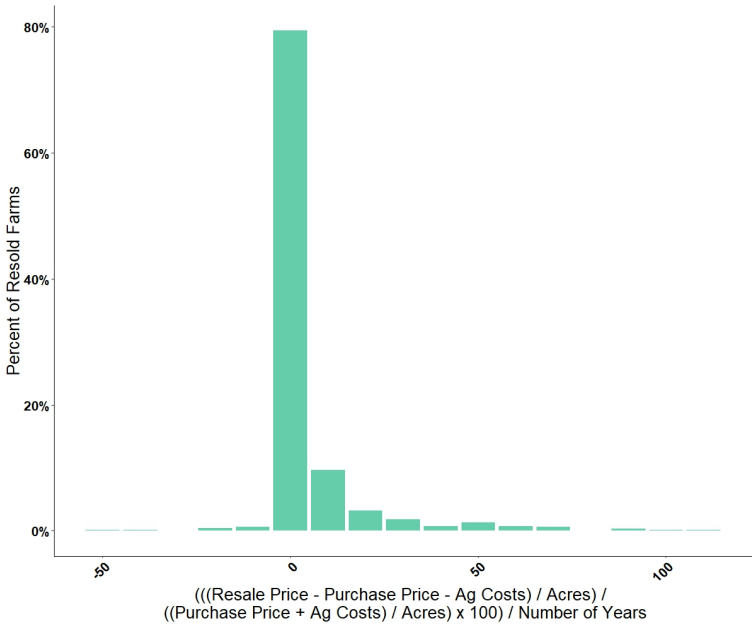

Figure 9: Annualized return on investment for all farms including farm costs

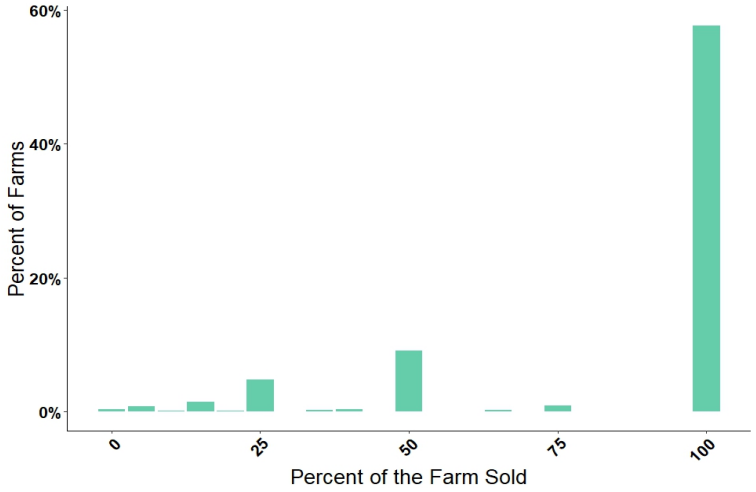

Figure 10: Percent of the farm sold

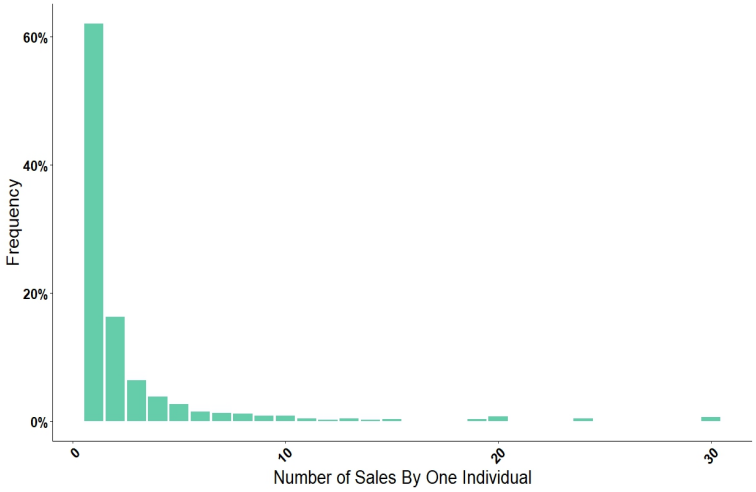

Figure 11: Distribution of the number of times any individual resold land

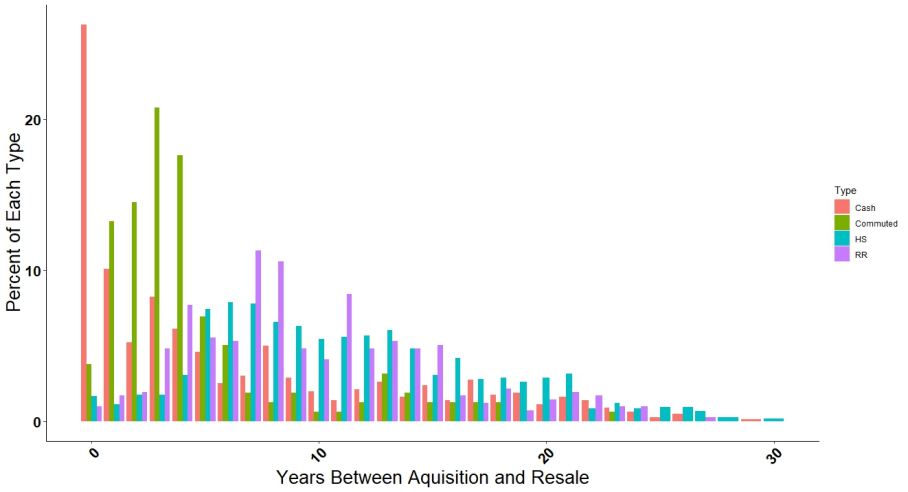

Figure 12: Distribution of years held after acquiring the title

Finally, Figure 12 shows the distribution of the number of years a piece of land was held by the initial owner who acquired it from the federal government between getting the title and reselling the land. The results are broken down by type. Figure 12 shows that about 30% of purchased farms and commuted homesteads are resold within the first year of gaining the title. About another 20% of purchased farms and commuted homesteads are resold in the next two years. After the first three years, the rate of resale for purchased land and commuted homesteads remains stable at about 2% for the next thirty years. Overall, more than half of resales for purchased land and commuted homesteads happen in the first three years. However, railroad land and proved homesteads do not exhibit this spike in resale in the initial years after gaining the title. Instead, proved homesteads and railroad land are resold at relatively stable rate of about 5% in every year after getting the title. This result is consistent with the idea that a significant number of individuals purchased land or commuted a homestead in order to resell it, whereas individuals who homesteaded and proved land did so with the intention of starting a long-term farm.

4 What Land was Homesteaded and By Whom?

In this section, I show how demographic and land characteristics predict land acquisition, and how those characteristics and the land acquisition decision interact with resale and agricultural production.

