

Communal Violence and Property Rights

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Abstract: In this examination of communal violence (intrastate armed conflict between two non-state groups), we examine the relationship between one aspect of state institutional strength—property rights protection (PRP) – and inequality between social groups. Using a contest success function model, we build in an assumption that increasing PRP reduces the effectiveness of appropriative effort, generally increasing the equilibrium allocation of productive effort. In addition, PRP is modeled as potentially biased in favor of one group, creating inequality between social groups. Adding this to the model produces a non-monotonic result with respect to increasing PRP. Specifically, if a society has a moderate level of PRP but some degree of bias away from equity, an increase in PRP can result in either a decrease or an increase in total appropriative effort. Thus, simply increasing PRP without addressing equity issues can increase the level of conflict in the society. We argue that this has implications for international organizations that encourage state governments to focus on strengthening property rights institutions without addressing the more sensitive issue of inequality.

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1 Inequality, Property Rights, and Communal Conflict

Conflict between pastoral and sedentary agriculturalists dates back to the dawn of history. Herodotus writing in the Fourth Century B.C. in Ancient Greece described Sythian nomadic depredations. Even earlier conflict is recorded in Ancient Mesopotamia (Kuznar and Sedlmeyer, 2005). The endless struggles between the nomadic Bedouin and the fellahin (or peasants) of Arab societies have shaped the history of the Mideast (Smith, 1969). Much of rural Sub-Saharan Africa experiences such conflict today, from Namibia, to Tanzania, to Burkina Faso, to the Sudan (Derman, Odgaard, and Sjaastad, 2007). Indeed, an important element of the conflict in Dafur is one between pastoralists and sedentary agriculturalists (Kuznar and Sedlmeyer, 2005). The essential problem is that pastoralists require access to relatively large areas of land and tend to move their herds according to the seasons, ecology and weather changes. Such activities almost inevitably mean that they and sedentary agriculturalists come into competition over land and water. It is this competition that serves as the basis for armed violence between different communities.

The role of property rights (particularly with regard to land and water) plays a central aspect to the conflict. The conflict between the homesteaders and the cattlemen in the American West is exemplary. This was not an ethnic conflict, but one of contested notions of property. It was a conflict over access to open range land versus staked out claims of private property. It was also a contest for support from the government, for state protection of two fundamentally different notions of property and land use. We shall return to this case after we present our model of inequality and private property protection.

Not much has been written about property rights protection and intrastate armed conflict. In contrast, two of the most commonly debated factors regarding civil conflict are inequality and state strength. Most analysis of the role of inequality in explaining the onset of intrastate conflict has not found a very robust relationship. Many more quantitative studies have been conducted on the likelihood or level of conflict between a rebel group and the government of a state than on communal violence. Among the causes of civil conflict, state strength and inequality are two concepts discussed by many researchers. The hypotheses as generally stated for these two concepts on internal conflict are as follows: Greater state strength reduces internal conflict; and independently, greater inequality increases the likelihood and/or severity of internal conflict. The arguments generating these hypotheses vary from researcher to researcher, but the hypotheses are similar.

Empirical results are mixed. State strength, while variously measured, seems to have a consistent effect (Fearon and Laitin, 2003; Hegre and Sambanis, 2006). Inequality, however, has sometimes been found to have a significant

effect in the hypothesized direction (Russett, 1964; Paige, 1975; Mueller, 1985) while others have found no significant effect (Fearon and Laitin, 2003; Collier and Hoeffler, 1998, 2004).

Part of the problem with most of these analyses is that inequality is measured at the level of the individual and not at the group. Yet, groups are the organizational basis of armed conflict. Civil wars are fought between a non-state rebel group and the state (and sometimes involving another non-state paramilitary organization or militia). Communal violence is between two non-state actors with varying degrees of state complicity. Francis Stewart (2000) has investigated the role of horizontal inequality, which is based on differences between groups and not individuals. Stewart's studies and others' demonstrate a strong association between inequality between groups and the onset of armed conflict (Østby, forthcoming) or the distribution of violence (Murshed and Gates, 2005).

Moreover, most studies of the role of inequality and state strength presume monotonic relations. Few have examined the interaction between these factors nor have they looked at possible curvilinear aspects. Along these lines, but not as we develop below, Cramer (2003, 2006) argues that the relationship between inequality and conflict is a complex one, "inseparable from the social, political, cultural and historical" (2003: 409). Keefer and Knack (2000) show that inequality and property rights protection are intrinsically linked. In contrast, Fearon and Laitin (2003: 81), albeit with regard to civil war only, explicitly hypothesize that inequality (along with other "grievance" concepts) will not have a significant effect once a control for state strength is included.

We argue that a complex interaction between the two concepts accounts for the mixed empirical results. Using a competitive appropriation model (e.g., Hirshleifer, 2001) with an exogenous but potentially biased level of property rights protection, we demonstrate how high inequality combined with high state strength can be just as conflictive as a situation with low state strength (with high or low inequality). Thus, for cases of low inequality, increasing state strength (through property rights protection) should indeed decrease the likelihood of internal conflict. For cases of high inequality, however, internal conflict will be lowest for moderate levels of state strength but will be high for either low or high levels of state strength. We further argue that because increasing state strength has been associated with liberal democracy in the modern era, state strength is correlated with more equal societies. This has tended to obscure evidence of an otherwise intuitive argument that equity is also important to peace. As developing states are pressed to strengthen property rights institutions, however, we must be concerned that inequality is also addressed.

