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State Trust Lands and Natural Resource Use in the US Northwest

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ABSTRACT

Under nineteenth-century US land policy, newly acceded Western states received large land grants to fund the development of local schools and other public purposes. To identify the effect of these land grants, we review the roughly contemporaneous grants to Idaho, Montana, North Dakota, and Washington to control for institutional variance in the granting acts. Using both water rights and other natural resource development measures, we identify the extent to which the institution of state trust lands had an effect on natural resource development in the US Northwest. Our results indicate that state trust lands were underutilized initially, in that state lands were less likely to be irrigated and were less developed relative to a class of development activities within a state. A closer examination of the data suggests that the early political economy involved states selecting and selling land more tractable to development, resulting in less developable lands remaining in state hands today. Despite our results' persistence, this should not be taken to indicate a net negative effect, as conservation and recreational uses for undeveloped land have since emerged, posing a potential reversal of fortune in terms of contemporary economic measures.

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Introduction

The development of the US West in the nineteenth century was greatly shaped by federal land policy (Gates, 1968; Hibbard, 1924), perhaps most notably by the Homestead Act and the railroad land grants, both of which operated to transfer massive amounts of land from the government to private parties. In addition to the importance of land policies, rights to minerals, timber, and water were central to the natural-resource-intensive nature of western economic development. Water rights were especially important and required the development of the novel prior appropriation doctrine suited to the scarcity of the West, and the incentive this doctrine created to claim water as soon it was applied to a beneficial economic use makes these rights especially useful for identifying relative dates of the development.

Where less study using modern empirical techniques has occurred in the context of federal land institutions in the nineteenth century US West surrounds lands granted to states upon accession to statehood. This policy goes back to the nation's colonial period and appeared alongside the Public Land Survey System (PLSS) applied to early "Western" territories that later became Ohio and Indiana. These grants were intended to provide fledgling state governments with land and revenues necessary to support schools, an endeavor seen as fundamentally one of local control. Like many federal policies, these educational land grants changed over time, including in the terms and amounts states received upon accession. These grants transferred significant amounts of land to the newly acceded states, varying from 2.7% to 10.8% of the public domain within the state. The variation in size, along with other institutional variation, was due to the timing of statehood — ranging in the West from California in 1850 to Arizona and New Mexico in 1914 — and institutional choice by Congress at that time. These differences make identification of the specific effect of these state land grants empirically challenging. Fortunately, though, in 1889 and 1890, six states acceded out of the western territories, and due to their contemporaneity, received uniform treatment in terms of the amount of land granted per PLSS township, as well as other essential institutional details like a minimum sale price. These states were Idaho, Montana, North Dakota, South Dakota, Washington, and Wyoming, and as such, our analysis focuses on this group of states to explore the potential development effects of state land trusts.

While the purpose of the state trust lands — to help fund public efforts with an emphasis on education — provides an incentive for the state to derive maximum revenue, the political economy and property right factors may cut in

the other direction. Complex governmental decision processes for the land use may reduce development by the states themselves. Further, distinctive facets of state land disposal vis-à-vis nearby federal lands may also disincentivize private acquisition and development. In the early phases of state trust land administration, states interpreted their trust requirement to involve selling the most valuable land, although legislative, administrative, and judicial decisions all came to restrict to varying degrees the ability of states to sell their entrusted lands.

We explore the development effects of state land trusts empirically based on the exogenous variation of land ownership the PLSS and land laws provide. We use the fact that the numbered sections given to the states (generally #16 and #36) are randomly endowed with natural resources due to the fixed nature of the grid. We analyze water development because this resource is particularly suited for analysis: (1) modern geospatial records exist for *where* irrigation was developed and (2) western water law, guided by the prior appropriation doctrine, provides a priority date indicating *when* irrigation began. This state-level data has been gathered and utilized for Idaho, Montana, North Dakota, and Washington. To consider other resource use and development, we have also gathered modern land cover classifications. Using spatial fixed effects (state and township) and covariates, we test how resource outcomes varied across similarly endowed state and nonstate lands and explore heterogeneity across the states themselves. Importantly, the granular nature of patent data enables us to consider lands initially entrusted to states, as well as those still owned by the states.

Our results in Idaho, Montana, and Washington suggest state ownership had a negative effect on irrigation decisions. Moreover, due to the state-level political economies at the time (and the economic activity that greatly defines such political economies), we also uncover distinct persistent development effects across states in terms of irrigation timing, share forested, and shares under pasture and cropland. Consistent with a temporal cost to an additional layer of public administration before land could be obtained for economic activity, the effects tend to reduce resource development that required capital investments and preserve more passive land uses. At this level of generality, though, a more important component of development is obscured, in which the state sold considerable amounts of their entrusted lands to private actors, lands on which no statistically significant detrimental development effect is observable. Thus, much, although not all the development effect, washes out when considered more granularly through the available empirical evidence. Given the extended time scale of lands entrusted for a permanent public educational purpose, though, our results confirm that initial economic institutional choices have identifiable persistent consequences, even if netting out the costs and benefits of these choices is unrealistic at a temporal scale of well over a hundred years.

Nineteenth-Century Natural Resource Institutions as Central to Western Development

There is a rich historical political economy literature considering the role of nineteenth-century federal land policy and development in the US West. While Fogel (1964) is considered a seminal turn toward the application of econometric techniques to questions about the effects of nineteenth-century federal policy, other historians of this period prior and contemporary to Fogel also warrant reference (Gates, 1968; Hibbard, 1924; Robbins, 1942). More recently, numerous contributions have been made toward better understanding the initial and long-run consequences of federal land policies in the US West. With respect to land policy in particular, Allen and Leonard (2021) have identified a long-run negative development effect associated with obtaining land through the Homestead Act as compared to other viable means. Fogel's initial examination of the effects of the railroad land grants (1964) has been updated with modern econometric methods showing both net development effects (Donaldson and Hornbeck, 2016), as well as regional variation as to the predominance of this effect (Alston and Smith, 2022). Identifying the comparative effect of institutional choices has also emerged as a theme, with Native American reservations proving a useful source by which to identify the causes and consequences of variance in property institutions in the US West (Alston *et al.*, 2021; Leonard *et al.*, 2020), a more dismal narrative in terms of federal government treatment that stands as a salient counterpoint to development patterns displayed by settlers of predominantly European heritage who received the lion's share of the public domain at a significantly subsidized cost.