In particular, I use the following specifications. Firstly, I use a multinomial logit model with the following index:

$$Type_{imty} = \alpha + \beta \mathbf{X_{imty}} \tag{2}$$

where $Type_{imty}$ is the method of land acquisition from the federal government and $\mathbf{X_{imty}}$ is a vector of land and demographic variables including the year acquired, the soil quality, the water access, the acres of the farm, the elevation, the slope, the precipitation, the latitude and longitude, the population of the nearest town, the growth rate of the nearest town, the miles to the nearest town, the miles to the nearest railroad, the miles to the nearest land office, the age of the farmer, the family size, race, gender, marital status, the age of their oldest child, the number of children, their occupation, whether they are the head of their household, and if they are a natural-born citizen. I estimate equation 2 using six choices: military warrants, pre-emption, abandoned homesteads, proved homesteads, commuted homesteads, and cash purchases. Cash purchase is the base choice which is left out, so all other choices are relative to purchase. The i subscript represents the individual level; m subscript represents the county; the t subscript represents the township-range; and y subscript represent the year. This model demonstrates what characteristics of the land and of the farmers are associated with different methods of land acquisition at the individual level by selecting the ones which predict the method most strongly.

Secondly, to supplement the probability of each type of land acquisition, I examine the years to acquisition at the farm level using a Cox proportional hazards model. This model relates the duration time that passed between 1863 and the date of acquisition of the farm to covariates, such that a unit increase in a covariate is multiplicative with respect to the hazard rate, which is the risk of failure. The effect of covariates estimated by a proportional hazards model are reported as hazard ratios. I estimate the following model:

$$h_i(t) = h_0(t) \times \exp(\beta_1 X_1 + \beta_2 X_2 + ... + \beta_p X_p) \tag{3}$$

where $h_i(t)$ is the expected hazard at time t, and $h_0(t)$ is the baseline hazard which represents the hazard when all of the covariates are equal to zero. In this case, failure is defined as the piece of land being acquired. The time t is measured in years since January 1st, 1863, the first day it was possible to homestead. The analysis time is the year, so if the land is acquired in a given year, it is considered to have failed at that time. I estimate this model at the individual level on the full sample and also separately for each type of acquisition.

Thirdly, I use a linear model to predict the types of crops and livestock grown on the farm and the other types of investment into the farm using the land acquisition method and land and demographic characteristics at the individual level. In particular, I use the following linear model:

$$Y_{imty} = \alpha + \beta \mathbf{X_{imty}} \tag{4}$$

where Y_{imty} is the dependent variable from the agricultural census, such as the number of bushels of wheat produced at the farm level. Again, $\mathbf{X_{imty}}$ is a vector of land and demographic characteristics including the acquisition method at the individual level.

Finally, I use a Cox proportional hazards model to predict how quickly land is resold using land and demographic characteristics including the acquisition method at the individual level. In this case, failure is defined as a piece of land being resold by the initial owner who acquired it from the federal government, measured from January 1st, 1863. The analysis time is the year. This model is used to predict what factors influence a piece of land being resold and how quickly.

4.1 Results

Here, I detail the results from the above regressions. Table 7 reports the results from the multinomial logit model in equation 2 which relates the decision of how to acquire land from the federal government to land and demographic characteristics at the individual level. Cash purchase is the base choice which is left out.

Importantly, the distance to the nearest railroad is not a significant predictor of how land is acquired. This result is in contrast with the previous literature which generally indicates that purchased land was closer to railroads and homesteads were confined to less value land farther from the tracks. If true, this would have decreased the market access for homesteaders in an economically significantly way. However, in this dataset, the distance to the nearest railroad is not a significant predictor of how land is acquired.

For a 1-mile increase in miles to the nearest town, there is an increase in the likelihood of homesteading relative to purchasing land. Homesteaded farms are more likely to be far from a town. Additionally, as the population of the nearest town increases, farms surrounding the town are more likely to have been purchased. The small coefficients on these covariates reflect that the distance and population are measured in 1 until increments, as towns often contained less than 100 people and were quite close to farms. Likewise, the probability of purchase increases with miles to the nearest land office which makes sense: the farther the land office, the more willing the settler would be to pay to avoid going there twice. The miles to the nearest land office is a highly significant, fairly stable predictor of how land is acquired, even after including covariates for the nearest town and railroad, indicating that the coefficient on miles to the land office does not simply reflect market access. Latitude is a highly significant predictors of how land is acquired. This result is consistent with the map in Figure 4, which depicts how purchased and homesteaded farms are not spread uniformly throughout the state of Kansas.

Notably, the age of the farmer is not a statistically significant predictor of how the land is acquired. While it might be expected that farmers of different ages select into different land acquisition decisions - for example, older or younger farmers might be more likely to abandon their farms - this is not the case for this dataset.

Table 7: Multinomial Logit Estimation of Land Acquisition

	Military	Pre-empt	Abandon	Prove	Commute
Latitude	12.41***	16.32***	14.81***	15.71***	14.57***
	(8.19)	(7.19)	(10.52)	(13.13)	(6.78)
Longitude	-1.370	-1.115	0.0534	-0.546	0.226
	(-1.61)	(-0.82)	(0.09)	(-1.07)	(0.22)
Acres	0.0169***	0.0153***	0.0116***	0.0127***	0.00877*
	(7.50)	(4.60)	(4.94)	(6.58)	(2.46)
Year Acquired	-0.780***	-0.496***	-0.0116	0.0390	-0.0189
	(-11.39)	(-3.79)	(-0.30)	(1.16)	(-0.26)
Miles to Railroad	-0.00214	-0.00345	-0.00205	-0.00147	-0.0124
	(-0.44)	(-0.38)	(-0.39)	(-0.32)	(-1.18)
Water=1	-0.440*	-0.609	-0.339	-0.475**	-0.573
	(-1.99)	(-1.84)	(-1.56)	(-2.62)	(-1.69)
Soil Quality	0.199	-0.206	-0.0149	0.316**	0.0770
	(1.20)	(-0.70)	(-0.09)	(2.61)	(0.29)
Elevation	0.0160**	-0.00181	0.0181**	0.00338	0.00540
	(3.02)	(-0.23)	(3.19)	(1.01)	(0.67)
Slope	-0.273***	-0.0384	-0.0702	-0.211***	-0.339*
	(-3.44)	(-0.27)	(-0.96)	(-3.78)	(-2.34)
Precipitation	-0.00466	0.00358	0.00124	0.000973	-0.00875
	(-0.45)	(0.23)	(0.12)	(0.11)	(-0.54)
Miles to Land Office	-0.0196***	0.0289***	-0.0401***	-0.0253**	-0.00994
	(-3.58)	(4.43)	(-3.33)	(-2.93)	(-0.57)
Miles to Town	0.0133	-0.0520*	0.0534***	0.0423***	0.0377*
	(0.92)	(-2.06)	(6.40)	(5.92)	(2.38)
Town Population	0.000130	0.000269	-0.000284***	-0.000103	0.0000326
	(1.38)	(1.53)	(-3.77)	(-1.68)	(0.28)
Town Growth	-0.0436	-0.0459	0.0128	0.0517	0.102
	(-1.09)	(-0.67)	(0.37)	(1.88)	(1.63)
Number of Children	-0.0356	-0.247**	-0.0842	-0.0763	-0.0703
	(-0.55)	(-2.64)	(-1.19)	(-1.36)	(-0.59)
Age of Oldest Child	0.0238	0.0200	-0.0179	0.00375	-0.0784
	(1.04)	(0.62)	(-0.73)	(0.19)	(-1.93)
Age	-0.0234	0.0222	-0.00983	-0.0148	0.0145
	(-1.38)	(0.92)	(-0.59)	(-1.09)	(0.56)
Farmer=1	1.068***	0.569	0.552*	0.0636	0.466
	(3.87)	(1.33)	(2.06)	(0.27)	(1.10)
Family Size	0.0443	0.134	0.0681	0.0819	-0.0655
	(0.80)	(1.69)	(1.19)	(1.74)	(-0.78)
Native=1	-0.850**	-0.445	-0.338	-0.105	-0.00433
	(-2.76)	(-0.96)	(-1.12)	(-0.40)	(-0.01)
Head of House=1	0.287	0.571	0.172	1.034	-0.0801
	(0.39)	(0.54)	(0.25)	(1.68)	(-0.08)
Married=1	-0.131	0.0229	-0.217	-0.722	-0.0156
	(-0.27)	(0.03)	(-0.48)	(-1.95)	(-0.02)
White=1	0.548	-1.325	13.97	1.737	13.73
	(-0.43)	(0.90)	(-0.02)	(-1.31)	(-0.01)
Female=1	1.059	0.268	0.173	1.016	0.0658
	(1.44)	(0.24)	(0.24)	(1.65)	(0.06)
Constant	851.3***	199.2	-538.3***	-721.5***	-497.1**
	(5.74)	(0.86)	(-5.15)	(-8.09)	(-2.76)
Observations	1700				

