

**The Mystery of the 160-acre Farms:  
Farm-Level Evidence from California, 1860-1880**

Karen Clay  
Carnegie Mellon University and NBER

This paper uses individual and farm-level data from California for 1860-1880 to understand a puzzle related to 160-acre farms. In 1860, 35 percent of farms in the sample were 160 acres. Surprisingly, these farms differed systematically from other similar farms in their share of improved acres. For example, on 160-acre farms, 42 percent of the acreage was improved, whereas on 80-239 (excluding 160) acre farms, 77 percent was improved. These differences were not attributable to the age, occupation, or ownership status of the farmer or to the quality of the land. Further, the differences diminished over time. The most likely reason for the difference is the Preemption Acts of 1841 and 1853, which gave farmers incentives to claim exactly 160 acres but weak property rights prior to actual purchase.

## 1. Introduction

Using newly collected individual and farm-level data from California for 1860-1880, this paper investigates a puzzle related to 160-acre farms. In 1860, 35 percent of the farms in the sample were 160 acres. These 160-acre farms differed substantially from other farms, even farms of similar size, in their share of improved acres. On average 80-239 acre farms (excluding 160-acre farms) had 77 percent improved acres, while 160-acre farms had 42 percent improved acres.<sup>1</sup> Farms with fewer improved acres had lower reported farm values and lower agricultural output. The differences between 160-acre farms and farms of similar size appear not have been driven by the presence of Spanish and Mexican land grants, because similar effects are found in townships with and without land grants. Between 1860 and 1880, differences between 160-acre farms and other farms diminished.

Using sample of individuals who are linked to the 1860 Census of Population and the 1860 Census of Agriculture, a number of possible explanations for the differences are evaluated, including later settlement, differences in occupation of individuals listed in the Census of Agriculture, lower quality land, and ownership status. The available evidence suggests the operators of 160-acre farms did not differ from the operators of similar farms along any of these dimensions. Even if differences had been found, the explanations beg the question of why 160-acre farms would be systematically different from other farms of similar sizes.

---

<sup>1</sup> The term improved acres in the census of agriculture refers to cleared acres being used to raise crops, even if currently fallow, and for grazing.

Historical evidence suggests that the Preemption Acts of 1841 and 1853 were the most likely reason why 160-acre farms differed from farms of other sizes.<sup>2</sup> The Act gave individuals an incentive to choose a specific size, since 160 acres was the largest size farm that could be purchased at the government minimum price of \$1.25 per acre. This price was well below the county average land value of \$5-18 per acre for the eight counties in sample. The acts only allowed individuals to purchase their land if the land had been surveyed and offered for sale. Up to 1860, very little land in California had been surveyed and offered for sale. Further, the rights of preemptors were subordinate to other groups, so their property rights were less secure. If a large share of the holders of 160-acre farms hoped to preempt their land, this would explain a number of stylized facts including the low levels of improved acreage in 1860, the decline in differences in improved acres over 1860-1880, and the more rapid decline of 160-acre farms in land-grant townships during this period.

This paper contributes to the literature on the development of American agriculture during the nineteenth century, by using individual and farm-level data to examine issues related to land acquisition.<sup>3 4</sup> While aspects of farming such as the agricultural ladder and the spread of agricultural innovations have been widely studied, limited attention has been paid to land acquisition.<sup>5 6</sup> Work using individual or farm-level data has tended not

---

<sup>2</sup> Until the passage of the Homestead Act of 1862, the Preemption Act was the main route, other than sales at auction, through which individual settlers could acquire land.

<sup>3</sup> There is a sizeable and somewhat distinct historical literature on California squatters. These squatters may have overlapped to some degree with the holders of 160-acre farms. On this literature, see Robinson (1948), Pisani (1994) and Gates (1991), which collects Gates earlier essays on squatting.

<sup>4</sup> Two interesting papers examine the effects of land demarcation systems on land and land markets in California and Ohio. See Libecap and Lueck (2009) and Libecap, Lueck, and Lopes (2009).

<sup>5</sup> On the agricultural ladder, see Atask (1988, 1989), Alston and Kauffman (1997, 1998) and Alston and Ferrie (2005). On the spread of agricultural innovations, see Olmstead and Rhode (2008), which brings together much of their work on innovation.

to examine issues related to land acquisition.<sup>7</sup> In one of the few mentions of acquisition, Atack (1988) notes in a footnote that high tenancy rates on the frontier may be farmers awaiting preemption.<sup>8</sup> Work on land acquisition has tended not to use farm-level or individual-level data.<sup>9</sup> For example, Anderson and Hill (1975, 1990), Barzel (1989), Allen (1991), and Bohanon and Coelho (1998) have debated the efficiency of homesteading and to a lesser degree preemption, but the debate has largely been theoretical or drawn on aggregate data. Two studies, Weiman (1991) and Bleakley and Ferrie (2010), have focused more explicitly on land acquisition using micro-data, but they focus on land lotteries, which were not the dominant mode through which individuals acquired land.

## **2. Land Grants, Gold Mining, and Land Disposal**

In 1848, the United States formally acquired California from Mexico. This made the federal government the immediate owner of all land in California – the public domain. However, in the Treaty of Guadalupe-Hidalgo (1848), the United States pledged to protect property rights in the lands ceded by Mexico. To settle what was then a remote frontier, the Spanish and Mexican governments had made grants to citizens and naturalized citizens of up to eleven leagues (48,708 acres) of land.<sup>10</sup> When granting

---

<sup>6</sup> One of the main barriers to the analysis of preemption is that federal government reports did not differentiate between preemption sales and other land sales and the Censuses of Agriculture did not collect ownership information until 1880.

<sup>7</sup> Much of this work has drawn on the Bateman-Foust sample, which did not include California.

<sup>8</sup> Atack (1988), p. 19, fnt 53. Tenancy is inferred by comparing real estate holdings on the Census of Population with farm value in the Census of Agriculture. Tenants are those whose real estate holdings are less than the farm value.

<sup>9</sup> An interesting exception is Kanazawa (1996), which examines the political economy of early land law, using Congressional role call votes.

<sup>10</sup> Almost all owners received grants during the Mexican period under the Colonization Act of 1824 and the Supplemental Regulations of 1828. See Clay (1999).

ended in 1846 as a result of American occupation, about 750 grants had been made.

These grants covered more than twelve million acres of fertile coastal and valley land.

To address the issue of Spanish and Mexican land grants so that the remaining land in the public domain could then be subdivided and sold, Congress passed the California Land Act in 1851. Under the Act, an individual with a Spanish or Mexican land grant could submit documentary evidence of their claim to the land commission. The commission would issue a decision on the claim's validity. Either side – the federal government (as the residual claimant for all land) or the owner of the land grant – could then appeal the commission's decision to the U.S. District Courts in California and from there to the U.S. Supreme Court. Once validity had been established, a claim was surveyed, any boundary disputes were resolved, and the federal government issued a patent for the land.<sup>11</sup> By the beginning of 1860, approximately 730,000 acres had been patented to the owners of Spanish and Mexican land grants. Although a large number of acres, it was small fraction of the 8.85 million acres that would ultimately be patented. Figure 1 shows the location of the land that was eventually patented to the owners of Spanish and Mexican land grants.

Federal purchasers were few in number.<sup>12</sup> By 1860 very little federal land had been surveyed and sold and most of that land was located outside of the counties in the sample.<sup>13</sup> Federal land was sold at auction on a cash basis in unlimited amounts. The average sale price was less than a penny over the government minimum of \$1.25/acre.

Table 1 shows land sales by land office through the middle of 1860. Most of the

---

<sup>11</sup> In a few instances, patenting would stretch into the 20<sup>th</sup> century. However, by 1880, 8.33 million out of a total of 8.85 million acres had been patented. Donaldson (1884), p. 381.

<sup>12</sup> For more public land disposal, see Gates (1968). For more on the federal land office, see Rohrbough (1990).

<sup>13</sup> Pisani (1994), p. 289.

surveying had begun in the interior, in the Central Valley (in the vicinity of the Marysville, Stockton, and Visalia land offices), because it was relatively flat – and thus easy to survey – and because it was well away from the land grants.<sup>14</sup> Through 1860 the number of acres sold was just under 149,000, and by the end of 1859 only about 20,000 acres of the land sold by the federal government had actually been patented. This is small in comparison to the number of acres in private land claims, both in total and relative to the acreage patented by the end of 1859.