Yet development in the US West was fundamentally a function of other natural resources' complementarities with land, whether it be the minerals below the surface, the timber growing upon it, or most centrally, the water that tended to be a primary input to most economic activities on the frontier, whether the industry in question was farming, ranching, or mining. Natural resource institutions have therefore also been identified as playing a central role in determining observed development outcomes. Mineral rights developed alongside the unique character of the western landscape, and required novel definition by the fledgling territorial and state governments that emerged to govern the explosion in economic activity that initially tracked discovery of valuable minerals (Gerard, 2001; Umbeck, 1977). Ranching activities also preceded federal authorization of private use of public lands, and similar to mining, served as precedent economic activity that influenced subsequent settlement patterns upon the opening of the public domain more generally with the advent of general access land laws in 1862 (Alston *et al.*, 2012). Crucially, the water rights doctrine that applied in the East was one suited to levels of precipitation the arid West did not receive, which meant water

institutions had to adapt to the climatological realities of the region (Leonard and Libecap, 2019). While the newly developed prior appropriation doctrine came to predominate in the West, several states, such as New Mexico, Wyoming, and California adopted distinctive water institutions, which themselves had an observable impact on development patterns (McDevitt, 1996; Libecap, 2007; MacKinnon, 2011; Smith, 2021). Furthermore, land and water institutions have been displayed to have significant complementarities as inputs to western development, to where defects in one class of institutions can affect development in the other class (Alston and Smith, 2022).

Water's centrality as an input made securing the right to its use an important precondition to economic activity at a given scale, whether it be for processing mineral ore, or developing irrigation canals to bring water from remote rocky canyons to ground more suited for cultivation or husbandry. For economic historians, this means water rights have several desirable features associated with dating economic activity in the US West. Because water rights in the arid West had to adjust to annual variation in supply, this means rights to water are governed by a priority system where senior users have greater certainty as to water availability relative to junior users. This gave water users on the western frontier strong incentives to file their claim as soon as they could prove that the water was being applied to "beneficial use". This latter requirement tended to track the public policy objective of spurring western development and reflected local communities' concerns about the comparative ability of well-capitalized eastern interests to speculate on natural resources, stymying development and the rents from these economic activities that would otherwise accrue to a greater extent locally (Clark and Joseph, 2005). Taken together, the incentive to file early upon applying the water to a beneficial (economic) use means that the priority date of a water right attached to a given land parcel is likely a close approximation of when settlement and development occurred (Alston and Smith, 2022). While land and mineral rights were subject to a more protracted claims process involving the General Land Office in Washington, DC (with a set of idiosyncrasies we are exploring elsewhere (Smith, S. (PI) *et al.*, 2021)), water rights' comparatively local nature coupled with the rush to appropriate makes them useful for identification purposes in ways that we further leverage in our analysis herein.

State Trust Lands as an Institutional Component of Western Development

As territories in the US West acceded to statehood, the federal government transferred the fledgling state governments' specific sections of land in each PLSS township (Gates, 1968; Souder and Fairfax, 1996). Under the PLSS in the US West, this meant specific numerical sections of land in each larger

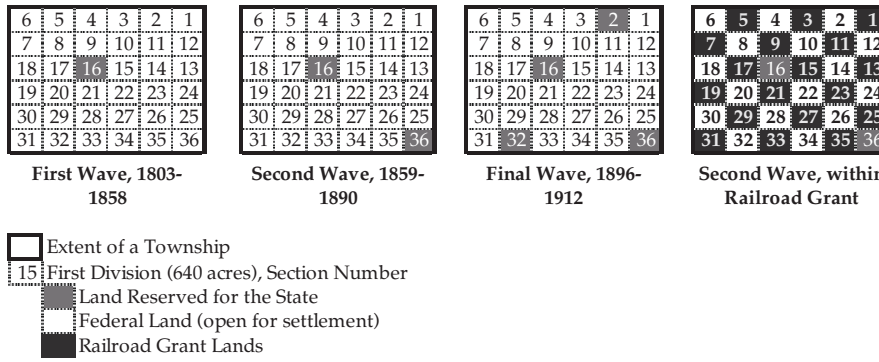

Figure 1: State land grants township illustration.

Notes: This is a stylized representation of iterations of the state land grants within the PLSS grid created by the authors. See Table 1 for more details about the states within each wave. The railroad land grant is included as the states in our empirical example were extensively covered by the Northern Pacific land grant.

township division transferred to state ownership, under the aegis of supporting schools and other local government functions through use or sale of these lands.[1] Figure 1 provides stylized versions of the practice across different time-periods and contexts. Each example is one township, a division of land that is 36 sq. miles further divided into sections that are each 1 sq. mile or 640 acres. Although numbering varied early on, the figure shows what emerged as the common numbering system of these sections. During the first wave, state governments only received one section, numbered 16, upon accession. The second wave added section 36, doubling the amount of land per township and finally, a third wave added sections 2 and 32 as well. Our empirical sample comes from the second wave and are states that also had extensive railroad land grants within them. The last panel illustrates this land disposition where the railroad received all the odd sections as a subsidy for construction, and the federal government retained the even sections except for sections 16 and 36, which were still reserved for the state. In most contexts, the federal lands could be disposed of based on active land laws, including cash purchases and, famously, homesteading. These land patents were typically 160 acres or one-quarter of a section.

[1]The public purpose underlying these state land grants had lengthy antecedents going back in federal policy to 1785, when Congress first provided legislative detail surrounding land disposal in the western territory, which at the time was referring to future states like Ohio and Indiana. This 1785 ordinance reserved "Lot No. 16, of every township, for the maintenance of public schools", a public policy that had its roots in earlier colonial New England governance, which itself drew on an English tradition granting land locally for religious schools (Taylor, 1922).

Table 1: State trust lands overview.

Numbered sections	Implied percent of lands	Statehood year range	States	Total acreage
16	2.7	1803–1858	($N = 14$) Ohio, Louisiana, Indiana, Mississippi, Illinois, Alabama, Missouri, Arkansas, Michigan, Florida, Iowa, Wisconsin, California, Minnesota	24,620,423
16, 36	5.4	1859–1890*	($N = 12$) Oregon, Kansas, Nevada, Nebraska, Colorado, North Dakota, South Dakota, Montana, Washington, Idaho, Wyoming, Oklahoma	42,613,929
2, 16, 32, 36	10.8	1896–1912	($N = 3$) Utah, New Mexico, Arizona	30,349,458
			Total =	97,583,810

Notes: Summary of state trust lands provided to states. Numbered sections and total acreage from Culp *et al.* (2006), Appendix. *Oklahoma received 16 and 36 later in 1907 amid other states receiving four sections.

The state land grants were a significant policy — these acts operated to transfer roughly 2.7% of lands to 14 states, 5.4% to 12 states, and 10.8% to 3 states for a grand total of nearly 100 million acres of land going from the federal government to the states. Table 1 provides a general overview of what lands states received and when. Beyond the distinction in the number of sections received, other institutional variation accompanied the state grants. States like Illinois, Indiana, and Michigan received varying institutional treatment as to how the lands entrusted to the states for public school treatment would be managed. For example, an attempt to require that state trust lands be leased was widely viewed as a failed public policy, and earlier states began to test the limits as to which their lands' revenues could be applied to internal improvements. This period of leasing requirements concluded with Ohio's state government petitioning for the ability to sell the lands, which ended up with the land transferring into the ownership of current lessors or local interests at purchase prices considered to be well below market value (Taylor, 1922, pp. 94–95). The inherited institutional "wisdom" that sales were preferable to leasing proved informative to Western states' institutional arrangements, which initially permitted the sale of entrusted lands to generate revenue for

the development of schools (and other related public purposes for which the lands were entrusted).

