The Roundup as a Worker Controlled Firm: Were the Ranges Under-Stocked?

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Abstract

Research by Anderson, Hill, Libecap, and others radically reshaped how we view the development of the American West. However, when it comes to the range cattle industry they have largely accepted the view that the industry overstocked the public domain. Libecap and others argue that institutions such as range rights, roundups, and maverick laws were designed, at least in part, to prevent overstocking. For a while these institutions were effective but eventually they failed. Recent works on property rights, notably by Sanchez and Nugent (1994) and Hotte (2005), challenge the new institutionalist models while still accepting the overgrazing story.

This paper offers a simple model that implies the ranges may have been under-stocked, particularly in 1880s Wyoming. The institution of the roundup created what was equivalent to a worker-controlled firm. As such, to the extent it was effective it created an incentive system that lead to the public domain being under-stocked. Given that recent research indicates that the evidence for widespread overgrazing in the 1880s is very weak (McFerrin and Wills, 2006), we call for a detailed empirical analysis of the development and operation of the roundup system in Wyoming to provide the data to differentiate the aforementioned models.

1. Introduction

It is a testimony to the work of Anderson, Hill, Libecap, and others that what is now considered the standard story of the American West is their story. Over the last 30 years how we view everything we associate with the old West – the range cattle industry, homesteaders, mining, violence, Indian wars – has moved from simply a story of heroes and villains to property rights and institutions.

Our understanding of the range cattle industry, the focus of this paper, in particular has gone through a transformation. Originally viewed almost entirely in a negative light it was characterized as an industry comprised of firms with unconstrained greed feeding (literally and figuratively) off the public domain. Largely financed by eastern and foreign capitalists these large firms were depicted as doing all they could to prevent the settlement of the West. These motivations lead to the overstocking of the range and the eventual collapse of the industry.

New-institutionalist research shifted the focus to the development of institutions, focusing particularly on the lack of private property rights. Today we understand how the path of development was affected by the imposition of land laws developed for the East that were ill-suited to the arid West and how a self-interested bureaucracy prevented the adaptation of those laws to reflect the economic reality of the area (Libecap, 1981, 1993). It was this impediment, it is argued, that led to the overgrazing of the public domain lands resulting in environmental degradation and industry collapse.

This paper examines the theoretical underpinnings of the alleged overgrazing of the public domain. We stress the term "alleged" because recent work calls into question this historical "fact" (McFerrin and Wills, 2006). The evidence supporting widespread

overgrazing, especially for Wyoming of the 1880s, is primarily anecdotal -- often articulated by those with a vested interest -- and derives from relatively few sources. Nor was there agreement at the time that the ranges were overstocked. So, at the very least, we think this historical "fact" is open to question.

The theoretical case implying widespread overgrazing is much stronger than the evidence which, perhaps, explains why the overgrazing story is so readily accepted. Historians accept overgrazing as an obvious example of the tragedy of the commons in a lawless territory populated by greedy businessmen. Economists, while acknowledging that individuals will devote resources to developing institutions to prevent or reduce the dissipation of rents from overgrazing, generally accept that these institutions failed. Libecap (1993) argues that institutions such as roundups (among other things such as Maverick Laws) were developed to prevent the tragedy of the commons and, for a while at least, were effective. However, as competition for land and resources increased these informal institutions broke down leading to overgrazing.

We argue, given the weak evidence for widespread overgrazing, that it is entirely possible these institutions were effective far longer than previously thought. Furthermore, if they were effective, then the ranges were actually *under-utilized*. The roundup institution even if it was effective at preventing entry and overuse did not replicate the conditions of private ownership. No one owned the roundup. If anything, the roundup is theoretically equivalent to a worker controlled firm where the existing workers control entry. This institutional framework produces less than optimal quantity.

In part two, we summarize what we refer to as the standard story, elaborate on the worker controlled firm analogy in part three, and in parts four and five explore other theories relating to range cattle firm operations showing their important differences.

2. Standard Story

The focus of the standard story is on the failure of U.S. land laws to adapt to the conditions of the arid West and allow the emergence of private ownership of vast tracts of land. Initially with little or no settlement of the western ranges there was little incentive to devote resources to defining property rights in land (Anderson and Hill, 2004). Ultimately this changed as settlement increased. However, distortions such as price floors and policies focusing on creating small family farms implemented via the Homestead Act (and its derivatives) unnecessarily created or, perhaps more accurately, permanently established a public domain. These policies, while perhaps suited to the eastern U.S. states, greatly overpriced land in the West and imposed restrictions on farm size that was uneconomical for that region. As Sanchez and Nugent (1994, p. 48) write, "In other words, according to conventional wisdom, common property arrangements existed only because the optimal property rights were ruled out by legal restrictions."