The state had been granted land by the federal government for internal improvements, schools (16<sup>th</sup> and 36<sup>th</sup> sections of each township), a university, and swampland. Sales of the internal land grant and swampland were authorized by the state in 1852 and 1855, well before federal land sales – and in many instances federal surveying – had begun. State land purchasers were allowed to buy up to 320 and later 640 acres. Sales of state lands were highly irregular – county surveyors sold land without coordinating with the owners of land grants or federal land offices and often sold swamp land that was clearly not swampy – causing considerable conflict with federal officials.<sup>15</sup> Nevertheless, state courts generally upheld the validity of the property rights of purchasers of state lands. By 1860, approximately 450,000 acres had been sold by the state.<sup>16</sup>

---

<sup>14</sup> The first government patents were issued in the interior was well. For location of the surveyed land, see the maps included in the Report of the Commissioner of the General Land Office Accompanying the Annual Report of the Secretary of the Interior (1856, 1860). See also the discussion in Gates (1991),

<sup>15</sup> In his 1856 report, the Surveyor General of California noted “The swamp land business in the State of California is yet entirely unsettled, although important correspondence has taken place on the subject between this office and the authorities of the State. In May last the register at Marysville reported that many county surveyors in the State had been returning to the authorities as swamp tracts of land not shown by the plats to be of that character.” Report of the Commissioner of the General Land Office Accompanying the Annual Report of the Secretary of the Interior (1856), p. 15. For more on the state’s highly irregular land policies and conflicts this created with the federal government, see Nash (1964), pp. 126-128.

<sup>16</sup> Nash (1964) p. 127.

Gold mining influenced both the supply of farmers and the demand for farm products. Figure 2 shows that gold production was still high in 1860, although it was well below its peak. By 1860 large corporations were systematically extracting gold through quartz and hydraulic mining. These large corporations employed most of the 84,500 individuals who listed their occupation as miner in the 1860 Census of Population. Many former miners with farming backgrounds had given up mining for farming or ranching. The 1860 Census of Population included 20,100 individuals who listed their occupation as farmer (which included ranchers) and another 12,500 who listed their occupation as farm laborer.<sup>17</sup> They were among those purchasing land from the owners of land grants, the state, and the federal government. Farmers supplied food to miners, nearby cities, and in some cases markets along the Pacific.

### **3. Farms in 1860**

The sample includes farm-level data for 1,024 farms located in California in 1860. 100 percent samples of farms in eight townships were collected from the manuscript records of the 1860 Census of Agriculture.<sup>18 19</sup> The data include information on the number of improved and unimproved acres, the value of farm implements, the value of livestock, the level of output of a long list of crops, and the value of the farm.

The eight townships were located in eight counties, and the location of these counties is shown in Figure 3. Two of the counties – Shasta and Fresno – were considerably larger than they are today, and the approximate locations of the historic boundaries are marked. Four of the eight townships – the townships in Alameda, Contra Costa, Santa

---

<sup>17</sup> Author's calculations based on the 1-100 national sample of the 1860 Census of Population.

<sup>18</sup> Only farms that had at least 3 acres were included in the sample, since smaller farms were essentially large gardens. Farms with less than 3 acres were 109 of the 1133 farms.

<sup>19</sup> Unpublished data for five of the townships were provided to the author by Jeremy Atack. For five townships, there is additional data for 1870 and 1880. These data will be discussed in the next section. The remaining three townships were collected by the author.

Clara, and San Mateo counties – were located in counties with significant numbers of land grants. Townships in these counties will be referred to as land-grant townships, and townships in the four counties with few or no land grants – Fresno, Placer, Shasta, and Sutter – as non-land-grant townships. Two of the eight counties, Placer and Shasta counties, both non-land-grant townships, had sizeable numbers of gold miners. Placer County had roughly 6,500 miners and Shasta County had 1,100 miners.<sup>20</sup>

Table 2 provides detailed summary statistics on the eight townships and the eight counties in which they were located. The percentage of 160-acre farms ranged from 46 percent in Contra Costa County to 16 percent in Fresno County. County land values ranged from \$18 per acre in Alameda and Santa Clara Counties to \$5 per acre in Shasta County. The share of land that would ultimately be patented to the holders of Spanish and Mexican land grants varied from 55 percent in San Mateo County to 0 percent in Fresno County. The share of land that had been patented by the end of 1859 to the owners of land grants similarly varied from 23.1 percent in San Mateo County to 0 percent in Fresno County.

To understand the representativeness of the sample, it is useful to compare the 1860 sample both to the counties in which they were located and to the state as a whole. With respect to the eight counties, the sample includes 32 percent of the farms, 25 percent of the total acreage, 32 percent of the improved acreage, and 27 percent of the farm value. With respect to the state, our sample includes 7.3 percent of the farms, 3.3 percent of the total acreage, 5.6 percent of the improved acreage, and 7.5 percent of the farm value. On

---

<sup>20</sup> Of the 845 miners who were in California in the 1-100 national sample of the 1860 Census of Population, 3 were in Fresno County, 65 were in Placer County, 11 were in Shasta County, and 0 were in Sutter County.

a per acre basis, the farms in the sample had roughly twice the farm value per acre as the average farm in the state.

Figure 4 shows the distribution of farm sizes in the 1860 sample in 50-acre increments. For the purposes of the graph, farms larger than 1000 acres were included in the 950-1,000-acre category. Compared to the state and the county published distributions, there are fewer small farms in the sample. For example, in the published distributions, about 30 percent of the farms are 3-49 acres and 20 percent are 50-99 acres, whereas in the sample the percentages are roughly 10 percent for each group.

Most of the analysis that follows will focus on the 60 percent of farms that were 80 to 239 acres, since these farms included farms that were of similar size to the 160-acre farms and would nominally have had similar objectives.<sup>21</sup> Many of the smaller farms focused on production of vegetables and other market products for nearby towns, while many of the larger farms focused predominantly or exclusively on livestock. Figure 5 plots the distribution of farm sizes and average share of improved acres for farms that were 80-239 acres in 10 acre increments. All of the farms in the 160-169 acre bin were exactly 160 acres.<sup>22</sup>

Two features of Figure 5 are worth noting – the large number of farms that were exactly 160 acres and their low share of improved acres relative to farms of similar sizes. On average 80-239 acre farms (excluding 160 acres) had 77 percent improved acres, while 160-acre farms had 42 percent improved acres. Even compared to farms that were 161-179 acres, which had 59 percent improved acres, 160-acre farms had low shares of improved acres.

---

<sup>21</sup> The results are similar if wider or narrower ranges of farm sizes are used.

<sup>22</sup> The ten farms in the 161-169 range were added to the 170 acre bin.

Table 3 shows that the differences in the shares of improved acres between 160-acre farms and other farms were large, even when controls were added for townships, the log of total acres, and whether the townships were land-grant townships or not. In the full sample, 160 acres farms had 32 percent fewer improved acres (column 1) or 33 percent when the log of total acres was added (column 2). Limiting the sample to 80-239 farms increased the difference to 35 percent (column 3). The differences were not solely a feature of townships with high shares of Spanish and Mexican land grants. In column 4, townships in counties with and without Spanish and Mexican land grants were not statistically significantly different.

Table 4 indicates that 160-acre farms had lower farm values and crop values in 1860, but that this was primarily due to the mix of improved and unimproved acres. In column 1, the point estimate on 160 acres was negative and very large, although not statistically significant. Once total acres was subdivided into improved and unimproved acreage in column 2, however, the point estimate on having a 160 acre farm was positive, tiny, and not statistically significant. The pattern is similar for crop value.<sup>23</sup> In column 3, the point estimate for have a 160 acre farm was negative, very large, and statistically significant. The magnitude of the difference falls and becomes statistically insignificant in column 4 when controls are added for improved and unimproved acres.

---

<sup>23</sup> Crop value is calculated by multiplying the prices by the quantities produced and adding them up. The measure includes the value of orchard and market garden produce (both were reported by respondents in dollar values), but does not include livestock slaughter value, butter or cheese production, or home manufacturers. Prices for wheat, barley, and oats are from 1859 Transactions of the State Agricultural Society of California (p. 325 (wheat \$1.00/bu.), 327 (barley \$0.83/bu.), and 329 (oats \$0.75/bu)). Values for wheat and barley in Berry (1984) are similar to the prices listed in Transactions. All other prices are national average prices from the county-level data on the Agricultural Census available from ICPSR Study No. 2896.