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8 details the results from equation 3, which uses a Cox proportional hazard model to estimate which covariates at the individual level most strongly predict how quickly land is acquired from the federal government. All coefficients are compared to one: coefficients greater than one indicate that the land was resold more quickly, whereas coefficients less than one indicate that the land was resold less quickly. The first column of Table 8 shows a Cox proportional hazards analysis of the time to acquisition since January 1st, 1863 for all types of acquisitions, and the remaining columns break down the hazards ratio by type. Because of the potential endogeneity issue between the acquisition date and the farm type, column 1 does not include farm type. Results from Table 8 show that land which has more market access - as defined by closer to a railroad and closer to a town - is at a significantly higher risk of being acquired regardless of the method of acquisition. Likewise, land which is located near growing towns is at a highly significantly greater risk of being acquired regardless of type. Land with water access is also more likely to be acquired quickly. Notably, land which is located closer to the land office is at a greater risk for privatization.

Tables 9 and 10 report the results from equation 4, which predicts several variables related to farm production and value at the individual level. Tables 9 and 10 show how the linear model relates demographic and land characteristics at the individual level to the farm value, the livestock value, the production value, the number of improved acres, the number of crop types, the number of bushels of corn grown, the number of bushels of wheat grown, and the wages paid in one year. From Tables 9 and 10, demographic characteristics are generally a significant predictor of agricultural production outputs such as the livestock value. The family size, number of children, and the age of the oldest child are all significantly related to agricultural output, where a larger family with older children are associated with higher agricultural output, such as more bushels of corn grown. As would be expected, the amount of precipitation and whether or not the farmer was born in America are also significant predictors of farm output and wages paid.

Notably, water access is not a significant predictor of agricultural production and value in Tables 9 and 10. Likewise, market access does not appear to be particularly relevant in predicting agricultural value: the miles to the nearest railroad, the miles to the nearest town, and the population of that town are not generally significant or relevant predictors of variables such as the number of bushels of corn produced.

Table 11 reports the results from equation 3, which uses a Cox proportional hazard model to predict which covariates determine how quickly land is resold at the individual level. The first column of Table 11 reports the hazards ratio for the first resale by the original owner from the federal government for all types of land. The later columns report the same result by original acquisition type. In contrast with the results for how quickly land is acquired from the federal government, land with more market access is at a slightly lower risk of being resold. However, similar to the results for how quickly land is acquired from the federal government, land with better soil quality is at higher risk for being resold.

5 Conclusion

In this paper, I combine five individual level data sources on historical land use, including 1) aliquot-level land acquisition records from the federal government; 2) aliquot-level land resale deeds; 3) aliquot-level land characteristics; 4) individual-level demographic characteristics; and 5) farm-level agricultural production and investment data from several counties in eastern Kansas. I use these data to document how land, farmers, and farms differ across different types of land acquisition decisions and how the land resale market interacts with the land market from the federal government.

The descriptive evidence provided here is consistent with the idea that homesteaders who commuted their farm did so in order to resell it. Commuted homesteads invested less into crops and livestock than almost any other type of farm; however, commuted homesteads were about as valuable as purchased farms and more valuable than other types of homestead on average. The value of the farm is something that contributes to its resale price, while the crops and livestock are not sold with the farm. Likewise, commuted homesteads and purchased farms were most commonly resold within the first three years of acquiring the title: about 30% of both commuted homesteads and purchased farms were resold within the first year, whereas proved homesteads and railroad land was resold at a consistent rate of about 2% every year after acquiring the title.

Notably, the in the land market in the last half of the 1800's, the resale market comprised a much greater share than did the land acquired directly from the federal government. Additionally, the revenue from resale could be very high: even excluding the long right tail, the average resale price for land was $7 per acre after