Naturally range cattle firms did not sit idly by and allow rents to be dissipated by the tragedy of the commons. They devised informal institutions designed to prevent entry and the overstocking of the ranges. According to Libecap (1993, p. 60), ranchers would claim strategically located acreages via the legal system which then gave them effective control over vast areas of the public domain. By controlling access to key water resources they could limit the usefulness of land to others. This evolved into a "range rights"

system where such rights were recognized, albeit informally, via livestock associations. Then by controlling membership in communal roundups current "owners" of a range could control entry. Institutional developments such as maverick laws served to strengthen entry limitation. These laws established that any cattle with brands not recognized by the livestock association were deemed "mavericks" and subject to confiscation by members of the roundup.

Sanchez and Nugent (1994) go on to argue that ranchers were effective at both preventing entry via roundup and preventing overuse by existing firms on the range (i.e. stinting). The share of the maximum herd size of an individual firm was linked to the proportion of permanent water sources owned by that firm (p 49). Given that the roundup method and branding made the number of each firm's cattle cheaply observable this restriction was credible.

Libecap (1993, p. 52) argues this arrangement appeared to be effective prior to 1880. "Increased settlement pressures and competition for land after 1880, however, made the informal rules of ranchers insufficient for delimited and protecting private claims." This lead to overgrazing, often by current "owners" of the land, as an entry-deterrence mechanism and ultimately to environmental degradation resulting in increased vulnerability to environmental shocks. With the heavy snows and cold of the winter of 1886/7 the range cattle industry sustained heavy losses in what came to be known as the big "die-up."

Unfortunately it is not clear how we know that the roundup institution ceased to be effective after 1880. If it is assumed that the institution became ineffective because of

overgrazing then that begs the question *how do we know there was overgrazing after 1880*?

3. Roundup as a worker-controlled firm

As described above institutions such as roundups and maverick laws were used to control entry and prevent the tragedy of the commons. Most seem to agree that for at least some period of time these institutions were effective. In other words, once established the roundup mechanism prevented excessive use (i.e. output) by new firms and by the existing firms (Sanchez and Nugent, p 48). Left unexplained, however, is the optimal number of firms in the roundup and what impact this organizational form has on output.

In the American West of the 1880s there were two private property rights issues. The first was the failure of land laws to effectively prevent the private ownership of large tracts of land, thus creating a public domain of an input. The second was the failure to protect private property, such as cattle. While acknowledging the latter the focus of the literature has been on the former. As a result, the literature has been somewhat loose in differentiating the impacts of these two failures. Both failures play into the development of the roundup.

There is no dispute that cattle were privately owned. Both legal and economic institutions, such as branding, were well developed establishing the private ownership of cattle (Anderson and Hill, 2004, p. 149). Branding clearly defined who owned which cattle and brands were both informally recognized as designating ownership and had legal sanction. The failure to prevent cattle rustling was a failure of the government to

enforce private property rights and lead to private investment in the prevention of rustling, resulting in both legal and illegal activities on the part of cattle owners.

If we take as our starting point that roundups were effective then the central questions become how many firms will be allowed on the range and who gets the profits? As demonstrated by Alchian and Demsetz (1972), how those decisions are made is vital for determining the output of the organization. In the case of what is called the "classical firm" the monitor is the residual claimant and is the central "person" who hires, fires, renegotiates -- the common party to all contracts. However, in the case of roundups, no single firm or entity owns the roundup -- there is no monitor. Whether an additional firm is allowed in the roundup is determined by the existing firms and they all share, albeit unequally, in the profits.

Under private ownership output will be increased as long as marginal profit is greater than zero. However, under the ownership structure of a worker controlled firm output will be increased only so long as profit per worker increases. In the case of the roundup institution an additional firm will be allowed on the range only if profits per *existing* firm increases.[1] Once average profit begins to decline it is in the interest of the existing firms to prevent entry and/or stop increases in output. In other words, those on the range have the incentive to use as their entry criterion the impact of the additional firm on their own profit (Pejovich, 1995, p. 175). As such, output will be below the optimal amount that would exist under private property rights.