In sum, 160-acre farms differed from other similar farms in their share of improved acres in 1860. Their lower share of improved acres explains their lower farm and crop values in 1860.

#### **4. Changes from 1860 to 1880**

The differences in 1860 raise questions about what happened between 1860 and 1880. Two types of changes may have occurred. The share of 160-acre farms may have increased or decreased. And 160-acre farms may have become more or less like other farms in their share of improved acres.

Data is available for four townships in 1860, 1870, and 1880 and for one township in 1860 and 1880. Two were land-grant townships, and three were non-land grant townships. These townships accounted for about 64 percent of the observations in the 1860 sample.<sup>24</sup>

Table 5 presents summary statistics for the five townships for 1860-1880. The share of 160-acre farms in aggregate was stable at 34-35 percent from 1860 to 1870 and then fell to 17 percent in 1880. The share improved increased steadily from 37 percent to 75 percent, while in other farms the share improved remained in the mid 80 percent range.

The aggregate statistics mask differences in the evolution in land-grant and non-land-grant townships. In land-grant townships, the share of 160-acre farms fell quickly to a very low level in 1870 and remained low in 1880. In contrast, in non-land-grant townships the share of 160-acre farms rose from 1860 to 1870 and then fell from 1870 to

---

<sup>24</sup> The number of farms enumerated in the four townships with complete data fell by about 40 percent between 1860 and 1870 before recovering to a number similar to in 1880. The four townships had a total of 586 farms, 347 farms, and 598 farms in 1860, 1870, and 1880. The decline in the number of farms from 1860 to 1870 reflected a number of factors including a decline in gold production that affected the townships in Shasta and Sutter Counties (see Figure 2), a major drought in 1863-1865, which resulted in crop failures and the death of thousands of cattle, and possibly the Civil War.

1880. The share improved converged more quickly in land-grant than in non-land-grant townships.

Table 6 examines the share of improved acres over time in 160-acre farms and other farms, including township, year, and township-year fixed effects, and controls for total acres that are allowed to vary by decade. In both the full sample (column 1) and the more restricted sample of 80-239 acre farms (column 2) convergence appears to have occurred between 1860 and 1870. Convergence appears to have occurred rapidly in both land-grant and non land-grant townships (column 3). The change was larger in land-grant townships than in non-land-grant townships, primarily because the difference between 160-acre farms and other similar farms was larger than in non-land-grant townships.

In sum, between 1860 and 1870, the share of 160-acre farms fell over time, and 160-acre farms became more like other farms in their share of improved acres.

## **5. Explanations**

This section considers three main classes of explanations for why 160-acre farms might have systematically differed from other farms in 1860. The holders of these farms may have arrived later than the holders of other farm sizes or been engaged in different (non-farm) occupations; they may have established their farms on lower quality land; or they may not have owned the land. The non-owners category would have included renters and squatters.

To evaluate these explanations, the farm holders listed in the 1860 Census of Agriculture were matched to the manuscript records for the 1860 Census of Population. It was possible to uniquely link 869 farm holders to their records in the Census of Population. The main impediment to linking was that some farms were jointly owned. In

some instances, it was possible to link the farm to multiple individuals. In other cases, the only the last names or even abbreviations for the last names were listed, making it impossible to link the farms to the owners. The sample is restricted to cases where a farm could be uniquely linked to one person. In appendix Table 3A, Table 3 is replicated using linked farms. The results for linked farms are very similar to the results for all farms, which suggests that the ability to link individuals and farms is largely random.

Table 7 compares adult white males ages 18-69 in California in the public use 1-100 sample of the 1860 Census of Population with individuals in the linked sample. Compared to the average adult male in California, men in our sample were older, wealthier and less likely to be foreign born. When attention is restricted to individuals who list their occupations as farmers, the two samples look much more similar, although farmers in the public use sample were still poorer. This is not surprising, since all of the townships in the sample were in the northern part of the state, where property values were higher, and four of the eight townships are in the San Francisco Bay area.

#### *Later Arrival or Different Occupation*

Later arrival or differences in occupation, if true, could account for the lower share of improved acres and lower output of individuals with 160-acre farms. Individual who arrived later or who had other occupations would have had less time to clear their land, causing them to have fewer improved acres. Similarly, if the owners of 160 acres farms were less likely to list their occupation as farmer, this could explain the lower shares of improved acres.

The timing of arrival is extremely difficult to document. Neither the Census of Agriculture nor the Census of Population asked questions about duration. The only

available data of relevance is age. If the individuals on 160-acre farms were younger than individuals on other farm sizes, this could plausibly account for the smaller share of improved acres.

Table 8 indicates that the age of the owner and occupational status was similar for individuals with 160-acre farms and other farm sizes. This holds both for the full sample in columns 1 and 2 and for farms of similar size in columns 3 and 4.

One other piece of evidence is relevant for the timing of arrival. About 60 percent of individuals with 160-acre farms and about 60 percent of individuals with other farm sizes had at least one child that was born in California. The average age of these children for both groups was 6.4 years.<sup>25</sup> Thus it appears that the two groups arrived in California at about the same time. This is consistent with the evidence on the ages of the linked individuals.

#### *Lower Quality Land*

Another possibility is that 160-acre farms were on lower quality land and so had fewer improved acres.<sup>26</sup> For example, the land may have been better suited to stock raising, in which case the lower share of improved acres would be appropriate. The cross sectional analysis for 1860 in Table 4 casts some doubt on this explanation. Farm and crop values for 160-acre farms were not statistically significantly different from other farms, once controls were added for improved and unimproved acres. Table 6 showed convergence in the share improved for 160-acre farms to the levels in other similar farms by 1870.

---

<sup>25</sup> The difference is not statistically significant using a t-test.

<sup>26</sup> Unfortunately, the census does not provide detailed locational information. If it did, this hypothesis could be tested directly.

Other evidence is consistent with the farms being similar on average. Enumerators walked from house to house, so farms listed on the same page of the manuscript census were near one another. Analysis of the distribution of 160-acre farms by townships does not show clumping of 160-acre farms, as would be the case if there were large areas of relatively poor quality land. Of course, this does not rule out the possibility that bad land was sprinkled randomly throughout the township. Taken together with other evidence, however, it does not indicate that 160-acre farms were located on poorer quality land.

### *Non-Ownership*

Unfortunately, the 1860 Census of Agriculture does not list the ownership status of the farm operator. Some evidence on ownership can, however, be inferred by comparing the real property listed on the population schedule with the farm value listed on the agricultural schedule. In 52 percent of the cases, the numbers matched exactly. In 13 percent of the cases, real property was larger, suggesting that the individual may have owned other property beyond the farm.<sup>27</sup> In 35 percent of the cases, real property was smaller than the farm value, suggesting that the individual did not own the farm. For small differences, this may simply reflect reporting error. In 24 percent of the cases (more than two thirds of the 35 percent), however, real property was reported as zero.

Table 9 provides evidence that individuals with 160-acre farms and other farm sizes were equally likely to have real property that was less valuable than the farm value or to list zero real property. This holds both for the full sample and for farms of similar size. In sum, the owners of 160-acre farms look very much like the owners of other farms in age, occupation, land quality, and ownership status.

## **6. Preemption Act**

---

<sup>27</sup> It is also possible that the individual did not own the farm, but did own considerable other real property.

The question remains: Why were 160-acre farms so common and so different from other farms? The size suggests some possibilities. 160 acres was a focal size in federal land policy. The Preemption Act of 1841 and the Homestead Act of 1862 both specified that applicants could claim up to 160 acres. Under the Preemption Act, individuals could purchase their land at the government minimum price of \$1.25 per acres. This price was well below the county average values of land per acre, which ranged from \$5 to \$18. Under the Homestead Act, if the homesteader lived on the land for 5 years, built a dwelling, grew crops, and paid \$10, he would be awarded title.