Table 8: Comparison of Survivor Functions by Farm Type

	All	Abandon	Purchase	Commute	Prove	Military Warrant
Acres	1.001	1.005**	0.997**	0.995	1.003*	1.003
	(1.87)	(2.69)	(-2.66)	(-1.09)	(2.08)	(0.82)
Latitude	1.549	0.326	68.47***	2.325	0.0874**	183.6
	(1.11)	(-1.29)	(5.27)	(0.31)	(-3.22)	(1.62)
Longitude	2.007	273.4***	6.121**	24.92	35.91***	77.64
	(1.79)	(5.09)	(2.89)	(1.16)	(4.84)	(1.58)
Miles to Land Office	1.005	1.099***	1.006	1.057	1.061***	1.094
	(0.51)	(4.25)	(0.44)	(0.91)	(3.62)	(1.44)
Precipitation	0.999	1.003	0.999	0.970	0.995	0.989
	(-0.41)	(0.48)	(-0.12)	(-1.81)	(-0.91)	(-0.85)
Miles to Railroad	1.033***	1.026***	1.077***	1.107**	1.026***	1.100***
	(14.11)	(5.37)	(8.35)	(3.14)	(6.34)	(3.37)
Soil Class	1.150**	0.771	1.145	0.559	1.335**	0.786
	(2.95)	(-1.86)	(1.92)	(-1.49)	(2.93)	(-0.93)
Elevation	1.001	1.009	1.003	1.016	0.989***	1.007
	(0.94)	(1.74)	(1.95)	(1.18)	(-3.54)	(0.79)
Slope	0.992	1.083	0.936**	1.387	0.962	1.044
	(-0.45)	(1.21)	(-2.58)	(1.61)	(-0.81)	(0.42)
Miles to Town	1.012***	1.010*	1.076***	0.989	1.006	0.963
	(4.79)	(2.00)	(8.92)	(-0.53)	(1.20)	(-0.93)
Town Growth	1.236***	1.195***	1.311***	1.530***	1.220***	1.118
	(15.21)	(5.91)	(10.09)	(4.10)	(6.82)	(1.06)
Water=1	1.094	1.152	0.887	0.675	1.069	1.252
	(1.39)	(0.96)	(-1.12)	(-1.06)	(0.60)	(0.84)
Town Population	1.000***	1.000*	1.000*	0.999***	1.000***	0.999***
	(-10.76)	(-2.57)	(-2.41)	(-3.52)	(-6.72)	(-4.74)
Female=1	1.044	0.771	0.856	2.296	0.766	0.310
	(0.23)	(-0.70)	(-0.63)	(0.67)	(-0.95)	(-0.97)
Age	1.009	0.996	1.006	0.993	1.000	1.031
	(1.59)	(-0.67)	(1.14)	(-0.32)	(0.05)	(1.09)
Family Size	0.990	0.916**	0.989	1.026	0.987	1.070
	(-0.58)	(-3.09)	(-0.50)	(0.31)	(-0.48)	(0.52)
Number of Children	0.997	1.138**	0.980	1.111	1.003	0.825
	(-0.14)	(2.95)	(-0.69)	(1.01)	(0.08)	(-1.33)
Farmer=1	1.047	1.559**	1.466**	0.749	1.067	0.845
	(0.60)	(2.73)	(2.89)	(-0.64)	(0.48)	(-0.47)
Nativity=1	1.280**	1.555*	1.317	0.870	1.300	0.616
	(2.83)	(2.37)	(1.85)	(-0.23)	(1.55)	(-1.30)
Head of House=1	0.882	0.566*	0.847	0.728	0.978	0.221
	(-0.67)	(-2.52)	(-0.90)	(-0.51)	(-0.07)	(-1.41)
Married=1	1.175	1.678*	1.002	0.822	0.944	6.076*
	(1.25)	(2.49)	(0.01)	(-0.36)	(-0.31)	(2.15)
N	1064	258	446	66	407	94

Exponentiated coefficients; t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: OLS Estimation of Agricultural Production

	ln(Farm Value)	ln(Livestock Value)	ln(Production Value)	ln(Num Improved Acres)
Method of Acquisition	0.0383	0.0441	0.0498	0.0563
	(1.55)	(1.33)	(1.63)	(1.06)
Latitude	-0.605	0.0613	0.534	-1.475
	(-1.47)	(0.11)	(1.05)	(-1.67)
Longitude	0.135	-0.588*	-0.362	-3.472***
	(0.76)	(-2.47)	(-1.65)	(-9.11)
Acres	0.00162**	0.000844	0.000573	0.00108
	(2.63)	(1.02)	(0.75)	(0.81)
Year Acquired	-0.0234	-0.00433	0.0188	-0.114**
	(-1.37)	(-0.19)	(0.89)	(-3.10)
Miles to Railroad	0.00228	0.00308	0.00502	0.00419
	(1.03)	(1.04)	(1.83)	(0.88)
Water=1	0.0977	0.0212	0.0544	0.232
	(1.56)	(0.25)	(0.70)	(1.72)
Soil Quality	-0.0603	0.0151	0.0179	-0.114
	(-1.40)	(0.26)	(0.33)	(-1.22)
Elevation	0.00153	-0.000622	-0.000249	0.00444
	(1.15)	(-0.35)	(-0.15)	(1.55)
Slope	0.0126	-0.0310	-0.0263	-0.0413
	(0.75)	(-1.37)	(-1.26)	(-1.14)
Precipitation	0.000794	-0.00102	-0.00396	0.000720
	(0.26)	(-0.25)	(-1.03)	(0.11)
Miles to Land Office	-0.00654***	-0.00354*	-0.00465**	-0.0131***
	(-4.91)	(-1.98)	(-2.82)	(-4.58)
Miles to Town	-0.00359	-0.00335	-0.00128	-0.0239***
	(-1.23)	(-0.85)	(-0.36)	(-3.80)
Town Population	-0.0000508*	-0.0000402	-0.0000397	0.000109*
	(-2.29)	(-1.35)	(-1.44)	(2.28)
Town Growth	-0.0101	-0.00597	-0.000206	-0.00132
	(-1.14)	(-0.50)	(-0.02)	(-0.07)
Number of Children	-0.00726	0.0341	0.0202	-0.0354
	(-0.44)	(1.53)	(0.99)	(-0.99)
Age of Oldest Child	0.0146*	0.00920	0.0224**	0.0106
	(2.19)	(1.03)	(2.72)	(0.74)
Age	0.00604	0.00954	0.00205	-0.00761
	(1.37)	(1.61)	(0.37)	(-0.80)
Farmer=1	0.0795	0.335**	0.136	0.240
	(0.86)	(2.69)	(1.19)	(1.20)
Family Size	0.0138	0.0363***	0.0163	0.0380*
	(1.78)	(3.49)	(1.70)	(2.28)
Nativity=1	-0.240**	-0.461***	-0.350**	-0.210
	(-2.60)	(-3.71)	(-3.07)	(-1.06)
Head of House=1	0.0530	0.115	0.327	-0.135
	(0.29)	(0.46)	(1.43)	(-0.34)
Married=1	0.274	0.220	0.226	0.773*
	(1.52)	(0.91)	(1.01)	(1.99)
White=1	0.157	0.181	-0.218	0.107
	(0.67)	(0.57)	(-0.75)	(0.21)
Female=1	0.231	0.0140	-0.126	0.585
	(1.17)	(0.05)	(-0.51)	(1.37)
Constant	85.81*	-45.21	-84.19	-60.88
	(2.15)	(-0.84)	(-1.70)	(-0.71)
N	767	767	767	767

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10: OLS Estimation of Agricultural Production