As problems like these with the prior state land grants (or challenges in public administration associated with land policy more generally) became apparent, the grants to new states came with more restrictions on their disposition by the time western territories reached a point where their development made accession to statehood feasible. For example, prior to Colorado's accession in 1876, the grant of lands to a state government had no restrictions on the price at which these lands could be sold. For the states from 1876 onward, a restriction on minimum price for sales of state trust lands was imposed, beginning with $2.50 in Colorado, and reaching $10/acre with all subsequent western states. Notably, this is more expensive than the typical federal minimum of $1.25/acre and exceeds the price for even sections of federal lands within railroad grants, which were $2.50/acre.

For the purposes of comparative analysis, this variation is superficially attractive, but such variation occurred across a lengthy period — California's accession to statehood was in 1850, while New Mexico and Arizona acceded in 1912. More specifically with respect to the variance as to the state grants, in 1850 California stood as one of the last states to be granted only one section in each PLSS township; from 1859 (OR) to 1890 (ID & WY), nine western states were each granted two sections per township prior to the change that resulted in Utah, New Mexico, and Arizona receiving four sections per township. To further confound parcel-level comparison across decades, land grants to western states began to occur for a wider range of purposes with grants from Colorado onwards including portions for agricultural and scientific colleges, a university, and common schools. From Utah's accession onwards in 1896, the number of distinct universities, colleges, and common school purposes was several times that of the original grants to California and Oregon. This makes a general identification of the effect of state trust lands in the US West a vexing empirical identification problem, as time of settlement, land characteristics, and institutional treatment all tend to vary significantly.[2]

Fortunately, though, one group of western states acceded to statehood at approximately the same time, which meant that the Congressional definition of their trust lands was relatively uniform. Passed on February 22, 1889, the enabling act for Montana, North Dakota, South Dakota, and Washington reserved sections 16 and 36 in each township and set a minimum price of $10/acre for the sale of these lands. Slightly over a year later, Idaho and Wyoming acceded to statehood on 3 July 1890 and 10 July 1890, respectively. These two states received the same sections for public schools and were governed

[2]Recently, Lewis (2019) provided analysis on how state trusts with mineral rights spilled over onto neighboring sections within the institutional context of Wyoming. Our work complements this by extending the analysis across states and considering other resource development in a different era.

by the same minimum sales price.[3] Unlike the variance that state trust lands across the US West display in terms of their timing, size, and restrictions on use or sale, the group of states that acceded in 1889–1890 present a better opportunity for empirical identification of the development effects of state trust institutions, an insight that we leverage herein.

At a minimum, this poses a straightforward comparative governance question due to the political distinction between state and federal government disposition of these lands, but the question has further theoretical value due to the hypotheses that this institutional variation poses for development outcomes. First, there is the mechanical nature of relative prices for state as compared to federal lands — while state lands in our sample all had a \$10/acre minimum, federal lands were available either for free with improvements, or between \$1.25 and \$2.50/acre for cash purchase. Furthermore, the grant of state lands tended to come after significant settlement and development had taken place, suggesting that a delay in development would also derive directly from the fact that these lands were selected after many adjacent lands on which some development was likely to have occurred given the timing of western settlement.

Thus, the question emerges of how accession to statehood is situated within the broader development patterns at the time. Statehood came after sufficient settlement of a given territory had taken place, which means a significant amount of sections to which fledgling states were otherwise entitled were already settled (or otherwise unavailable under the specific terms of the Enabling Act). This reality entitled states to selection of lands "in lieu" of those unavailable. Ultimately, though, the way in which states could obtain lands "in lieu" of those already settled presented a revenue-maximizing alternative compared to the exogenously fixed set of lands they could have otherwise prioritized for sale or leasing. In the longer run, this very ability to select lieu lands presented a valuable development opportunity in the case of federal lands containing valuable mineral deposits (Culp *et al.*, 2005, p. 11).

There are additional theoretical reasons why state lands could have developed later. Scholars of property institutions in developing nations have identified how public authorities have been observed to retain control rights to land or natural resources to maintain electoral support among the actual resource users. This suggests that land disposition can be a powerful political economic tool, such that in some places, there is a perpetual "gap" or "wedge" between property rights on paper (Albertus, 2021) or in de facto use (Alston *et al.*, 1996) and their economically efficient optimum (Alchian and Demsetz,

[3]Idaho and Wyoming's enabling acts were more specific regarding the application of revenues from these land grants to school and university purposes, although the states acceding prior to this had all (with the exception of Minnesota) devoted revenues from their trust lands to these school purposes, despite the ability to devote the funds to internal improvements more generally (Cromwell, 1922, p. 109).

1973; Demsetz, 1974). But for local political actors to capture rents associated with economic development, this suggests an additional transaction cost to development on state lands compared to adjacent federal parcels. Furthermore, given all these reasons we also anticipate a persistent negative development effect, as initial institutional variation has been linked to persistent negative development consequences in the US West in other contexts (Allen and Leonard, 2021; Alston and Smith, 2022).

Nonetheless, despite initial institutional variation as to the fiscal restrictions on the use of funds derived from sale or lease of state trust lands, the early reports of state trust land administrators clearly considered sale of these lands a high priority. In Montana, the first two years of the State Land Agent's annual reports surround lands surveyed with intent to select in lieu of lands already settled, lands whose beneficial development characteristics the report emphasizes as reason for their selection (Stuart, 1892).[4] These lands selected with intent to sell totaled well above 100,000 acres in the first two years of Montana's state land administration. Put more directly, "[i]nitially, Idaho chose to concentrate on selecting high-valued agricultural and grazing lands with the intention of selling them. Timberlands were selected with the intention of removing the timber and then selling the land as agricultural or grazing lands" (O'Laughlin *et al.*, 2011, p. 4). Similarly, in the case of Idaho, large trust land ownership blocks were created through in-lieu selections (O'Laughlin *et al.*, 2011, p. 6).