In contrast, 160 acres was not a focal point for land acquired through state land sales or the purchase of part of a land grant. Individuals could purchase 160 acres, but they could also purchase 100 or 150 or 200 acres. For example, Talbot Green, Thomas Larkin's property manager, wrote to Larkin in 1856 about sales on nearby claims: "The squatters are now beginning to want to buy. Mr. Thoms sold 300 acres for twenty dollars per acre. Another squatter offers the same price for 100 acres, and another fifteen for 200 acres. I think as soon as the news comes out of the confirmation of Redding's grant he will be able to sell all the land he wants to sell at that price, or at least the portion now occupied by squatters."<sup>28</sup> Historical atlases showing the subdivision of land grants suggests that 160 acre parcels existed but were not the norm. Figure 6 shows a map of part of Fremont Township – one of the four land-grant townships in the sample – that was published in 1876. The map shows the subdivision of several land grants including San Francisquito Rancho, Rincon de San Francisquito, and Rancho Pastoria de las Borregas. The parcel sizes are extremely varied. Thus, it is unlikely that one third of all farms and 60 percent of farms 80-239 acres would be exactly 160 acres.

---

<sup>28</sup> Larkin X, p. 240. Talbot Green to Thomas Larkin, Feb. 9, 1856.

Preemption was widely discussed in letters and newspapers in California from the late 1840s on. For instance, in 1852 a ranch manager reported to the owner of a land grant: “A portion of the settlers are ... [taking] up what they call a preemption of 160 acres.”<sup>29</sup> And in 1853, a special act was passed temporarily allowing preemption on unsurveyed public lands. Previously preemption had only been permitted on *surveyed* public lands. In 1860, the Surveyor General of California stated “A great body of the settlers are located adjoining to or upon land heretofore claimed by parties under grants.”<sup>30</sup> Orson Lyon, the defendant in an 1863 ejectment suit, argued, “That land is Public land belonging to the United State of America and at the time of the entry by this Defendant said land was vacant ... this Defendant made entry on said lands for the purpose preempting the same under the laws of the government.”<sup>31</sup>

Preemption would in theory eventually entitle the preemptor to a patent, but the delay could be long and the outcome was not certain. Preemption could only occur once the land had been surveyed. This could take years. Further, preemptors were subordinate to the holders of Spanish and Mexican land grants and, in practice if not in theory, to the purchasers of state lands. The boundaries of land grants were not well defined and so were often shifted during the survey process. The purchasers of state lands would emerge without warning. Further, the land offices were not always well organized. In at least one case, multiple individuals filed to establish preemption rights on the same land. Thus, being on the land with the intent to preempt did not convey a high level of security.

---

<sup>29</sup> Larkin IX, p. 83.

<sup>30</sup> Report of the Commissioner of the General Land Office Accompanying the Annual Report of the Secretary of the Interior (1860), p. 159.

<sup>31</sup> *Javier Alviso v. Orson Lyon*, Third District Court, Santa Clara County (1863).

The uncertainty was highlighted by the U.S. Supreme Court in *The Yosemite Valley Case* (1872), which affirmed principles established in *Frisbie v. Whitney* (1869).

And it was there held that under the preemption laws mere occupation and improvement of any portion of the public lands of the United States, with a view to preemption, do not confer upon the settler any right in the land occupied, *as against the United States*, or impair in any respect the power of Congress to dispose of the land in any way it may deem proper; and that the power of regulation and disposition, conferred upon Congress by the Constitution, only ceases when all the preliminary acts prescribed by those laws for the acquisition of the title, including the payment of the price of the land, have been performed by the settler. When these prerequisites have been complied with, the settler for the first time acquires a vested interest in the premises occupied by him, of which he cannot be subsequently deprived. He is then entitled to a certificate of entry from the local land officers, and ultimately to a patent for the land from the United States. Until such payment and entry, acts of Congress give to the settler only a privilege of preemption in the case the lands are offered for sale in the usual manner -- that is, the privilege to purchase them in that event in preference to others. The United States by those acts enter into no contract with the settler, and incurs no obligation to anyone that the land occupied by him shall ever be put up for sale. They simply declare that in case any of their lands are thrown open for sale, the privilege to purchase them in limited quantities, at fixed prices, shall be first given to parties who have settled upon the improved them. The legislation thus adopted for the benefit of settlers was not intended to deprive Congress of the power to make any other disposition of the lands before they are offered for sale, or to appropriate them to any public use.

Historical evidence suggests that uncertain property rights had negative effects on settlers' willingness to invest in their property.<sup>32</sup> In 1860, James Mandeville, the Surveyor General of California commented explicitly on this issue:

Owing to the insecurity of titles, the settler has placed mere temporary fences and improvements on his farm, nor can he become permanently settled, until his lines of demarcation are fixed. The settler only wishes to know where, with safety to his limited capital, he can build his house, raise his crops or vine, graze his stock, and hew his lumber. To him these are matters of great moment, and, as I before stated, the policy of the government should be to foster the settler, by giving him permanency and stability, and thus increase the wealth of the nation.<sup>33</sup>

Who exactly Mandeville was referring to and the extent to which they overlapped with the holders of 160-acre farms is not entirely clear. He states: "A great body of the settlers

---

<sup>32</sup> See Alta California 1851, Jan 11, Paul (1973) p. 22 quoting Hittell (1863) , and Transactions of the State Agricultural Society (1866), p. 74 .

<sup>33</sup> Report of the Commissioner of the General Land Office Accompanying the Annual Report of the Secretary of the Interior (1860), p. 159.

are located adjoining to or upon land heretofore claimed by parties under grants from the former government.”<sup>34</sup>

If most holders of 160-acre farms were planning to preempt their land claims this would resolve a number of puzzles. It would account for the high concentration of farms at 160 acres and their low average levels of improved acreage in 1860, the period in which property rights were most uncertain. It might also account for a second pair of facts. The share of 160-acre farms fell sharply from 1860 to 1870 in land-grant townships. As boundaries were resolved, it may have become clear that most land could not be preempted or homesteaded. If this was true, individuals who held 160-acre farms may have either purchased farms from the owners of land grants or state lands or moved on. During this same period, 1860-1870, the share of 160-acre farms rose sharply in non-land-grant townships. Homesteaders may have been staking their claims, and preemptors may have been able to purchase their land.

The interpretation of the low share of improved acreage on 160-acre farms – whether due to the Preemption Act or some other factor – depends on the counterfactual. It is not obvious what the right counterfactual is. The debate over homesteading had turned on whether farm development occurred too soon.<sup>35</sup> It is more difficult to evaluate the timing issue in the context of California, since the 160-acre farms were not located on a remote frontier. Holders of 160-acre farms were producing crops and livestock, and these may have been sold in the market. Given the large share of 160-acre farms, there would have been general equilibrium price effects had the land been empty or had the 160-acre farms been developed at the level of other similar farms.

---

<sup>34</sup> Report of the Commissioner of the General Land Office Accompanying the Annual Report of the Secretary of the Interior (1860), p. 159.

<sup>35</sup> See Anderson and Hill (1975, 1990), Barzel (1989), Allen (1991), and Bohanon and Coelho (1998).

## 7. Conclusions and Future Research

This paper documented that 160-acre farms were surprisingly different from other farms in California in 1860 in their share of improved acreage. Their share of improved acreage had implications for outcomes such as farm and crop values. The difference does not appear to be attributable to the characteristics of the farmers such as their age, occupation, or ownership status, or the quality of the land. Nor does this difference appear to be attributable to the presence of Spanish or Mexican land grants in the county in which the township was located.

The available evidence suggests that the difference was likely the result of the Preemption Act of 1841 and its extension to unsurveyed land in California in 1853. Individuals could take up preemptions of 160 acres, but could not purchase the land until it had been surveyed and offered for sale. Very little land had been surveyed and offered for sale by 1860, and preemptors rights were subordinate to the owners of land grants or state lands. Their property rights were relatively insecure and so may have reduced investment in improving land.

These findings raise a number of questions the answers to which have implications for understanding the development of American agriculture during the nineteenth century. Were 160-acre farms systematically different from other farms in other public-land states? If so, were they different because of some feature of federal or state land policies? Did these policies accelerate or delay the development of agricultural land? In 1860, more than 10 percent of the farms in the Midwest and roughly 50 percent of the farms in Minnesota and Kansas were 160 acres.<sup>36</sup> Claims clubs were active in Illinois, Iowa, Kansas, Nebraska, Wisconsin, and elsewhere in part to provide interim property

---

<sup>36</sup> Atack and Bateman (1987), pp. 126-127.

rights until individuals could purchase their preemptions.<sup>37</sup> It is possible that because of the gold rush 160-acre farms in California were simply different from 160-acre farms in other public-land states. Further research can shed new light on the role federal land policy played in the development of agriculture on public lands during the nineteenth century.

---

<sup>37</sup> See Bogue (1958) and Murtazashvili (2009).