Consider the following hypothetical story on the development of a roundup district. For simplicity we'll assume a roundup district and a range as equivalent and that

[1] We will abstract from issues such the distribution of profits and voting rules on allowing entry. In other words, we'll equate a firm with a worker and the impact of entry is identical on all workers/firms.

there is a fixed relationship between a firm and the number of cattle. Suppose a range cattle firm "discovers" an unused range. It cannot purchase the range, even if it wants to, and it must expend resources to prevent its cattle on the range from being stolen. Obviously the firm must incur all the costs of roundups.

Now suppose a second range cattle firm wants to graze its cattle on the range. At this point the first firm must decide on whether to spend resources preventing entry or to allow it. The benefits of allowing the second firm are that roundup costs are now shared as are expenditures preventing cattle rustling. The costs imposed are the negative externalities such as decreased weight gain from having more cattle on the range. Assuming that these costs are quite small, at least initially, relative to the aforementioned cost savings then average costs for the initial firm falls and profits rise. Thus, it is in the interest of the existing firm to allow entry.

Suppose another range cattle firm arrives. Now the decision on entry is jointly made by the two firms and they will allow entry as long as average profits rise. Additional firms will be welcomed onto the range as long as the marginal profit exceeds the average profit. Assuming that roundup and enforcement costs are falling at a decreasing rate and that the externality costs are rising at an increasing rate, then at some point average profits begin to fall for the firms controlling entry into the roundup. At that point, the firms on the range will claim that the range is full and thus prevent entry by excluding further firms from the roundup.

However, because the decision on allowing entry is based on averages and not at the margin the range will be under-utilized. This type of institution leads to under-

production.[2] We argue that even if the roundup institution was effective in controlling the grazing on the range this solution was inherently suboptimal relative to private property rights because nobody owned the roundup. The lack of private property rights forces the private range cattle firms to form partnerships to effectively control grazing on a specific range. These partnerships – the roundups – now become the unit of production and are theoretically equivalent to worker controlled firms. None of the individual firms own the roundup but they control who joins the roundup and the intensity of use by the members.

In 1884 the Wyoming Stock Growers Association was given legal standing to organize all roundups in the state. As Osgood (1970, p. 187) describes, newcomers to the ranges were effectively forced to join in the official roundup which, technically, was open to all. However, "If a range was beginning to get too crowded, the newcomer might find it difficult to obtain such permission….Under its by-laws, the applicant for admission must have his name presented by a member. … Rather than risk being denied the advantages that accrued from membership in the Association, the newcomer was likely to seek a less crowded area…" (Osgood, p. 188).

A more complete description is given by E. V. Smalley, an expert witness employed by the Nimmo report. Writing in 1885 he said,

> Membership of an association is obtained by buying the herd of an old member or negotiating with the association as a body for admission. On some ranges new men bringing in cattle have little difficulty in being admitted to the association, but on others the occupants have passed resolutions declaring that the range is

[2] For those familiar with Alchian and Allen's textbook example "Fishland" the range is the water, the roundup is the boat, and the members on the boat determine who gets to fish from the boat. See Exchange and Production (1977), p 203.

> fully stocked and that no new herds will be admitted. Of course there is no legal power to keep out new men who may wish to bring in cattle, but such men would be boycotted by not being allowed to participate in the round-ups by having their mavericks taken as the property of the association, and by being annoyed in many ways by the cowboys of the old occupants of the Territory. It is not often that a stockman will attempt to put a herd into a round-up district without the consent of the association. (Nimmo, p. 77)

Libecap, in line with Osgood, argues that these informal institutions were, in the end, not effective in preventing overgrazing, that this weakened the carrying capacity of the range, and lead to the industry contracting after the severe winter of 1886/7. This is entirely plausible except for the facts that there is little or no evidence, particularly as early as 1885, that the ranges were overstocked or evidence of a massive decrease in cattle after the 1886/7 winter (McFerrin and Wills, 2006).

4. Other Theories

4.1 Common Property Rights as Optimal

Sanchez & Nugent (1994) take issue with the argument that "common property rights were but a second-best solution." They argue that, given the circumstances of the time, other externalities besides those created by open access existed and that common property allowed those externalities to be internalized. Furthermore, in many cases, this approach was successfully chosen in areas where there were no constraints on the emergence of private property rights.