Lands granted to the state government upon accession faced a temporal lag in terms of their development relative to adjacent lands in the event those sections were available, or otherwise the state had to select still-undeveloped lands elsewhere — on either margin, state lands were mechanically less likely to be developed than other lands. This was coupled with a comparative price effect which made state lands more expensive. Nonetheless, to a state administration tasked with maximizing the value of state lands, yet unable to capitalize fully on all lands at once, the ability to select lands presented the near-term optimizing margin in a context of limited administrative and fiscal capacity. Relative to surveying areas where the state was relatively confident they would obtain their allotted and therefore exogenously determined sections — which were the least developed by definition — the state land trust administrations had the incentive to prioritize land selections most tractable to sale in lieu of those they had already lost to development, mineral character, or other federal administrative activity. This suggests that the margin of lands still held by states should be compared to the outcomes associated with lands granted to the states originally and ultimately sold, because this at a minimum suggests a potentially revenue maximizing benefit to the state trust land administration.

[4]"Under this law I was appointed, and entered upon the discharge of my duties by a personal examination of the *places deemed most favorable for locating the large quantity of land to be selected.* <emphasis ours>" (Stuart, 1892).

This recognition animates our consideration of the data beyond the intent-to-treat level of the sections reserved in the Enabling Act for the states in our sample; instead of examining sections 16 and 36 only, our empirical strategy directly considers the comparative set of lands entrusted to and sold by the states versus those that remain in state hands to this day.

Despite the general effect we anticipate being present on state trust lands in our sample of western states, it is also possible that there are state-specific effects of this institution, due to the interaction between the potential inputs to economic activity and set of political economic actors within each state. Given the significant amount of land transferred to state governments, and the effect we predict this unique institution had on development, in the next sections we explore the development effects empirically based on the exogenous variation of land ownership the PLSS and land laws provide.

Data and Methods

To probe our hypotheses about state lands, we collect spatial data on resource use across the sample of US states acceding around 1890. We have prioritized irrigation development in the Western US because (1) modern geospatial records exist for where irrigation was developed and (2) western water law, guided by the prior appropriation doctrine, provides a priority date indicating when irrigation first began yielding more temporal precision for early resource development. Furthermore, as discussed above, irrigation is highly asset specific and a complementary input to the land, making the lack of land ownership likely to reduce the incentive to develop the water resource more than other colocated resources.

However, states administer their own water rights systems, not the federal government, leaving the records as state specific. This constraint led to our sample including Washington, Idaho, Montana, and North Dakota and lacking Wyoming and South Dakota of the states entering the union around the same time. For each of the states with available data, we located GIS information on the place of use for water rights as well as the rights' priority date. We limit all samples to water rights for irrigation, which remains the dominant use in the Western US, and was even more so during the initial settlement and development.

Although we focus on irrigation, we consider additional resource outcomes. First, we also consider the temporal component of irrigation, looking at both the earliest irrigation year as an outcome and estimating different coefficients by time period. In other words, we take the outcome as whether the section was irrigated by each decadal year (1870, 1880, etc.). For more modern outcomes, we utilize the CropScape cropland data layer (CDL) to calculate the shares of the section that are developed, used for crops, and remain in grassland pasture

or forest cover. We utilize 2008 as this is the earliest year with coverage for all the states.

Table 2 provides a summary of the main variables. Around one-fifth of the sections have an irrigation water right, indicating a significant number of sections are irrigated. However, we note that seldom is the entire section irrigated and the share of land that is irrigated on average is closer to just 10%. Priority years are only measurable conditional on irrigation. They span from 1800s through today, but the average is around 1922. Developed share is relatively low, indicating it is uncommon in general. Among other uses, forest share is the most dominant, followed by grassland and then cropland. The sections intended to be granted to the states make up 5.5% of the sections by construction.

Our ideal approach is to rely on the inherent exogeneity of where state lands fell due to the rigidity of the PLSS along with legislation that grants certain sections. In the context of railroad land grants and state lands, this method has been fruitful recently (e.g., Alston and Smith, 2022; Edwards *et al.*, 2019; Lewis, 2019). This approach uses the fact that the sections given to the states (#16 and #36) are randomly endowed with natural resources due to the fixed nature of the grid. However, as discussed above, the process of land disposition did not proceed as simply as implied. First, due to prior settlement by the time a territory acceded to statehood, many of these 16/36 sections were unavailable and the states could select an alternative available section in lieu. Second, the state need not maintain ownership today and the land may have been sold at the advertised prices. In other words, not all 16/36 are or even were state-owned while non-16/36 sections could also be state lands. These outcomes can be seen in Figure 2.

The figure draws on additional data from the General Land Office patent records (BLM, 2022) and "protected land" from the PAD-US database (USGS, 2022).[5] State land retained is land patented by the state and still owned by the state while state land sold had a state patent but no longer is owned by the state. The remaining shares of each section number across the four states were not patented by the state. Of sections numbered 16 and 36, roughly 20% were never patented by the state due to prior settlement or other deficiencies, a component whose deficiency presented a selection opportunity for states in pursuit of their trust responsibilities as they construed them. Roughly 50% of 16/36 sections are still under state ownership today. The balance of 30% or so has been disposed of by the state after securing a patent. These ratios vary across the states slightly (See Online Appendix, Figure A1) with the most notable distinction in Montana, where none of the 16/36

[5]The lands extracted for this project are "fee" lands, meaning they are or were owned outright by the state. There is not necessarily a legislative or regulatory "protected" status implied, just that it is state owned.

Table 2: Data summary.

	Count	Mean	St. Dev	Min	Max	Description
Irrigated	370,510.00	0.219	0.413	0	1	Equal to one if section has irrigation water rights
Priority year	78,403.00	1,921.60	35.93	1763	2020	Priority year of first water right
Developed share	299,591.00	0.00960	0.0594	0	0.998	Fraction of the section "developed" based on CDL
Grassland share	299,591.00	0.273	0.330	0	1	Fraction of the section with grasslands based on CDL
Cropland share	299,591.00	0.128	0.259	0	1.069	Fraction of the section with cropland based on CDL
Forest share	299,591.00	0.304	0.368	0	1	Fraction of the section with forest cover based on CDL
State section	370,510.00	0.0545	0.227	0	1	Equal to one if the section is numbered 16 or 36
State claimed	370,510.00	0.103	0.304	0	1	Equal to one if the section was patented or currently owned by the state
State indemnity	370,510.00	0.0641	0.245	0	1	Equal to one if the section is state Claimed but not numbered 16 or 36
State owned (Today)	370,510.00	0.0613	0.240	0	1	Equal to one if the State maintains ownership of one quarter section based on PADUS
Inside railroad Grant	370,510.00	0.246	0.431	0	1	Equal to one if the section is within the bounds of the Northern Pacific Grant
Distance to railroad	370,510.00	19.99	20.64	0	122.0	Distance, miles, to the closest railroad line
Distance to stream	370,510.00	1.873	3.105	0	39.96	Distance, miles, to the closest stream
Strahler order of stream	370,510.00	1.692	1.217	1	7	Strahler order of the closest stream (1–7)
Elevation, mean	370,510.00	1,100.80	598.1	1	4148.5	Average elevation (m) above sea level
Elevation, Std.	370,510.00	32.74	45.30	0	433.7	Standard deviation of elevation within the section
Average precipitation	370,510.00	631.1	551.2	158.8	6602.5	Average annual precipitation (mm)
Average temperature	370,510.00	6.215	2.262	−11.21	12.79	Average annual temperature (Celsius)
Soil classification	370,510.00	5.052	1.922	0	8.007	Average soil class (1–8)

Notes: Summary statistics and brief description of data used. Full description and sources are found in Online Appendix A.