	Number of Crop Types	ln(Corn Bushels)	ln(Wheat Bushels)	ln(Wages Paid)
Method of Acquisition	0.0895*	0.116	-0.00656	0.0692
	(2.36)	(1.91)	(-0.10)	(1.15)
Latitude	-0.308	0.433	-1.628	0.994
	(-0.49)	(0.43)	(-1.44)	(0.99)
Longitude	0.0687	0.431	-0.543	-1.334**
	(0.25)	(0.99)	(-1.11)	(-3.08)
Acres	0.00112	-0.0000318	0.0000437	0.000135
	(1.18)	(-0.02)	(0.03)	(0.09)
Year Acquired	-0.0218	0.0865*	-0.0555	-0.103*
	(-0.83)	(2.05)	(-1.18)	(-2.47)
Miles to Railroad	-0.00571	0.0127*	0.000425	0.000610
	(-1.68)	(2.32)	(0.07)	(0.11)
Water=1	-0.0609	-0.0804	0.234	0.253
	(-0.63)	(-0.52)	(1.35)	(1.65)
Soil Quality	-0.0839	0.0177	0.0171	-0.133
	(-1.27)	(0.17)	(0.14)	(-1.26)
Elevation	-0.000184	-0.00185	0.000888	0.00254
	(-0.09)	(-0.56)	(0.24)	(0.78)
Slope	-0.00570	0.000626	-0.0457	0.0402
	(-0.22)	(0.02)	(-0.99)	(0.98)
Precipitation	-0.00910	-0.0176*	-0.00400	0.00244
	(-1.92)	(-2.30)	(-0.47)	(0.32)
Miles to Land Office	-0.00432*	-0.0113***	-0.0110**	-0.00919**
	(-2.12)	(-3.44)	(-2.98)	(-2.82)
Miles to Town	0.000463	0.0114	-0.0218**	-0.0123
	(0.10)	(1.58)	(-2.71)	(-1.73)
Town Population	-0.0000139	-0.000161**	0.000114	0.0000218
	(-0.41)	(-2.94)	(1.87)	(0.40)
Town Growth	-0.00818	0.000946	0.0486*	-0.00186
	(-0.60)	(0.04)	(1.98)	(-0.09)
Number of Children	0.0435	0.0279	0.0202	-0.0300
	(1.71)	(0.68)	(0.44)	(-0.74)
Age of Oldest Child	0.0132	0.0279	0.0311	0.0185
	(1.29)	(1.69)	(1.69)	(1.14)
Age	0.00698	0.00808	-0.00927	-0.00384
	(1.03)	(0.74)	(-0.76)	(-0.36)
Farmer=1	-0.0395	-0.135	0.511*	0.0734
	(-0.28)	(-0.59)	(2.00)	(0.32)
Family Size	0.00461	0.0123	0.0276	0.0436*
	(0.39)	(0.64)	(1.29)	(2.30)
Nativity=1	-0.265	-0.315	0.324	-0.344
	(-1.87)	(-1.38)	(1.27)	(-1.53)
Head of House=1	0.0810	0.697	0.385	0.0183
	(0.29)	(1.52)	(0.75)	(0.04)
Married=1	0.333	0.398	0.779	-0.0711
	(1.21)	(0.89)	(1.57)	(-0.16)
White=1	1.264***	1.273*	1.397*	0.905
	(-3.50)	(-2.18)	(-2.15)	(-1.57)
Female=1	-0.0269	-0.0861	0.915	-0.861
	(-0.09)	(-0.18)	(1.67)	(-1.78)
Constant	61.83	-133.2	113.2	28.91
	(1.01)	(-1.35)	(1.03)	(0.30)
N	767	767	767	767

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11: Comparison of Survivor Functions by Farm Type

	All	Abandon	Purchase	Commute	Prove	Military Warrant
Acres	0.999	0.990	0.999	0.991	0.993***	1.007**
	(-0.67)	(-1.80)	(-0.34)	(-1.83)	(-3.67)	(3.07)
Latitude	0.402	0.0000312**	10.78	0.00287*	0.0414**	3.122
	(-1.88)	(-2.85)	(0.98)	(-2.05)	(-2.64)	(0.81)
Longitude	0.661	6.451	1.352	0.889	0.911	4.722
	(-1.65)	(1.18)	(0.52)	(-0.04)	(-0.08)	(1.49)
Miles to Land Office	1.001	1.031	1.008	0.957	1.014	1.012
	(0.48)	(0.82)	(0.93)	(-0.46)	(0.57)	(1.51)
Precipitation	1.004	0.989	1.006	0.969	1.012	1.014
	(0.90)	(-0.43)	(0.51)	(-1.53)	(1.51)	(1.54)
Miles to Railroad	0.991***	1.012	0.989	0.928***	0.985**	0.973**
	(-3.62)	(0.76)	(-1.51)	(-3.31)	(-2.61)	(-2.94)
Soil Class	1.137*	2.072	1.110	0.630	1.160	1.305
	(2.21)	(1.35)	(0.74)	(-0.92)	(1.17)	(1.67)
Elevation	0.998	0.978	0.998	1.064**	0.997	1.007
	(-1.19)	(-1.24)	(-0.55)	(2.63)	(-0.92)	(1.01)
Slope	0.990	0.651	0.976	0.943	0.933	1.194*
	(-0.47)	(-1.62)	(-0.71)	(-0.27)	(-1.26)	(2.15)
Miles to Town	0.991**	0.950*	0.979	1.068	0.992	1.030
	(-2.61)	(-2.30)	(-1.68)	(1.72)	(-1.15)	(1.58)
Town Growth	0.991	0.862	0.954	1.060	1.002	1.035
	(-0.54)	(-1.11)	(-1.49)	(0.47)	(0.06)	(0.59)
Water=1	0.858	1.917	0.757	1.522	0.708*	1.857**
	(-1.90)	(1.78)	(-1.37)	(0.91)	(-2.19)	(2.62)
Town Population	1.000	1.000	1.000	1.000	1.000	1.000
	(1.55)	(-1.48)	(-0.25)	(1.50)	(0.11)	(1.16)
Female=1	0.547*	0.567	1.076	0.433	0.322**	0.0418***
	(-2.35)	(-0.85)	(0.07)	(-1.91)	(-2.74)	(-3.53)
Age	0.994	0.968	1.000	0.987	0.966**	0.958*
	(-0.92)	(-1.15)	(0.01)	(-0.73)	(-2.61)	(-2.33)
Family Size	0.973	1.036	1.015	0.885	1.039	1.053
	(-1.40)	(0.45)	(0.28)	(-1.79)	(0.88)	(1.16)
Number of Children	1.009	1.242	1.067	1.405*	0.926	0.950
	(0.36)	(1.48)	(0.95)	(2.43)	(-1.61)	(-0.89)
Farmer=1	1.182	0.766	1.598	3.277**	0.692	2.200***
	(1.69)	(-0.45)	(1.41)	(2.59)	(-1.77)	(3.70)
Nativity=1	1.068		0.700		1.182	1.272
	(0.55)		(-1.04)		(0.63)	(0.88)
Head of House=1	0.555*	2.821	0.502	0.803	0.773	0.157*
	(-2.39)	(0.93)	(-0.69)	(-0.43)	(-0.63)	(-2.46)
Married=1	0.701*	0.764	0.671	0.541	0.410**	0.493
	(-2.02)	(-0.31)	(-0.77)	(-1.19)	(-2.93)	(-1.24)
N	736	66	145	70	240	195

Exponentiated coefficients; t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

including input costs like fencing, while it could be purchased from the federal government for only $1.25 per acre or homesteaded for even less. However, about 20% of farmers lost money on their resold farm. The land resale market is an under-explored area of research into how the land market in the late 1800's worked, and the results presented here help better understand how individuals made decisions about land resale.