Under the conditions found in the American West of the 1880s, particularly the significant spatial variability in rainfall, ranchers were vulnerable to production failure due to local drought. This risk could be diversified away by allowing cattle to graze over some geographically dispersed area.[3] Inherent in this solution, however, is an increase in transactions costs from moving cattle from one privately held section of property to another. A movement from private to common property rights would lower these transactions costs.

The cattle pool system that developed to organize roundups, among other things, is considered by Sanchez and Nugent to be the institutional development to deal with the externality problem. The difference from the standard story is that cattle pools existed so firms could efficiently use common property and would have existed even in the absence of restrictions on private land holdings. In their view the impact of the legal restrictions has been greatly exaggerated (p 48). They argue that the conditions where common property was optimal existed through to the end of the 1880s (p 47).

We find this challenge plausible. It does appear to be consistent with actions taken by cattle pools such as the Wyoming Stock Growers Association. In 1879/80 range cattle ranchers were not particularly interested in buying and/or leasing the land when given the opportunity to do so (Weaver, p 303). Furthermore, in 1884, a representative of the WSGA, Thomas Sturgis, lobbied Congress to change US land laws and allow the leasing of public land. "Instead of special leases to individuals or corporations, it is desired that all the stock owners within and between certain natural boundaries….become in a body

[3] A similar motivation induces modern farmers to grow crops on dispersed sections of land to avoid hail damage. Hail storms can wipe out an entire crop but it is extremely localized and usually causes devastating damage 'only' within a small area. Having crops on different sections of land, even a few miles apart, significantly lowers the risks of a farmer's entire crop being destroyed.

the lessees of the grazing lands within specified limits." (New York Times, Dec. 22, 1884).

Their argument is different from ours in two important ways. First is with respect to the incentive to arrange production in this way. We argue the roundup method exists due to the legal restrictions on land ownership and failure to protect private property. They argue the roundup, as it was structured, would have existed regardless due to the arid conditions, variability in rainfall, and transactions costs of moving cattle from one area to another. Second, they argue that stinting was controlled by linking maximum herd size of an individual firm to the carrying capacity of the range (p 49). We argue that maximum herd size would be linked to the point that maximizes average profits.

The weakness of their challenge, in our opinion, is that no evidence is presented that the ranges were of sufficient size to capture the diversification effects of variability of rainfall. A claim at the time put the average roundup district to be approximately 2,000 square miles.[4] Whether a district that is less than 50 miles by 50 miles is sufficiently large to capture significant variability in rainfall is an empirical issue.

Furthermore, it seems reasonable to assume that variability in rainfall is a function of natural land formations (ridges, etc.). Therefore, if roundup districts were motivated by variability in rainfall then this consideration should have been taken into account when deciding the location of those districts and their shape.

While it is entirely plausible that this may have been the motivation for using common property it would only be if the size of the roundup ranges were sufficiently large and that the determination of roundup districts took this into consideration. This has yet to be demonstrated.

[4] Statement of E.V. Smalley in Nimmo, Report, p. 171 (as reported in Dennen, p. 51).

4.2 Impact of Costly Enforcement of Property Rights

Another approach linking resource exploitation to property rights comes from Hotte (2005). In this model the firm must expend resources to prevent illegal extraction. The enforcement cost function is positively related to the value of the marginal output of the firm and negatively related to the wage rate (assumed to be the opportunity cost of illegal activity). In this formulation, Hotte shows that firms have an incentive to hire more than the "socially optimal" quantity of labor. Hiring an extra worker makes illegal extraction less attractive, assuming diminishing marginal productivity, thus reducing enforcement costs (p 509). In other words, "…an owner will resort to a sort of 'overexploitation' of the resource in order to economize on enforcement costs" (p 509).

Furthermore, if the wage rate falls below some sufficiently low level the increase in enforcement costs will rise to a point that a firm abandons the site to free access. The opportunity cost of illegal activity is so low it is not profitable to expend resources to prevent illegal extraction.