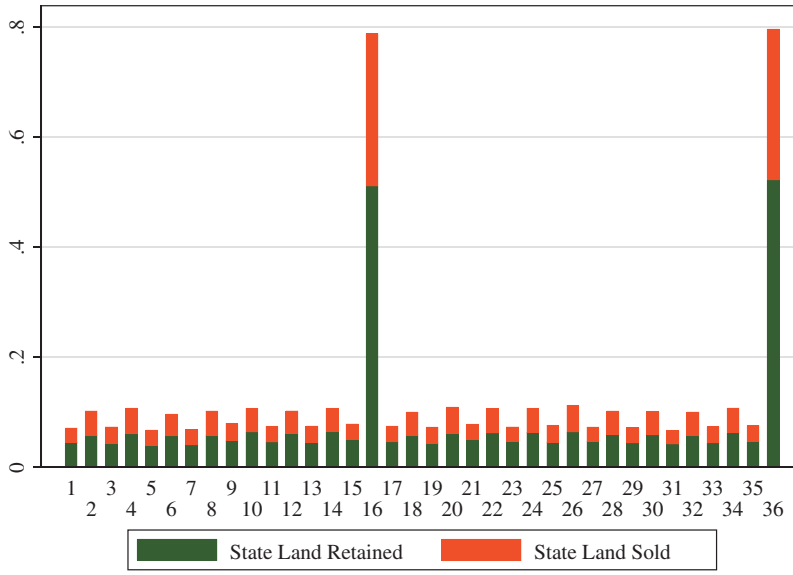

Figure 2: Share of sections.

Notes: Graphs of the percentage of sections under various ownership statuses across each state. "State Land Retained" is that which was patented by the state and remains owned by the state today. "State Land Sold" was patented by the state but is no longer owned by the state today. The balance does not have a state patent. Patents are from GLO land records (BLM, 2022) and current ownership is from PAD-US (USGS, 2021).

sections patented by the state left state ownership.[6] Importantly, a good portion of state lands therefore come from non-16/36 numbered sections. The even sections are systematically more frequent owing to many odd sections being unavailable due to the Northern Pacific Railroad land grant. While the instances of selection are otherwise spread evenly across sections, they may not be randomly endowed with development potential nor is the land that subsequently left the states' hands likely to be randomly selected.

In Table 3, we consider potential selection among some of the various subsamples of land associated with the state trust lands. The 16/36 sections themselves look very similar to the entire sample, save for the state land-related variables. This aligns with the exogenous nature of the land survey

[6]While the data and archival records do not provide a clear explanation why Montana retained all of its 16/36 sections relative to the other states in our sample, Montana was in 1898 the first to adopt a policy of not selling state trust lands (Davis, 1963, pp. 17–18). Given that the state had only been selling lands for 7 years at that point, it may be that it never moved to sell its generally allotted sections before the policy change, as the early reports of the State Land Agent focus on selection of in-lieu lands that were especially well suited to agricultural development (Stuart, 1892).

Table 3: Balance table.

			Means of state land subgroups			
	All	All 16/36	State patented	Selected state lands	Retained	Sold
Irrigated	0.219	0.208	0.238	0.226	0.209	0.252
Priority year	1,921.60	1,922.20	1,922.50	1,921.50	1,925.70	1,920.10
Developed share	0.00960	0.00897	0.00908	0.00778	0.00319	0.0218
Grassland share	0.273	0.290	0.291	0.255	0.329	0.188
Cropland share	0.128	0.115	0.128	0.119	0.0862	0.195
Forest share	0.304	0.301	0.279	0.335	0.303	0.251
State section	0.0545	1	0.380	0	0.385	0.326
State claimed	0.103	0.720	1	1	1	1
State indemnity	0.0641	0	0.620	1	0.615	0.674
State owned (today)	0.0613	0.433	0.593	0.588	1	0
Inside railroad grant	0.246	0.247	0.228	0.200	0.241	0.206
Distance to railroad	19.99	19.88	17.65	17.56	21.45	11.56
Distance to stream	1.873	1.886	1.874	1.773	1.721	2.192
Strahler order of stream	1.692	1.696	1.676	1.609	1.607	1.754
Elevation, mean	1,100.80	1,088.50	969.1	981.6	1,038.30	840.5
Elevation, Std.	32.74	31.79	26.24	30.22	30.39	20.62
Average precipitation	631.1	619.1	670.7	766.3	709.8	636.2
Average temperature	6.215	6.258	6.667	6.552	6.761	6.500
Soil classification	5.052	5.015	4.839	4.896	5.259	4.173

Notes: Summary statistics for subsamples of the data. "All 16/36" is all sections numbered 16 or 36, originally intended for the state land trust. "State Patented" is the sample of sections with relevant state patent no matter the section number. "Selected State Lands" are those patented not on sections 16/36. "Retained" are those patented by the state and still under state ownership. "Sold" are those patented by the state but no longer owned by the state.

with respect to resource endowment. Those patented or owned by the state are also relatively similar, although perhaps slightly wetter and lower. The state lands selected from non-16/36 sections are biased to be beyond the railroad grant and typically have even more precipitation. Overall, the "selection" of in-lieu lands appears minimal based on observables. However, they are slightly more likely to be sold, a tendency even more pronounced if only state-patented lands are considered (42% of 16/36 state-patented sections are sold compared to 52% of non-16/36 state-patented sections).[7]

The potential selection is important because the largest distinctions are between what the state retained and what has left the states' portfolios, shown

[7]Because current ownership includes some once "private lands" that State Trusts later acquired through foreclosure of lands whose private mortgages the state had owned, our state lands owned measure is slightly biased upward relative to the original portfolio of land granted.

in the final two columns. Most notable is that the "sold" land averages half the distance from a railroad. Sold land is also lower and flatter than retained land and has better soil suitability. This suggests private purchasers were more willing to pay the price premium for state lands where market access was greater and agricultural production potential higher. What remains with the state today appears to be relatively less desirable measured by the observable characteristics at hand. This is consistent with the early administrative records from the states we consider that lands were selected for sale to maximize revenue as a function of local survey data and the ability to obtain consolidated tracts of land relative to those available to individual settlers under the federal land laws.