## References

Allen, Douglas W. (1991), "Homesteading and Property Rights: or, 'How the West was Really Won'." Journal of Law and Economics **34**, 1–23.

Alston, Lee J., and Joseph Ferrie 2005. Time on the Ladder: Career Mobility in Agriculture, 1890-1938. Journal of Economic History 65: 1058-1081.

Alston, Lee J., and Kyle D. Kauffman. 1997 "Agricultural Chutes and Ladders: New Estimates of Sharecroppers and 'True Tenants' in the South, 1900–1920." Journal of Economic History 57: 464–75.

Alston, Lee J., and Kyle D. Kauffman 1998. "Up, Down, and Off the Agricultural Ladder: New Evidence and Implications of Agricultural Mobility for Blacks in the Postbellum South." Agricultural History 72: 263–79.

Alta California. January 11, 1851

Anderson, Terry L., and P. J. Hill. (1975). "The Evolution of Property Rights: A Study of the American West," Journal of Law and Economics 18 (April), 173-179.

Anderson, Terry L., and Hill, Peter J. (1990), "The Race for Property Rights." Journal of Law and Economics **33**, 177–198.

Atack, J. (1988). "Tenants and Yeomen in the Nineteenth Century." Agricultural History, 62: 6-32.

Atack, J. (1989). "The Agricultural Ladder Revisited: A New Look at an Old Question with Some Data for 1860." Agricultural History 63: 1–25.

Atack, J. and F. Bateman. (1987). To Their Own Soil: Agriculture in the Antebellum North. Ames: Iowa State University Press.

Barzel, Yoram. (1989). Economic Analysis of Property Rights. Cambridge: Cambridge Univ. Press.

Berry, T. S. (1984). Early California: Gold, Prices, Trade. Richmond: The Bostwick Press.

Bleakley, Hoyt and Joseph Ferrie. (2010). Shocking Behavior: Land Lotteries in 1832 Georgia and 1901 Oklahoma and Later Life Outcomes. Working Paper.

Bogue, A. (1958). "The Iowa Claim Clubs: Symbol and Substance." Mississippi Valley Historical Review, 45(2):231-253.

Clay, Karen. (1999). "Property Rights and Institutions: Congress and the California Land Act of 1851." Journal of Economic History, 59: 122-142.

Donaldson, Thomas. (1884). The Public Domain: Its History with Statistics. Washington: Government Printing Office.

Gates, P. W. (1991). Land and Law in California: Essays on Land Policies Ames: Iowa State University Press.

Gates, Paul W. (1968). History of Public Land Law Development. Washington, DC: Government Printing Office.

Hittell, J. (1863). The Resources of California. San Francisco, A. Roman & Co.

Kanazawa, M. (1996). "Possession is Nine Points of the Law." Explorations in Economic History, 33: 227-249.

Larkin, T. O. (1951-1968). The Larkin Papers: Personal, Business, and Official Correspondence of Thomas Oliver Larkin, Merchant and United States Consul in California. Berkeley, University of California.

Libecap, Gary D. and Dean Lueck. (2009). "The Demarcation of Land and the Role of Coordinating Institutions." NBER Working Paper 14942.

Libecap, Gary D., Dean Lueck, and Adrian Lopes. (2009) "The Effect of Land Demarcation Systems on Agriculture in 19th Century California." Manuscript 2009.

Murtazashvili, Iliia. (2009). "The Political Economy of Claim Clubs: Squatters, Presumptive Rights, and the Origins of Legal Title on the American Frontier." Ph.D. Dissertation, University of Wisconsin.

Nash, G. (1964) State Government and Economic Development: A History of Administrative Policies in California, 1849-1933. Berkeley: Institute for Governmental Studies.

Olmstead, A. and P. Rhode. (2008). Creating Abundance: Biological Innovation and American Agricultural Development. New York: Cambridge University Press.

Paul, R. (1973). "The Beginnings of Agriculture in California: Innovation vs. Continuity." California Historical Quarterly, 52(1): 16-28.48

Pisani, D. J. (1994). "Squatter Law in California, 1850-1858." Western Historical Quarterly, 25(3): 277-310.

Report of the Commissioner of the General Land Office Accompanying the Annual Report of the Secretary of the Interior (various years) Washington: Government Printing Office.

Robinson, W. W. (1948). Land in California: The Story of Mission Lands, Ranchos, Squatters, Mining Claims, Railroad Grants, Land Scrip, Homesteads. Berkeley, University of California Press.

Rohrbough, Malcolm J. (1990). The Land Office Business. Belmont, CA:Wadsworth. Second ed.

Third District Court, Santa Clara County. Records in Santa Clara County Superior Courthouse, San Jose.

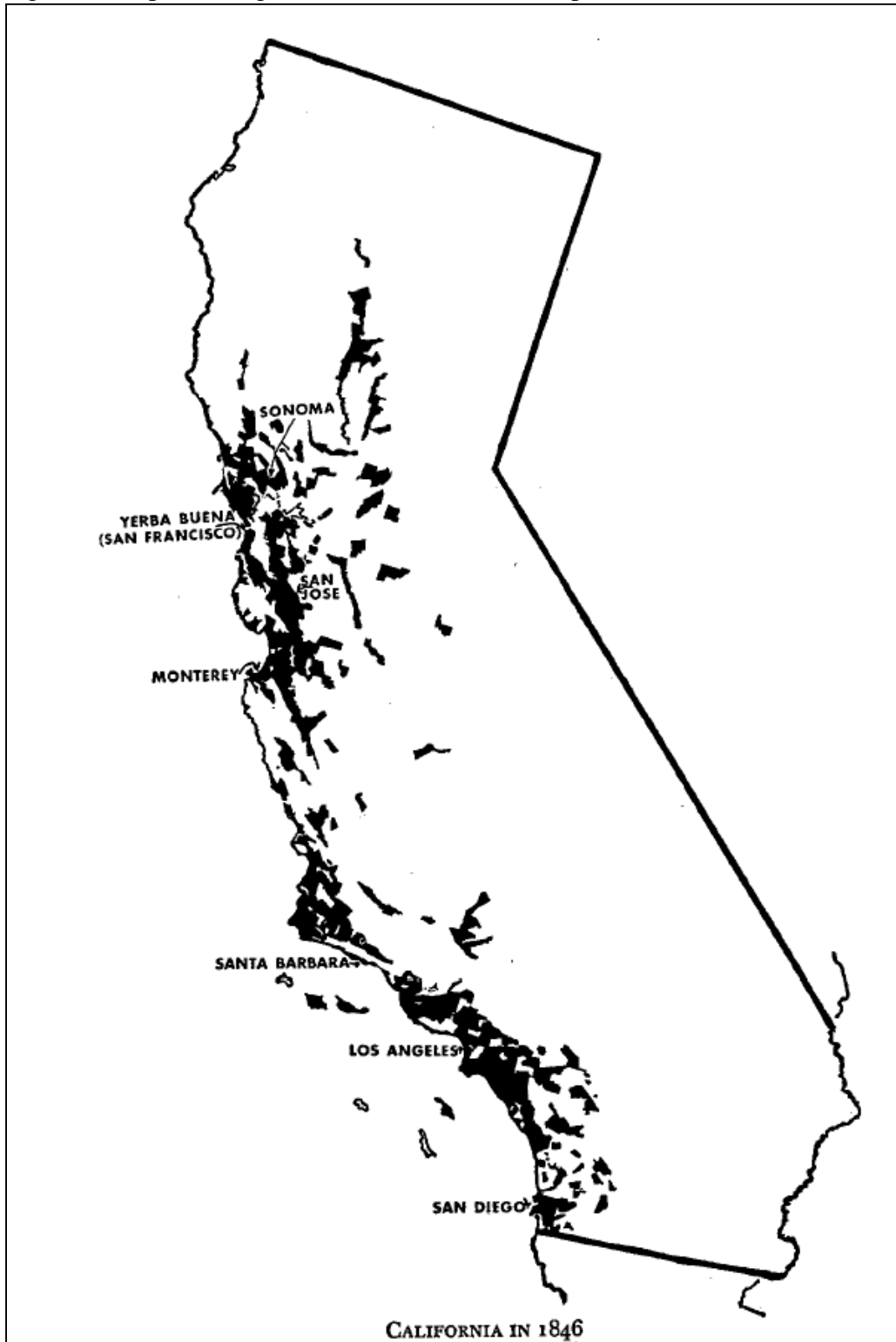
Transactions of the California State Agricultural Society (various years). Sacramento.