I predict the most important land and demographic characteristics for how land was acquired and how quickly. I use a similar method to predict how quickly it was resold. Additionally, I use predict the most important land and demographic characteristics for the type of production farmers generate on their farm. I find that both demographic and land characteristics at the individual level are significant predictors of how the land was privatized, including wealth, the market access, the miles to the nearest land office, and the latitude and longitude of the farm. Likewise, demographic characteristics are generally significant predictors of the type of agricultural production on the farm. Specifically, demographic characteristics like wealth and family variables including family size, number of children, and the age of the children are significant predictors of the types of crops and livestock produced on the farm.

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Appendices

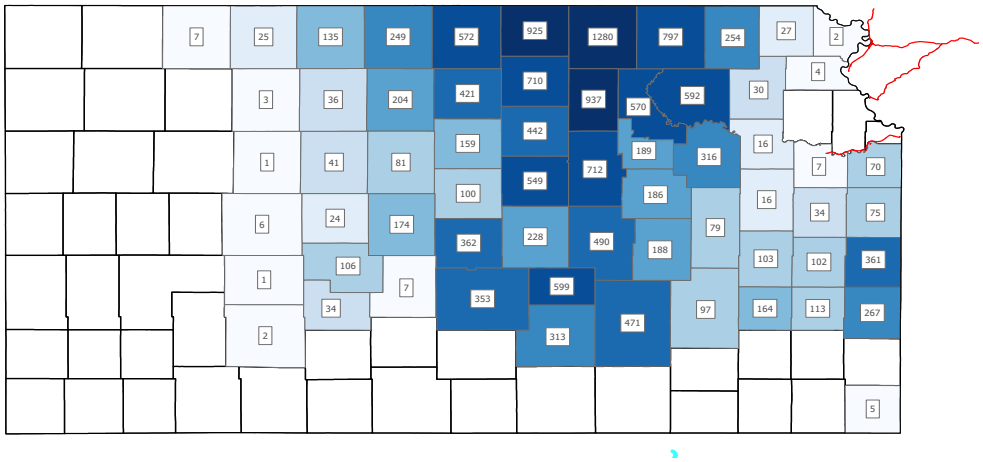


Figure 13: New Homesteads from 1863 to 1868

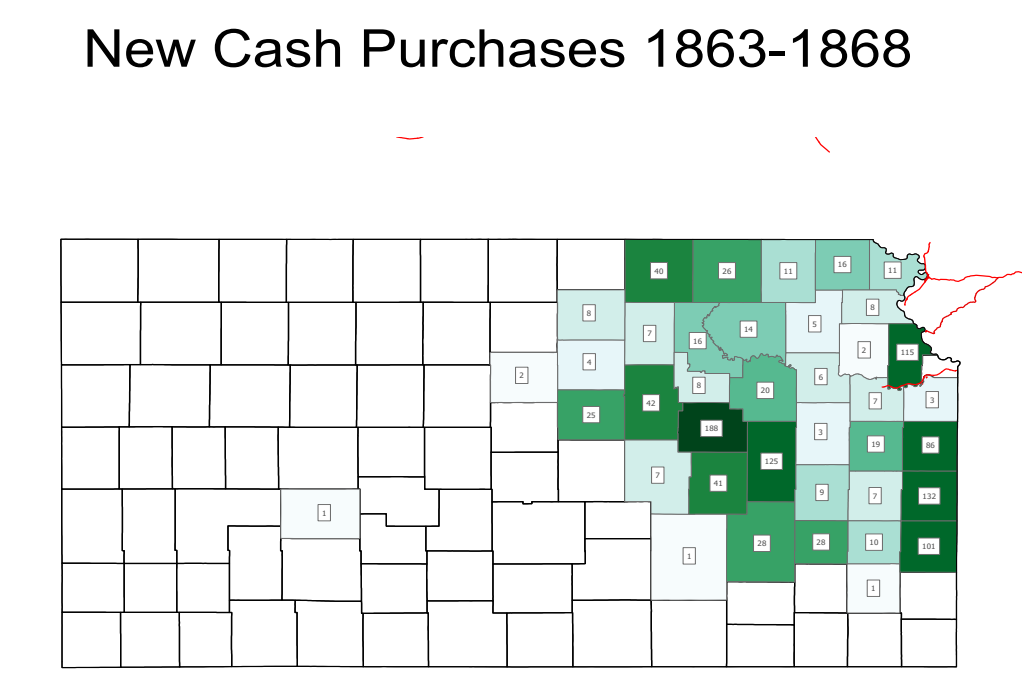


Figure 14: New Cash Sales from 1863 to 1868

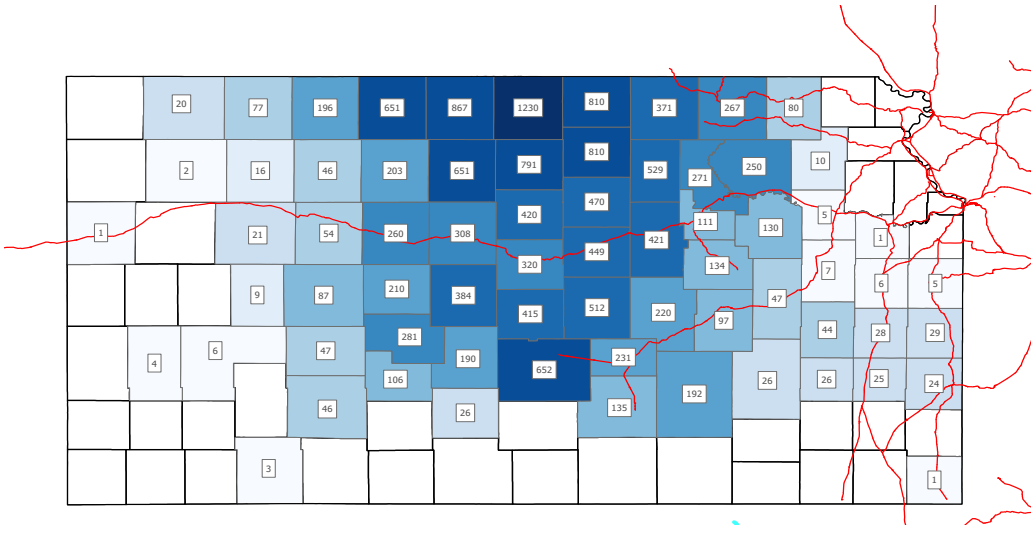
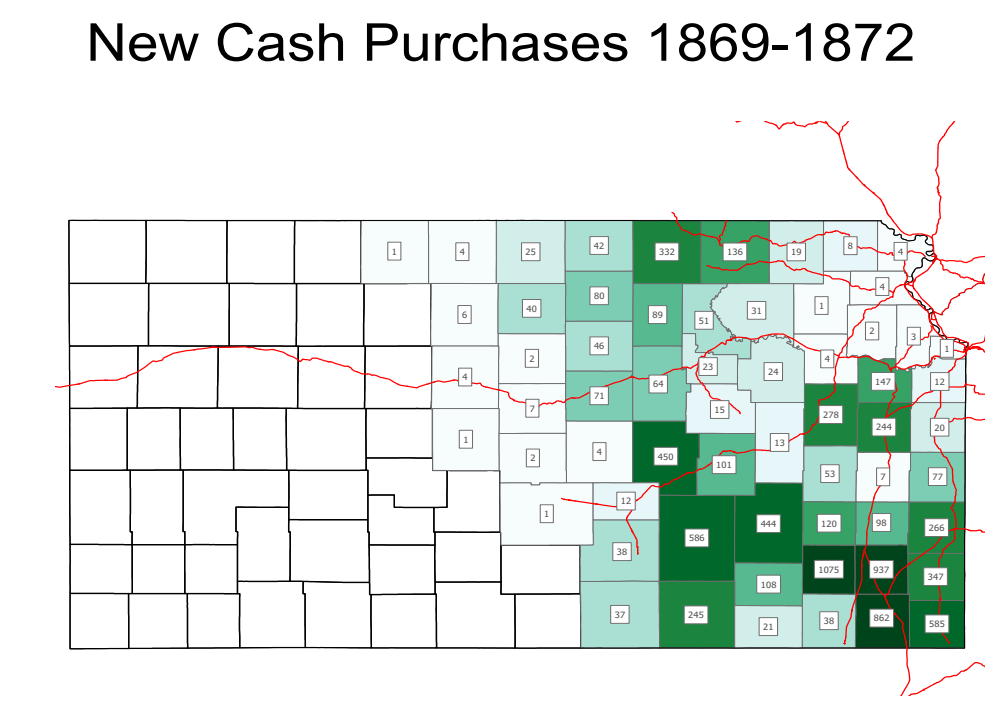