For the persistent effects of state land grants, we estimate versions of the equation:

$$Y_{sti} = \alpha \cdot \mathbf{1}[State\ Section_{sti}] + \boldsymbol{\sigma'} \cdot \mathbf{F}_{\boldsymbol{sti}} + \boldsymbol{\gamma}_{\mathbf{st}} + \varepsilon_{\text{sti}} \tag{1}$$

For Y_{sti}, we focus on an indicator function equal to one if section i in township t and state s has an irrigation water right associated with it. The coefficient of interest is α, providing an approximation for how state trust sections are distinct in their odds of being irrigated. We measure $\mathbf{1}[State\ Section_{sti}]$ in several ways given the various grant land outcomes already discussed. First, we let it be equal to one if the section is numbered 16 or 36, providing an intent-to-treat baseline given the number of prior land claims and number of selected sections elsewhere in the townships. Second, we consider state lands as those patented by the state under the land grant laws. Third, we consider only those lands still retained by the state today. Finally, we also include combinations of these indicators to uncover statistically distinct effects.

While the exogeneity of the PLSS provides a credible causal interpretation of the intent-to-treat version, to enhance precision of the estimates and address some selections of the other land statuses, we include several covariates likely to affect irrigation decisions. Namely, $\mathbf{F}_{\boldsymbol{sti}}$ is a vector that includes distance to and size of the nearest stream, historic average precipitation and temperature, elevation, variation in elevation, and soil quality. In addition, because of the importance of the railroads and railroad land grants to land-use decisions in the area, we also include distance to railroad, whether the section falls within the land grant borders and whether it is odd, representing the sections granted to the railroads. Finally, $\gamma_{\mathbf{st}}$ are spatial fixed effects to represent any omitted variable that is constant for sections within a given area. Our preferred unit is a township (36 sections in a 6×6-mile grid) fixed effects, but we show robustness to larger (state and county) and smaller (1/4, 1/3 1/9 of townships) fixed effects in the Online Appendix (Table A2). We also estimate the coefficients by state separately. All standard errors are clustered at the county level to allow for arbitrary correlation across space.

Results

Table 4 provides the estimates of the regression results utilizing data from all the states in the sample (Washington, Idaho, Montana, and Idaho) for the various resource and development outcomes. Panel A considers treatment as those sections the state patented under the grant acts, regardless of section number or current status. Across all metrics, the state lands are less developed. Irrigation uptake is about 8% less likely ($0.0181/0.219 = 0.083$) and nearly 2 years later, on average. Although statistically significant and of a non-negligible economic scale, the results also indicate that many of the state lands are brought under irrigation. Today, state lands have a smaller share "developed", less cropland planted, and greater share of remaining grassland or forest. An important point we return to is that this latter result of having more forest, although indicative of lower resource extraction on state lands, could in fact provide recreational activity and may be a great public benefit today both in terms of revenues and direct use utility.

Panel B considers only land retained by the state today where, in general, the magnitudes of the point estimates are larger, indicating development measures are smaller. For instance, irrigation is 20% less likely on this retained land than other lands in the township. In panel C we see that many of the differences between the retained land and the sold land is statistically significant, save for irrigation timing. This indicates that once land left the state land trust portfolio, the development potential could often be realized on relatively equal terms of other nonstate lands. Finally, panel D considers whether the outcomes on state lands are distinct by whether they are "selected", or from a non-16/36 section. The evidence is mixed. On irrigation, there appears no statistically distinguishable difference. The selected lands are less "developed" by modern standards, but also with more cropland and forest share. More cropland suggests this land was perhaps more suitable for agriculture than the random 16/36 section.

The results are robust to specification and sample. Table A1 of the Online Appendix focuses on selection. It provides the intent-to-treat specification, an IV specification (using sections numbered 16/36 as the IV), excluding non-16/36 sections the state selected, those selected and later sold, and sections without any patents on them. The effects all remain statistically significant and tend to be larger under these alternatives. Finally, in Table A2 we present the state-owned land treatment across the outcomes using progressively finer spatial fixed effects for our main sample. The results are robust although the forested share is not statistically distinguishable from zero using larger fixed effects (state and county). The sub-township fixed effects are generally stable.

In Table 5 we have broken up the results by each state to consider heterogeneity of the state lands. The specification includes all claimed lands and the interaction with those that the states no longer owns akin to specification

Table 4: Pooled sample regression results.

	(1) Irrigated	(2) Priority year	(3) Developed share	(4) Grass share	(5) Cropland share	(6) Forest share
Panel A						
State claimed section	−0.0181***	1.716***	−0.00302***	0.0214***	−0.0210***	0.00619*
	(0.00378)	(0.418)	(0.000634)	(0.00451)	(0.00369)	(0.00368)
N	370,510	77,676	299,591	299,591	299,591	299,591
Adj. R-sq	0.509	0.615	0.621	0.771	0.660	0.841
Dep. var. mean	0.219	1,921.30	0.00960	0.273	0.128	0.304
Dep. var. std.	0.413	35.79	0.0594	0.330	0.259	0.368
Panel B						
State owned (Today)	−0.0448***	2.096***	−0.00377***	0.0334***	−0.0442***	0.0198***
	(0.00501)	(0.530)	(0.000719)	(0.00683)	(0.00502)	(0.00543)
N	370,510	77,676	299,591	299,591	299,591	299,591
Adj. R-sq	0.509	0.615	0.621	0.771	0.661	0.841
Dep. var. mean	0.219	1,921.30	0.00960	0.273	0.128	0.304
Dep. var. std.	0.413	35.79	0.0594	0.330	0.259	0.368
Panel C						
State claimed section	−0.0374***	2.138***	−0.00370***	0.0296***	−0.0362***	0.0151***
	(0.00490)	(0.514)	(0.000721)	(0.00604)	(0.00446)	(0.00511)
State section sold	0.0509***	−1.065	0.00219***	−0.0265***	0.0488***	−0.0285***
	(0.00529)	(0.833)	(0.000796)	(0.00650)	(0.00546)	(0.00554)
N	370,510	77,676	299,591	299,591	299,591	299,591
Adj. R-sq	0.509	0.615	0.621	0.771	0.660	0.841
Dep. var. mean	0.219	1,921.30	0.00960	0.273	0.128	0.304
Dep. var. std.	0.413	35.79	0.0594	0.330	0.259	0.368

(*Continued*)

Table 4: (*Continued*)

	(1) Irrigated	(2) Priority year	(3) Developed share	(4) Grass share	(5) Cropland share	(6) Forest share
Panel D						
State claimed section	−0.0360***	2.513***	−0.00217***	0.0325***	−0.0432***	0.00534*
	(0.00454)	(0.540)	(0.000432)	(0.00517)	(0.00423)	(0.00290)
State selected (non-16/36)	−0.00170	−0.606	−0.00295***	−0.00599	0.0139***	0.0174***
	(0.00671)	(0.866)	(0.000851)	(0.00621)	(0.00440)	(0.00558)
N	356,430	74,172	290,189	290,189	290,189	290,189
Adj. R-sq	0.507	0.616	0.615	0.773	0.658	0.841
Dep. var. mean	0.217	1,921.40	0.00920	0.276	0.126	0.306
Dep. var. std.	0.412	35.76	0.0579	0.331	0.257	0.369