Weiman, David F. (1991). "Peopling Land by Lottery? The Market in Public Lands and the Regional Differentiation of Territory on the Georgia Frontier," Journal of Economic History 51 (December), 835-860.

U.S. Supreme Court, (1872) *The Yosemite Valley Case*, 82 U.S. 15 Wall. 77.

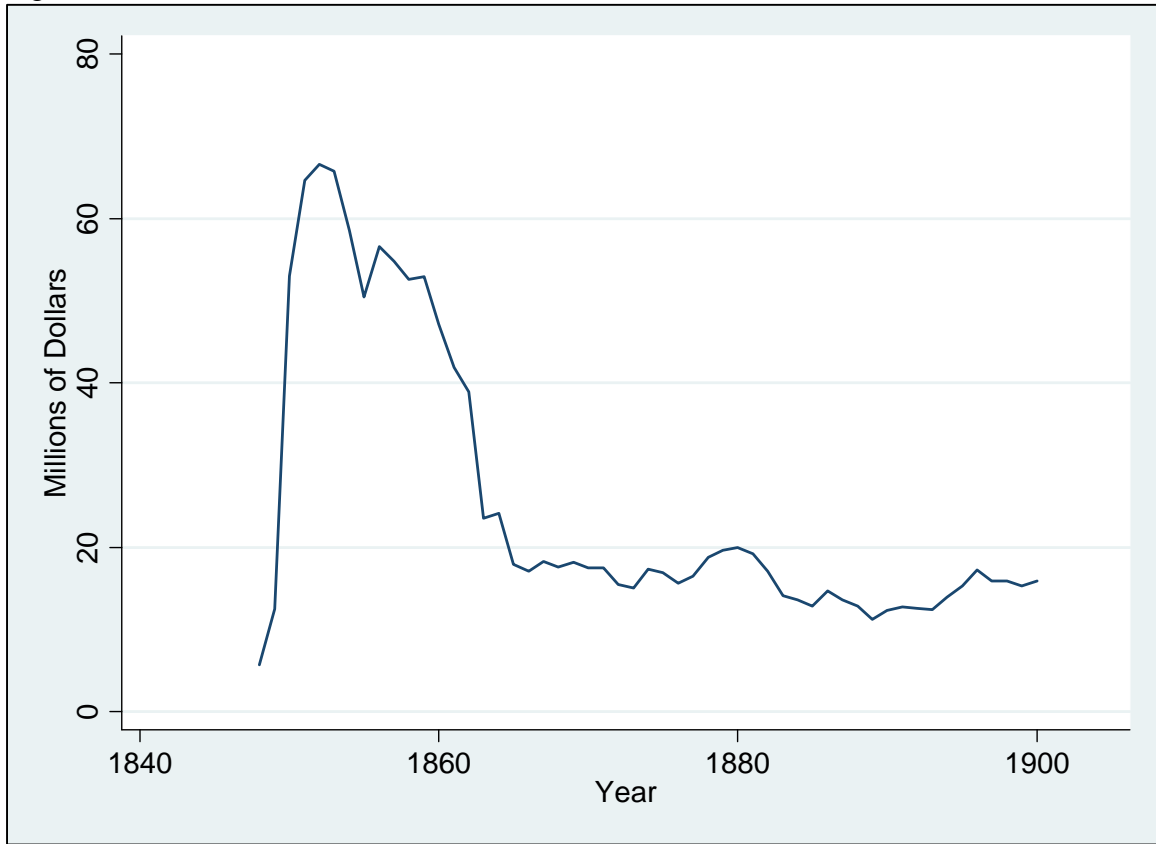
U.S. Supreme Court, (1869) *Frisbie v. Whitney*, 76 U.S. 9 Wall. 187

Figure 1: Map Showing Location of Land Grants up to 1846



From Robinson (1948), p. 68.

Figure 2: Gold Production in California over Time



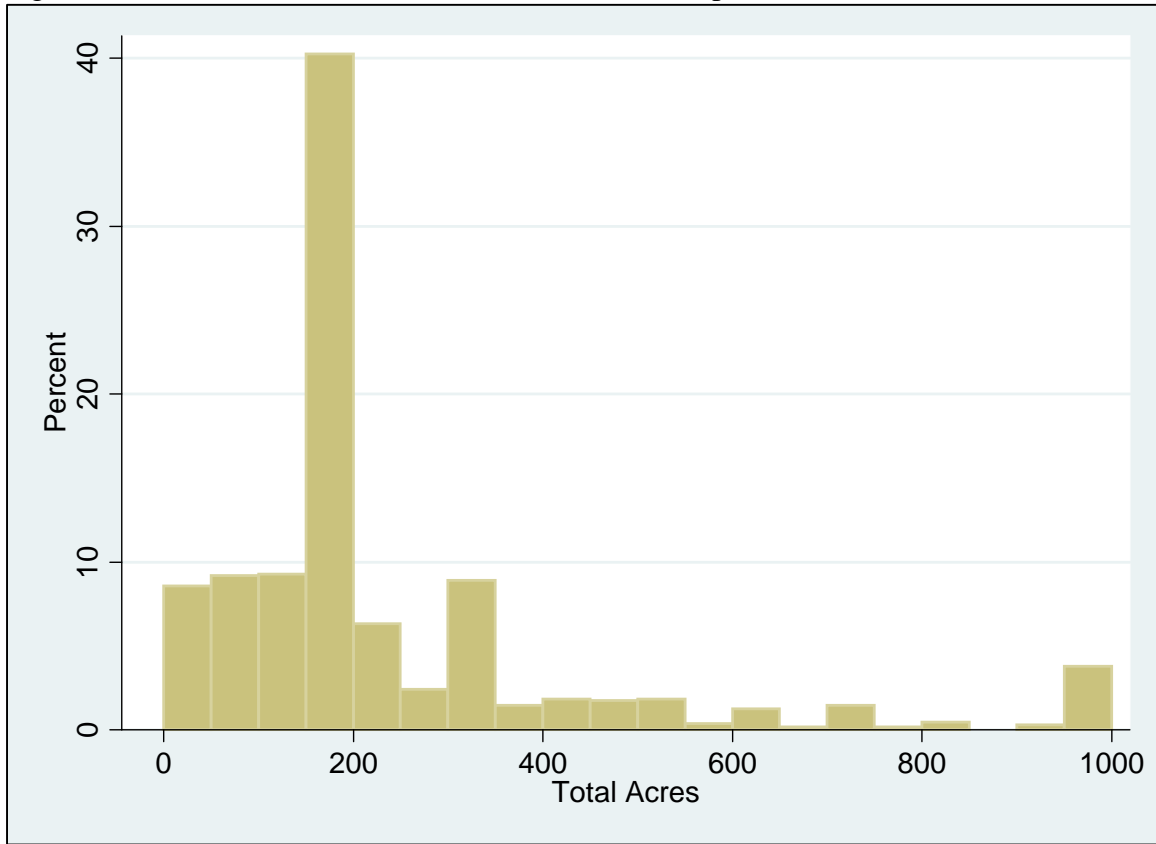
Source: Berry (1984), pp. 74, 76, 78.