While primarily aimed at explaining why free access conditions are often observed in less-developed countries Hotte does single out Anderson and Hill (1975) and Johnson and Libecap (1980) for criticism.[5] Hotte asserts that their arguments for enclosure movements as driven mostly by changes in enforcement technology and increases in output prices is insufficient to account for the variety of tenure regimes observed between industrialized and less-developed countries (p 499). The overgrazing on the Southwestern Indian reservations that Johnson and Libecap (1980, p. 510)

[5] Hotte also claims to refute a claim by Barzel (1989). At the same time support is provided for Demsetz (1967) and Chueng (1970). These aspects of the model are beyond the scope of this paper.

interpret as being a mechanism to discourage potential entrants could be due to private decisions on preventing theft.

While Hotte does not explicitly differentiate between the aforementioned two private property issues, the model does imply that in the case of the US West overstocking would have occurred even if there had not been a public domain issue. Furthermore, the model implies that with sufficiently low wages private ownership of land would have been abandoned creating a public domain.

Unfortunately Hotte provides no supporting evidence, statistical or otherwise.

5. Differentiation of the Models

We believe that the roundup institution is the key to differentiating between the aforementioned models and that the ideal historical period for testing them is Wyoming from about 1875 to 1895. The Wyoming Stock Growers Association was the most developed and effective cattle pool. In 1884, it had the legal authority to organize roundups and enforce maverick laws. Finally Wyoming was the state that bore the brunt of the winter of 1886/7 and where the consequences, if any, of that weather should have been the most consequential.

Clearly the issue of the optimal stocking rate is a theme running through all the models. Whether or not that issue can be tackled directly is a matter of whether objective measures of the ex ante carrying capacities of the ranges can be established and then whether that number was exceeded. We suspect that is unlikely. More likely indirect tests will have to be devised to assess that implication.

The argument of Sanchez and Nugent will be severely undermined if it turns out that rainfall conditions played little or no role in the formation of roundup districts. This will require detailed knowledge of the actual districts and the criteria determining their formation. And, if roundup districts changed over time, what were the reasons for those changes?

We agree with the standard story that the roundup institution was effective, at some point, for preventing the tragedy of the commons – but what is that point when the institution was no longer effective and how do we know it? Our modification to the story rests on the roundup being equivalent to a worker controlled firm and thus produced less than the optimal amount. It is therefore incumbent upon us to provide evidence that roundups were operated in a manner consistent with worker controlled firms. Can our modification explain the variation in the number of roundup district members and/or how that number changed? Did current firms effectively control members of the roundup as Osgood and Smalley suggest? These questions require a level of institutional detail that we currently do not have.

Hotte's challenge raises a separate, yet not unrelated, set of questions; was the public domain issue completely secondary to the issue of private property protection? If so, then we should see range cattle firms actively promoting settlement in the west assuming that with more population comes better private property protection.[6] Yet the story as always been – and the new standard story doesn't alter this – that there was a conflict between homesteaders and range cattle firms. The basis for that story was that homesteaders prevented or at least inhibited access to water.

[6] As Allen argues was the motivation for the Homestead Act.

However, Gressley describes the conflict in the west over land laws as more between large and small ranchers than ranchers and homesteaders (or sheepmen). "A far more credible cinematic picture could be made from the struggle between the cattlemen who owned ten to twenty thousand acres and their neighbors who lorded it over sixty to seventy-five thousand acres." (Gressley, p. 238). It is important to note that the ranchers' proposal to create communal leases did not seek any changes in the Homestead Act.

As in the case of overgrazing, one should ask, what is the evidence of conflict between ranchers and homesteaders? Did homesteads significantly interfere with roundup district operations and/or did they actually impede access to water? If so, why didn't homesteaders and ranchers enter into mutually beneficial contracts?

6. Conclusion

There is little doubt new institutionalist research has radically altered how we view the development of the 19th Century American West. Not only does this period provide the impetus for new theoretical developments but ample opportunity for testing. However, literature on this area and time period is long on theories and short on systematic empirical analysis. It is time to correct that imbalance.

What is now considered the standard story has a well developed coherent theoretical framework and consistent with, if somewhat spotty, empirical evidence. However, none of the three alternative models described above, including our own, provide an iota of empirical support.

As Coase (2006) recently argued,

> *….progress in understanding the working of the economic system will come from an interplay between theory and empirical work. The theory suggests what empirical work might be fruitful, the subsequent empirical work suggests what modification in the theory or rethinking is needed, which in turn leads to new empirical work.*

We believe that an in-depth systematic analysis of the development and operation of the roundup institution in Wyoming for a twenty year period starting in the mid-1870s will provide enough data to test the aforementioned theories.

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