Notes: Coefficients from estimating equation (1) for the outcomes indicated in the column headers. All estimates are from a linear OLS model. Each panel uses a different "treatment". To address the railroad land grant, the regressions also include an indicator for whether the section is within the railroad grant, odd numbered, and the interaction term. Additional controls for distance to a railroad, distance to a stream, size of that stream (Strahler order), mean elevation, standard deviation of elevation, average precipitation, average temperature, and soil class are also included. Township — 6 × 6-mile areas including 36 sections – fixed effects are utilized across all regressions. CDL outcomes (columns 3-6) include only Washington, Idaho, and Montana but do not include North Dakota. Robust standard errors, clustered by county, in parentheses.
$^{***}p < 0.01$, $^{**}p < 0.05$.

Table 5: State-by-state regression results.

	(1) Irrigated	(2) Priority year	(3) Developed share	(4) Grass share	(5) Cropland share	(6) Forest share
Panel A: Washington						
State claimed section	−0.0854***	2.481*	−0.0109***	−0.0226***	−0.0109**	0.0650***
	(0.0138)	(1.260)	(0.00243)	(0.00441)	(0.00451)	(0.0103)
State section sold	0.0740***	−2.783*	0.00610***	0.0217***	0.0155***	−0.0676***
	(0.0153)	(1.406)	(0.00211)	(0.00419)	(0.00513)	(0.0103)
N	67,928	19,428	67,928	67,928	67,928	67,928
Adj. R-sq	0.605	0.677	0.682	0.569	0.719	0.823
Dep. var. mean	0.288	1,925.90	0.0295	0.0571	0.128	0.434
Dep. var. std.	0.453	36.28	0.107	0.118	0.275	0.377
Panel B: Idaho						
State claimed section	−0.0579***	0.263	−0.00214**	−0.00533	−0.0271***	0.0271**
	(0.00997)	(1.599)	(0.000970)	(0.00501)	(0.00716)	(0.0112)
State section sold	0.0674***	1.465	0.00210**	−0.000471	0.0527***	−0.0373***
	(0.0123)	(2.175)	(0.000996)	(0.00726)	(0.0110)	(0.0124)
N	84,216	16,523	84,216	84,216	84,216	84,216
Adj. R-sq	0.557	0.650	0.430	0.622	0.688	0.846
Dep. var. mean	0.198	1,906.30	0.00487	0.120	0.0995	0.337
Dep. var. std.	0.399	34.14	0.0387	0.198	0.242	0.373

(*Continued*)

Table 5: (*Continued*)

	(1) Irrigated	(2) Priority year	(3) Developed share	(4) Grass share	(5) Cropland share	(6) Forest share
Panel C: Montana						
State claimed section	−0.0208***	2.274***	−0.00120***	0.0608***	−0.0497***	−0.00686*
	(0.00517)	(0.614)	(0.000420)	(0.00670)	(0.00627)	(0.00378)
State section sold	0.0715***	−0.603	0.00179**	−0.0521***	0.0615***	−0.0170**
	(0.0124)	(1.380)	(0.000742)	(0.0109)	(0.00815)	(0.00742)
N	147,447	40,003	147,447	147,447	147,447	147,447
Adj. R-sq	0.427	0.488	0.317	0.685	0.618	0.837
Dep. var. mean	0.290	1,922.90	0.00314	0.460	0.144	0.226
Dep. var. std.	0.454	33.40	0.0282	0.350	0.259	0.341
Panel D: North Dakota						
State claimed section	−0.0128***	1.301				
	(0.00314)	(3.680)				
State section sold	0.0162***	−0.000199				
	(0.00440)	(3.659)				
N	70,919	1,722				
Adj. R-sq	0.168	0.522				
Dep. var. mean	0.0276	1,975.90				
Dep. var. std.	0.164	19.87				

Notes: Coefficients from estimating equation (1) for the outcomes indicated in the column headers. Each panel presents the estimates using only observations from the indicated state. All estimates are from a linear OLS model. To address the railroad land grant, the regressions also include an indicator for whether the section is within the railroad grant, odd numbered, and the interaction term. Additional controls for distance to a railroad, distance to a stream, size of that stream (Strahler order), mean elevation, standard deviation of elevation, average precipitation, average temperature, and soil class are also included. Robust standard errors, clustered by county, in parentheses.
$^{***}p < 0.01$, $^{**}p < 0.05$.

Panel C of Table 4. The states each show a reduction in rates of irrigation on state lands. The scale ranges from just 10% in Montana to 30% in Washington and Idaho and nearly 50% in North Dakota where the baseline uptake is much smaller. Across all states, the state sections subsequently sold erased the irrigation deficit or, in the case of Montana, even had a positive effect. Timing wise, irrigation was most delayed in Montana, where irrigation on state lands occurred an estimated 2 years later, or about 7% of one standard deviation in irrigation timing in that state.

The effect on development is strongest in Washington where state land has about 37% lower shares of the area classified as developed ($-0.0109/0.0295 = 0.37$). Notably, this detectable effect is in the state where development shares are the largest by an order of magnitude. Again, the deficit in development is partially offset on lands no longer owned by the state. Washington, Idaho, and Montana all have less cropland on state lands, but the size of the effect is much larger in Montana, where state lands have a cropland share 35% smaller than the average compared to 8.5% in Washington. Furthermore, while Washington's state lands also have a smaller share in grass pasture, Montana's state lands have more, roughly the same magnitude increase as its decrease in cropland. This apparent substitution in Montana is notably distinct. Finally, state lands have higher shares that remain in the forest today, but the magnitude is larger in Washington, although similar as a percent of the underlying state averages. Again, the state land that was sold does offset much of these effects.

Discussion

The states considered here exhibit persistently distinct resource development on state lands relative to nearby nonstate lands. Overall, the state with greater abundance of the underlying land use tends to have a larger effect of state lands on that particular outcome. For instance, North Dakota state lands have no detectable effect on irrigation, but the underlying irrigation uptake is just 2.8% of all sections there compared to an average 20% in Idaho and 29% in both Montana and Washington. We discuss the potential reasons for this general pattern and the specific outcomes in each state.