Figure 15: New Homesteads from 1869 to 1872



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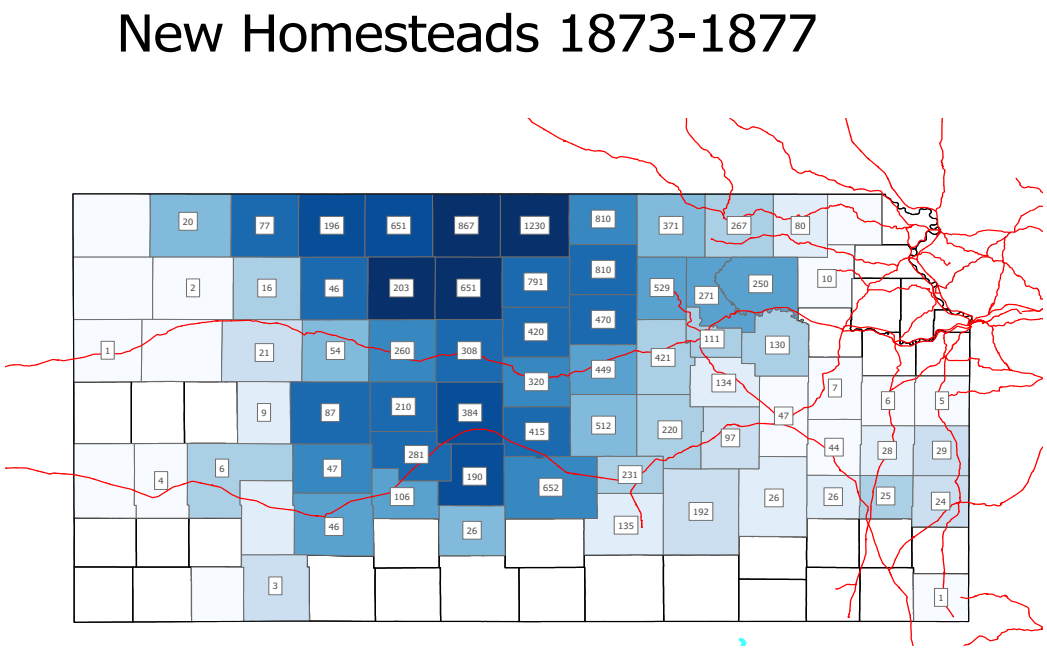
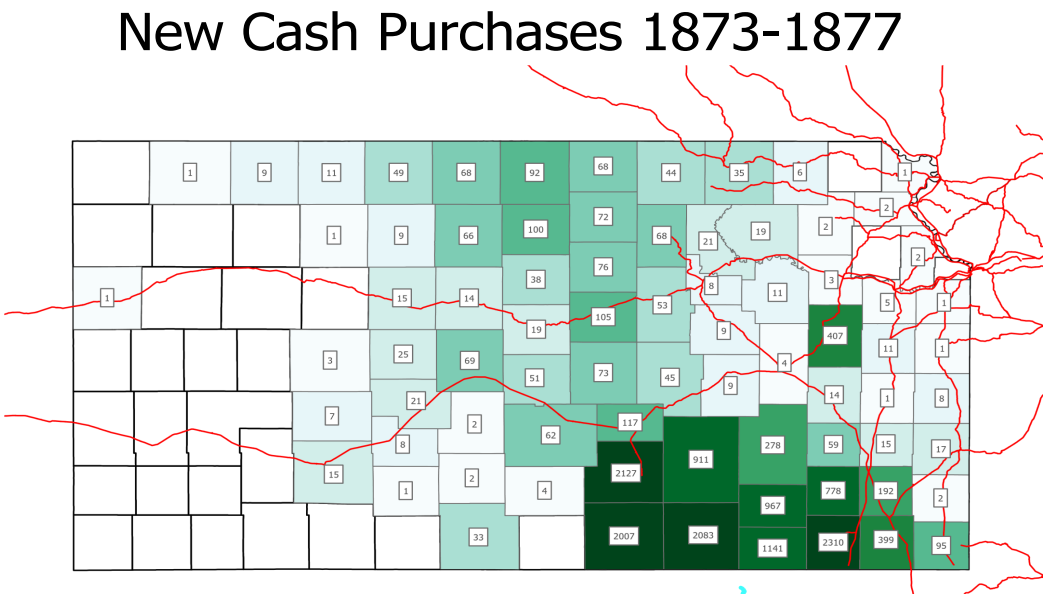