Figure 3: Map of Counties in 1860 Sample



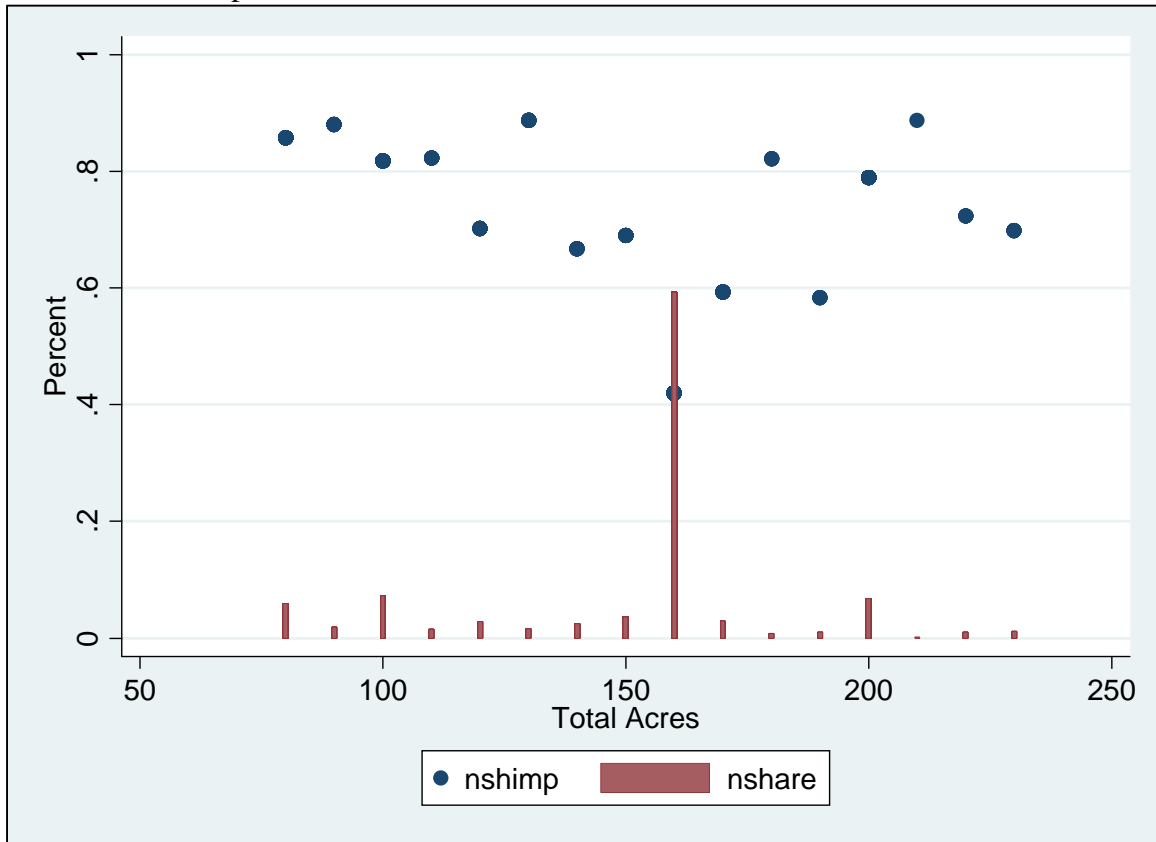
Notes: Shasta and Fresno counties were larger in 1860 than they are today. Counties that were part of these counties in 1860 in whole or part are in gray and the approximate historical boundaries are shown with dotted black lines.

Figure 4: Distribution of Farm Sizes in California Sample in 1860



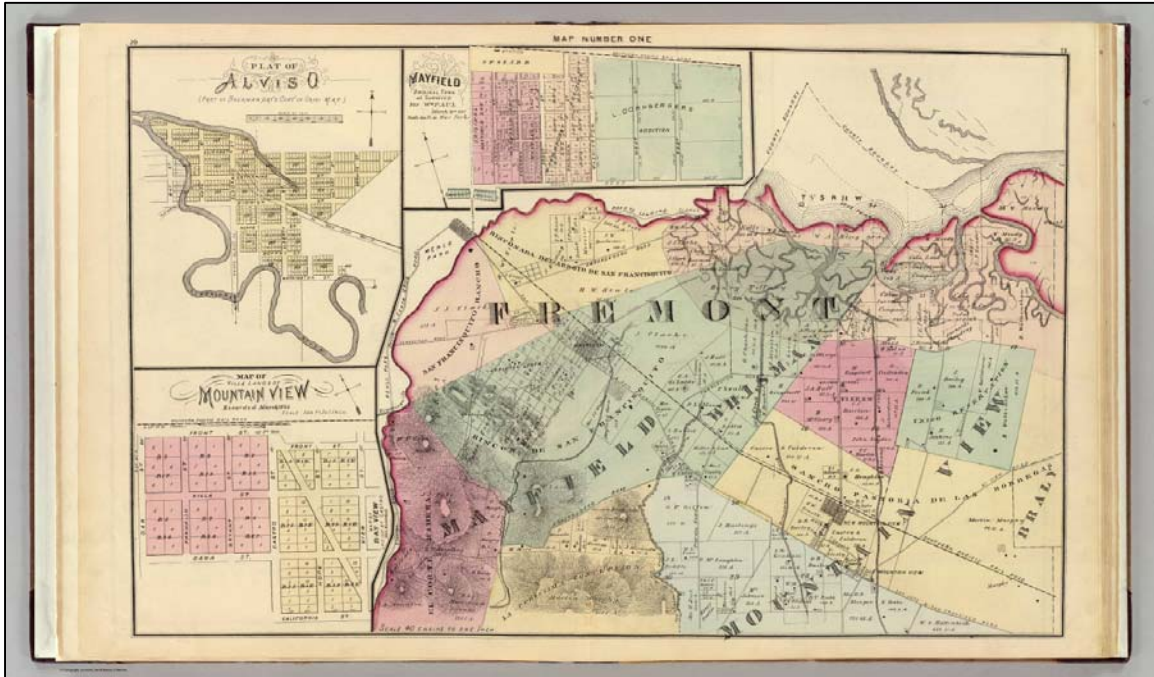
Notes: Farms greater than 1000 acres were included in the 950-1000 bin.

Figure 5: Distribution of Farm Sizes and Share of Improved Acres, 80-240 Acre Farms, in California Sample in 1860



Notes: The 160-169 acre bin only includes 160 acre farms. The ten farms with 161-169 acres were shifted to the 170 acre bin.

Figure 6: Map Showing Part of Fremont Township, Santa Clara County, 1876



Source: Historical atlas map of Santa Clara County, California. Compiled, drawn and published from personal examinations and surveys by Thompson & West, San Francisco, Cal. 1876. Thos. Hunter Pr. Phil. N. Friend, Engr. Philad. C.L. Smith, Del.

Notes: From davidrumsey.com. The site permits non-commercial reproductions of their images.

Table 1: Federal Land Sales in California 1857-1860

	7/1/57- 12/31/57	1/1/58- 6/30/58	7/1/58- 12/31/58	1/1/59- 6/30/59	7/1/59- 12/31/59	1/1/60- 6/30/60	Total
	Acres						
San Francisco	675.07	539.08		1,208.69	1,400.00	926.80	4,749.64
Los Angeles					39.71		39.71
Marysville		4,915.85	5,056.83	22,963.14	4,755.96	4,908.08	42,599.86
Humboldt			5,791.49	26,545.34	3,212.83	4,650.43	40,200.09
Stockton			2,774.02	22,981.32	2,982.38	1,899.18	30,636.90
Visalia			1,393.88	16,870.99	5,511.37	6,987.70	30,763.94
Total	675.07	5,454.93	15,016.22	90,569.48	17,902.25	19,372.19	148,990.14

Notes: Report of the Commissioner of the General Land Office Accompanying the Annual Report of the Secretary of the Interior, For the Year 1860, pp 50, 56. 1859, pp. 202, 208. 1858, pp. 144, 150. Based on the proceeds of sale in the various reports, all of the above acreage sold at \$1.25 per acre. No land sales were listed before July 1, 1857 in reports of the General Land Office.

Table 2: Summary Statistics for Townships and Counties in 1860

County	Acres in Farms in Township	Farms in Township	Percent 160-acre	County Land Value	Acres in Farms County	Farms in County	Land grant share	LG pat. end 1859
	<i>Township, 1860</i>				<i>County, 1860</i>			
Alameda	56,773	228	32	18	240,915	658	0.40	0.072
Contra Costa	56,354	193	46	9	205,836	447	0.42	0.038
Fresno	12,584	57	16	8	23,201	85	0.00	0.000
Placer	24,419	59	24	6	90,289	254	0.002	0.002
San Mateo	47,381	80	21	11	169,940	304	0.55	0.231
Santa Clara	23,802	106	28	18	166,548	665	0.48	0.087
Shasta	48,009	229	41	5	78,043	218	0.005	0.005
Sutter	19,073	72	43	15	168,005	549	0.08	0.005
<i>Total</i>	<i>288,395</i>	<i>1,024</i>	<i>35</i>		<i>1,142,777</i>	<i>3,180</i>		

Notes: The townships are: Alameda (Eden), Fresno (Township #1), San Mateo (Township #2), Shasta (whole county), Sutter (Nicolaus), Santa Clara (Fremont), Placer (Township #10), Contra Costa (Township #2). The data in the first three columns are from the sample. The data in next three columns are county statistics of the 1860 Census of Agriculture, available at ICPSR. The last two columns are authors calculations based on Bureau of Land Management (BLM) land patent records, which comprise the original patents for all public land in the United States. The BLM data are available online from the BLM or from rootsweb.com. Numbers for Shasta and Fresno are approximate. In 1860, Shasta County included most of what is today Lassen County, so records for the two modern counties were included. In 1860, Fresno County included Madera County and parts of Mono and Inyo Counties. The calculations shown are only for the modern Fresno and Madera Counties. No public land in any of the counties other than land encompassed by land grants had been patented by the end of 1859.