In the case of the negative effect on irrigation we find, we consider this general effect as evidence of the additional transaction costs associated with obtaining state lands relative to federal lands that tended to be available in adjacent sections. For a settler arriving on the frontier, the anticipated gains to developing state land for irrigation would have had to be significant relative to developing federal land in the vicinity; settlers could obtain federal lands at a purchase price of \$1.25–2.50 an acre (depending on the federal lands' adjacency to a railroad land grant or not), or obtain those lands at a

considerably lower effective cost through improving those lands in satisfaction of the Homestead Act's requirements. Given that irrigating the lands (or using water productively from an adjacent watercourse) would satisfy homestead requirements, state lands would have to present highly desirable features in terms of productivity or proximity to a transportation network to warrant the additional expenditure that the minimum price of \$10/acre involved. Not all western states had such a high price requirement imposed on their state lands, so this may suggest that the development effect we find in our chosen northwestern states may be less likely to be present in California, Nevada, and Oregon (which had no minimum price imposed in Congress' granting legislation) or Colorado (which had a minimum price of \$2.50 that did not so drastically exceed purchase costs on adjacent federal lands).

The variance in state institutions governing the disposition of state lands provides one explanation for the distinct effects we do find within our sample of western states in the case of lands actually granted to states (as opposed to the statutorily specified sections alone). Because we identify an effect that persists nearly 120 years later, this makes the ongoing administration of state lands a nontrivial input to their development patterns over that same period. Between Idaho, Montana, and Washington, the specific institutions governing state lands vary on several margins. In Montana and Washington, state lands are managed within their respective departments of natural resources, while in Idaho these lands are managed by an independent agency dedicated solely to state trust land administration (Culp *et al.*, 2006, pp.t 45–46, 50). Given the distinction in mandates between government agencies dedicated more generally to natural resource management and conservation, and one dedicated exclusively to trust land management, this could reflect different policy priorities over the twentieth century that resulted in the varying effects by state and why many effects are not present in Idaho. One important margin of institutional variation surrounds the immediate and gradual separation of control of state trust revenues from that of the common funds of the state. In Idaho, for instance, the Admission Act (26 Stat. 215, Ch. 656, § 5 1890) held that funds from the sale of lands be deposited into a permanent endowment fund.

Notwithstanding the margins on which revenues could be insulated from an immediate political economy, the means by which to maximize revenues in pursuit of this public purpose still meant active selection of lands for sale likely strictly dominated sale of the exogenously determined sections in less well-developed areas. This ability to select lands in lieu of those already developed is borne out in the data, and suggests a complex development process associated with statehood's temporal subsidiarity to development of the western territories. States not only could not receive already developed sections, but for those cases where development had already occurred, the

state government could choose land for immediate sale without reference to the fixed sections the terms of the grant otherwise bound them to.

Additional granular institutional variation also merits consideration. While Idaho and Montana's state agencies are self-funding, Washington's is not. Washington's Commissioner of Public Lands is directly elected, whereas Idaho's executive administrator is appointed by a board and Montana's is appointed by the state governor. These distinct appointment processes for the executive administering trust lands (and their revenues) could also plausibly reflect distinct policy priorities and constituencies whose interests are reflected in the trust land administration in these states. Finally, while trust lands in all three states are governed by a land board or commission, Idaho and Montana elect the members of these bodies, while Washington has a hybrid model involving appointment and election (Culp *et al.*, 2006, p. 16).

While the effect on measures of natural resource development is negative in the states we survey here (on several margins for Montana and Washington, and with respect to three states in terms of likelihood of irrigation), this should not be taken to indicate a net negative development effect with respect to state trust lands. The animating public policy purpose of these lands was notably distinct from those of federal lands disposed through other public land laws (Souder and Fairfax, 1996), which suggests assessing their comparative effect solely under the guise of economic development may be unjustified. Furthermore, these lands became subject to considerable legal definition given their status as a "trust", which entails precise responsibilities on the part of state governments entrusted with these lands' management (Culp *et al.*, 2005). Moreover, state trust lands have become newly valuable as conservation and recreation have become more important to the inhabitants of western states. This suggests that an initially negative development effect — such as less irrigation and cropland but more left as forest or grasslands — could have resulted in these state lands being preserved relative to other federal lands, allowing for a future reversal-of-fortune once newfound uses trumped the early natural-resource-intensive industries that characterized the early phases of development in the US West. For instance, Colorado's largest state park leases several trust sections, providing both revenue and recreation for the state. More generally, the institutional distinction of state lands from federal lands have offered environmentalist groups a way to secure nonuse rights over extractive interests (Leonard and Regan, 2019).

Conclusion

State trust lands make up a significant portion of western lands. The nearly 100 million acres transferred to the states rivals the 130 million acres granted to railroads, and yet the latter have been more often analyzed by economic and

political historians. We have provided an important step here by considering the resource development on state trust lands and some of the political economy contributing to it. Still, the sample could be further expanded across other geographies and socio-political settings in other states to further probe the heterogeneity of trust lands. Our results here indicate that state trust land did lead to lower levels of resource development initially, leaving the lands more likely to be covered in naturally occurring land cover like grass and forests.

More granular consideration of state land trust data surrounding lands sold versus lands retained by the states in our sample yields additional insights. Due to significant levels of observed sales of state land, the \$10/acre minimum does not appear to have been a major impediment. In a context of certain allocation of exogenously fixed sections, and a rush to select in-lieu sections, the historical records indicate states maximized revenue (and in a static sense, their trust responsibility) by selecting lands most valuable for settlement; empirical analysis is not inconsistent with this interpretation. Land not sold and retained today appears less desirable by observables, providing one reason less development would be expected in an absolute sense. Nonetheless, our robustness checks display a nontrivial development effect down to within 1/9 of the township, meaning that state lands still had observable development delays relative to three sections adjacent to them — very unlikely to differ greatly in their development potential.

This effect is derivative of our identification of development classes surrounding initial economic activity on the frontier. Water, as an input to most activities, was sensitive to the institutional impediments to use of state lands overall. Nonetheless, on state lands that were sold, development proceeded apace to that originating from direct federal control, suggesting that a summarily negative characterization of this treatment would be too simple. Furthermore, the public policy purpose animating the disposition of these lands was one of perpetual support of schools. While the wisdom of the federal land grants in their many forms has been considered extensively in other contexts, such consideration is outside the scope of our empirical identification here. Even from a calculus of the value of the lands today relative to what they were sold for, this misses how distinct states managed the permanent funds revenues in furtherance of their trust purposes as construed under state and federal law.

Assessing the net benefits of the state trust policies is thus beyond the scope of our empirical identification strategies here. Nonetheless, our results suggest identifiable persistent consequences to the state land trusts. Ultimately, a negative economic development effect is attributable to the institution itself, which we associate with the greater cost of state lands, the later starting point for acceding states compared to extant development patterns, and the transaction costs of subjecting lands to an additional layer of political control. Much of this negative development effect is counterbalanced by consideration

of the development of lands entrusted to states that were sold, slightly more likely to occur on lieu lands. Ultimately, given the duration and substantive importance of state trust land policies' animating purposes, assessing their success or failure may defy empirical rigor, but our results at a minimum indicate consequences to these policies that persist to this day.

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