Figure 17: New Homesteads from 1873 to 1877



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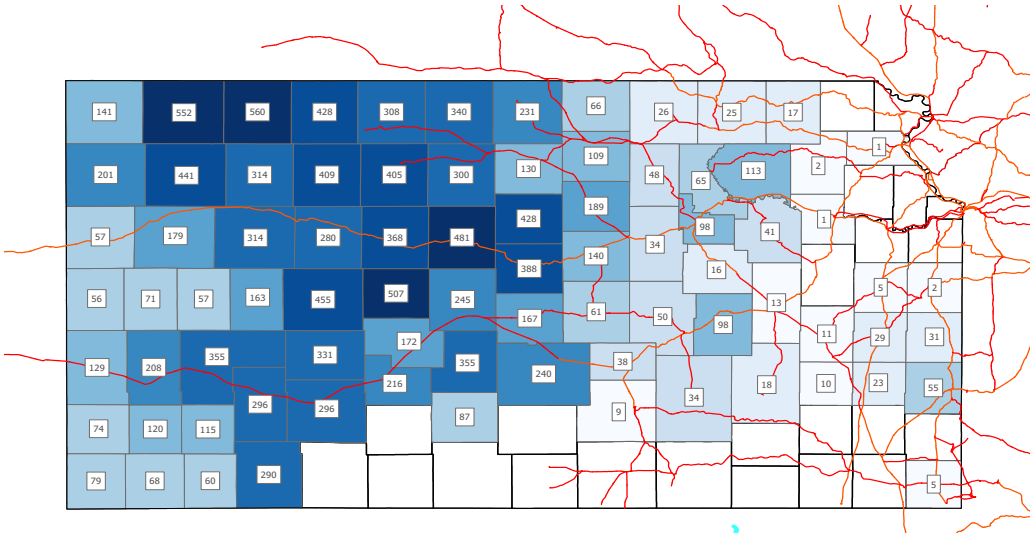

Figure 19: New Homesteads from 1878 to 1881

New Cash Purchases 1878-1881

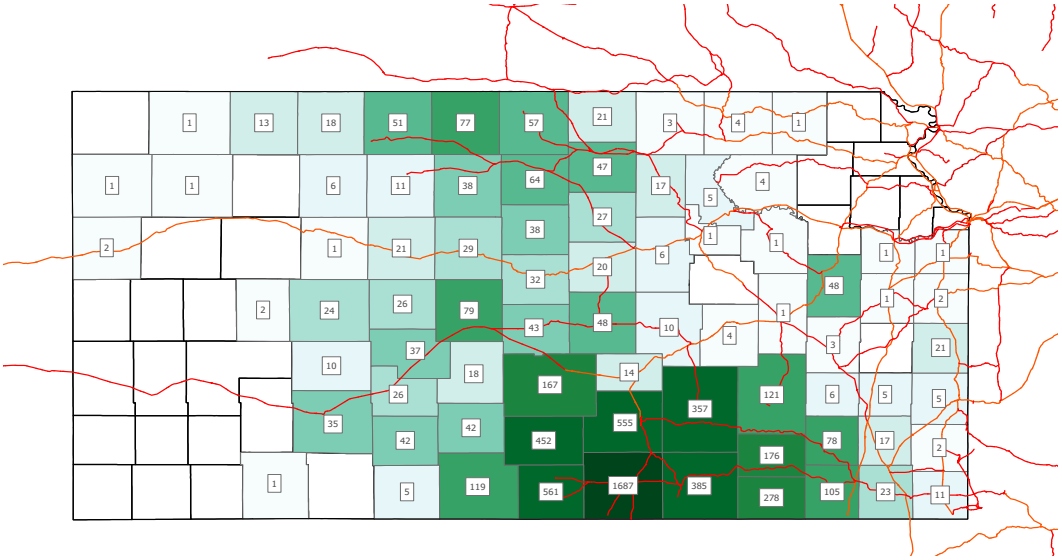

Figure 20: New Cash Sales from 1878 to 1881

New Homesteads 1882-1889

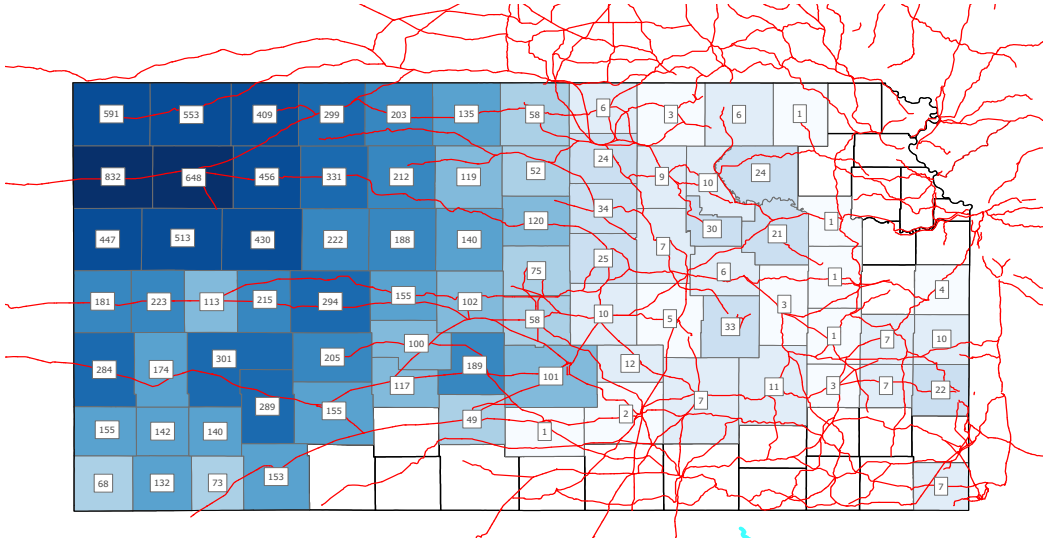

Figure 21: New Homesteads from 1882 to 1889

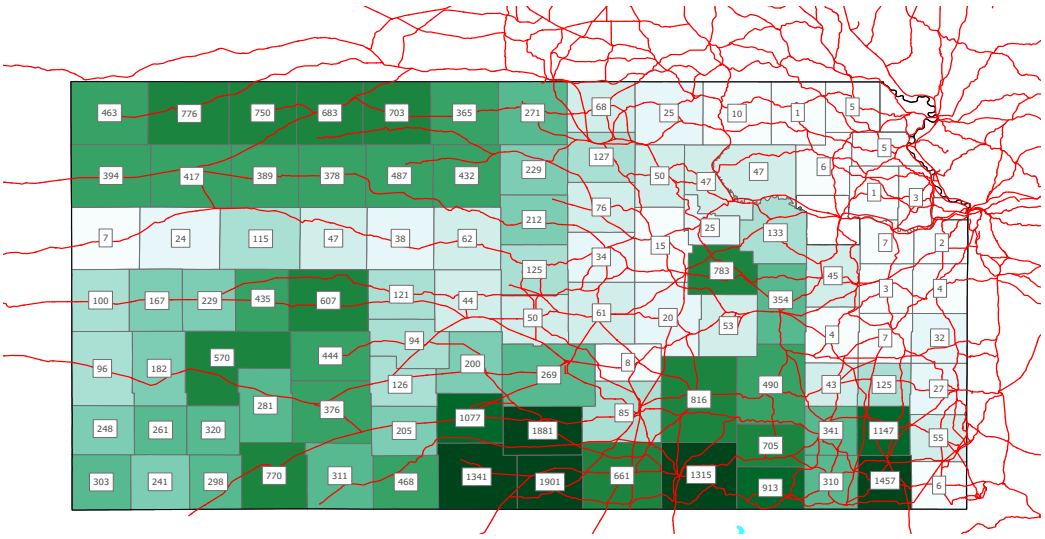

Figure 22: New Cash Sales from 1882 to 1889