Table 3: Share of Improved Acres on 160 Acre and Other Farms in 1860

	(1) Sh. improved Full sample	(2) Sh. improved Full sample	(3) Sh. improved 80-239 acres	(4) Sh. improved 80-239 acres
160 acres	-0.320*** (0.0742)	-0.325*** (0.0651)	-0.349** (0.104)	-0.289*** (0.0202)
160 acres x land grant				-0.0923 (0.150)
Ln(total acres)		-0.122*** (0.0180)	-0.164*** (0.0307)	-0.157*** (0.0294)
Township FE	Yes	Yes	Yes	Yes
Observations	1024	1024	609	609
R-squared	0.210	0.303	0.261	0.263

Notes: Standard errors are in parentheses, are robust, and are clustered by township. \*, \*\*, and \*\*\* denote statistical significance at the 10, 5, and 1 percent levels.

Table 4: Farm and Crop Values for 160 Acre and 80-239 acre Farms in 1860

	(1) Ln(farmvalue)	(2) Ln(farmvalue)	(3) Ln(cropval)	(4) Ln(cropval)
160 acres	-0.549 (0.437)	0.0318 (0.0956)	-1.681** (0.662)	-0.167 (0.106)
Ln(improved acres)		0.512*** (0.0462)		1.062*** (0.166)
Ln(unimproved acres)		0.109 (0.0825)		0.0348 (0.0956)
Intotac	0.720*** (0.138)		0.965* (0.454)	
Township FE	Yes	Yes	Yes	Yes
Observations	607	607	607	607
R-squared	0.237	0.412	0.194	0.468

Notes: Two of the 609 farms in Table 3 did not report farm values, so the number of observations is 607. Standard errors are in parentheses, are robust, and are clustered by township. \*, \*\*, and \*\*\* denote statistical significance at the 10, 5, and 1 percent levels.

Table 5: Evolution of Farms in Five Townships, 1860-1880

Year	Share of 160-acre farms	Share improved, 160-acre farms	Share improved, 80-239 acre farms
1860	0.34	0.37	0.84
1870	0.35	0.46	0.86
1880	0.17	0.75	0.82
	Share of 160-acre farms in Non-Land-grant townships	Share improved, 160-acre farms in Non-Land-grant townships	Share improved, 80-239 acre farms in Non-Land-grant townships
1860	0.37	0.45	0.74
1870	0.50	0.42	0.65
1880	0.28	0.68	0.68
	Share of 160-acre farms in Land-grant townships	Share improved, 160-acre farms in Land-grant townships	Share improved, 80-239 acre farms in Land-grant townships
1860	0.31	0.26	0.89
1870	0.08	1.00	0.98
1880	0.08	0.92	0.91

Notes: The five townships are in this sample are Alameda (Eden), Fresno (Township #1), San Mateo (Township #2), Shasta (whole county), and Sutter (Nicolaus). Data for San Mateo (Township #2) are missing for 1870.

Table 6: Share of Improved Acres on 160 Acre and Other Farms, 1860-1880

	(1) Sh. improved Full sample	(2) Sh. improved 80-239 acres	(3) Sh. improved 80-239 acres
160-Acre	-0.395*** (0.0723)	-0.451** (0.109)	
160-Acre, 1870	0.361** (0.109)	0.428** (0.127)	
160-Acre, 1880	0.328* (0.126)	0.383* (0.161)	
160-Acre, LG			-0.589*** (0.0481)
160-Acre, 1870 LG			0.614*** (0.0496)
160-Acre, 1880 LG			0.553*** (0.0479)
160-Acre, NLG			-0.275*** (0.0207)
160-Acre 1870, NLG			0.233*** (0.0223)
160-Acre 1880, NLG			0.186 (0.111)
Ln(total acres)	-0.121*** (0.0218)	-0.194** (0.0537)	-0.200*** (0.0239)
Ln(total acres) 1870	0.0509 (0.0282)	0.146* (0.0611)	0.148** (0.0334)
Ln(total acres) 1880	0.0939** (0.0313)	0.216** (0.0474)	0.220** (0.0762)
Township, year, and Township x year FE	Y	Y	Y
Observations	1673	893	893
R-squared	0.519	0.546	0.561

Notes: LG = land-grant townships, NLG = Non-land-grant townships. Standard errors are in parentheses, are robust, and are clustered by township. \*, \*\*, and \*\*\* denote statistical significance at the 10, 5, and 1 percent levels.

Table 7: Characteristics of Men in California in 1860

Occupation	Age	Real Property	Personal Property	Farm Value	Farmer	Foreign Born	160 Acre Farm	Number obs.
All-IPUMS	32	340	466		0.09	0.51		2120
Linked - MS	37	3872	2747	3553	0.83	0.30	0.34	878
Farmer-IPUMS	35	1725	2107		1	0.26		198
Farmer-MS	37	3848	2907	3885	1	0.28	0.33	727

Notes: All data are for white men ages 18-69 who report positive total acreage. IPUMs 1-100 sample for 1860 was used to compute All-IPUMS and Farmer-IPUMs. The remaining lines are draw from the linked manuscript (MS) sample. Farmer is the share listing their occupation as farmer.

Table 8: Age and Occupational Characteristics of Individuals with 160-Acre Farms in 1860

	(1) Age Full sample	(2) Farmer Full sample	(3) Age 80-239 acres	(4) Farmer 80-239 acres
Preemptor	0.255 (0.610)	-0.0699 (0.0849)	1.293 (0.781)	-0.115 (0.0879)
Ln Total Acres	1.007*** (0.239)	0.0667 (0.0443)	2.510 (2.392)	0.0202 (0.0817)
Township fixed effects	Yes	Yes	Yes	Yes
Observations	869	869	534	534
R-Squared	0.027	0.122	0.037	0.131

Notes: Farmer refers to the occupation that the individual listed in the Census of Population. Standard errors are in parentheses, are robust, and are clustered by township. \*, \*\*, and \*\*\* denote statistical significance at the 10, 5, and 1 percent levels. The number of observations is smaller than the 878 reported in Table 7, because farms of less than 3 acres were dropped.

Table 9: Ownership Characteristics of Individuals with 160-Acre Farms in 1860

	(1) RP<FV Full Sample	(2) RP=0 Full Sample	(3) RP<FV 80-239 acres	(4) RP=0 80-239 acres
Preemptor	-0.0197 (0.0391)	0.0230 (0.0311)	0.0317 (0.0434)	0.0495 (0.0412)
Ln Total Acres	-0.0329 (0.0205)	-0.0614** (0.0225)	-0.0422 (0.0788)	-0.138 (0.0863)
Township fixed effects	Yes	Yes	Yes	Yes
Observations	869	869	534	534
R-squared	0.318	0.304	0.387	0.362

Notes: RP is real property listed in the Census of Population, and FV is farm value listed in the Census of Agriculture. Standard errors are in parentheses, are robust, and are clustered by township. \*, \*\*, and \*\*\* denote statistical significance at the 10, 5, and 1 percent levels.

Table 3A: Share of Improved Acres on 160 Acre and Other Farms in 1860, Linked Sample

	(1)	(2)	(3)	(4)
	Sh. improved Full sample	Sh. improved Full sample	Sh. improved 80-239 acres	Sh. improved 80-239 acres
160 acres	-0.284*** (0.0638)	-0.295*** (0.0572)	-0.302** (0.0931)	-0.260*** (0.0212)
160 acres x land grant				-0.0648 (0.136)
Ln(total acres)		-0.107*** (0.0175)	-0.161*** (0.0351)	-0.158*** (0.0338)
Township FE	Yes	Yes	Yes	Yes
Observations	869	869	534	534
R-squared	0.201	0.265	0.219	0.220

Notes: Standard errors are in parentheses, are robust, and are clustered by township. \*, \*\*, and \*\*\* denote statistical significance at the 10, 5, and 1 percent levels.