Focusing on inter-group violence or communal violence, this paper features these aspects of inequality and state strength. In particular, inequality is treated as the inequality between groups and state strength is evaluated through

property rights protection. Both horizontal inequality and property rights protection dominate analysis of communal violence. We focus substantively here on armed conflict between pastoral or nomadic peoples and sedentary agriculturalists or peasants.

2 Modeling Inequality and Property Rights, and Conflict

We analyze armed civil conflict through the development of a contest success function model. Contest success functions (CSFs) offer a flexible way to model the dynamics of conflict. CSFs are economic models of conflict. Instead of featuring the technologies of production as most other economic models do, they also summarize the technologies of appropriation and war. “There are ways of tilling the land and quite a different set of ways of capturing land and securing it against intruders” (Hirshleifer, 1995/2001: 104). Contest success functions allow us to model both aspects of an economy, the productive and the predatory. In times of war, particularly civil war, property rights and the enforcement of contracts breakdown. The institutions that serve to regulate the economy no longer work. Consequently conventional models of economic production do not apply to the political-economy of civil war. The original idea of a CSF is that actors choose how they are going to allocate their individual resources in the absence of property rights. Resources can be allocated either into production or appropriation. The allocation of this wealth is what turns money into guns (for appropriation) or butter (production).

The two types of model are at opposite ends of an institutional spectrum. Conventional production models assume perfect property rights and enforceability of contracts. Hirshleifer purposely examines the “dark side” of economic activity in which the opposite is true on both counts. Part of our purpose here is to examine the full range of institutional possibilities. Rather than the stark contrast of binding, enforceable contracts versus the complete absence of moderating institutions, we examine interactions of non-state actors under the imperfect gaze of the state. State institutions are neither perfect nor absent. Instead, we examine how the biases inherent in state institutions and their relative strength can be significant factors accounting for the level of conflict between non-state actors.

2.1 Assumptions

To study the effects of property rights on communal violence, we make several simplifying assumptions. First, we assume there are only two groups which may represent different families, clans, or ethnic communities. These two groups rely on land positioned between them for their livelihoods, whether for farming or grazing. This is not that heroic of an assumption. Most communal conflicts involve two groups. When there are more than two groups alliances

form. This was evident in the American West where sheep herders, small holding cattlemen (possessing relatively small ranches but owned as private property) and homesteaders were allied against the free-range cattlemen.

The division or access to land for each group is a key variable in our model. It may be that there is a clear boundary that is strictly enforced, or the boundary may be clear but there is no effective enforcement. Alternatively, there may be no clear boundary but rather a genuine communal plot that is shared between the groups. Or, as is often the case in pastoralist-sedentary agriculturalist conflict, one group regards land as a private good (excludable and rival), which can be divided piecemeal and the other regards the good as communal property. Even in this case, however, we assume that there exist norms of how much each group will get come harvest-roundup time and that these norms have a varying level of enforcement. In short, we assume that there is some expectation of how the productivity of the land will be divided if there is no conflict and that this expected division is enforced by some external source but that the level of enforcement can be at any level from perfectly enforceable contracts to no enforcement whatsoever.

We recognize that the technology of production may well be related to the level of enforcement or expectations of division. For agriculturalists, parceling of land into private lots sets clear expectations for division of the harvest and a sense that land and its produce is excludable and rival. For pastoralists, there may be greater variance in the expectation of division precisely because the land is not seen as excludable though it remains rival. Even so, non-excludability is never perfect. Though fences may make good neighbors, they do not absolutely guarantee that your neighbor cannot steal some cabbages in the middle of the night.

Given this environment, our two groups make decisions regarding how much to invest in the productivity of the land and how much to take come harvest time. In particular, we model how much effort each group puts into taking from the other group. The effort put into such appropriation is assumed to detract from the overall productivity of the land. The question we pose is how the expected division of productivity and its level of enforcement affect the levels of appropriation from each group. This appropriation is presumed to be a form of violence.

2.2 Model

We answer our question theoretically through the use of a contest success function (CSF). CSFs have been used by others to model many aspects of conflict. Our model has several assumptions common with other CSFs. Each group optimizes its welfare given the anticipated behavior of the other group. Each group has some initial resources ($R_i > 0$) that are then allocated into productive and appropriative effort. The appropriative effort is conceptualized as fighting effort, $F_i \in [0, R_i]$. In the absence of enforceable contracts, all productive effort is assumed to create a

collective income (I) that is divided between the two groups according to their appropriative effort. Collective income is assumed to be the sum of productive effort.

$$I = (R_i - F_i) + (R_j - F_j) \quad (1)$$

To answer our question, we adopt a modified version of a CSF first presented by Neary (1997). The proportion of collective income that group i gets (p_i) is a function of its fighting effort divided by the total fighting effort of both groups. The η terms (assumed to be strictly positive and non-zero) allow for definition of this function when fighting effort is zero.¹ It is through these additional terms that we will analyze property rights and bias later in the paper.

$$p_i = \frac{F_i + \eta_i}{(F_i + \eta_i) + (F_j + \eta_j)} \quad (2)$$

Given this division mechanism, each group maximizes its share of the collective income ($I_i = p_i I$).

$$I_i = \frac{F_i + \eta_i}{(F_i + \eta_i) + (F_j + \eta_j)} [(R_i - F_i) + (R_j - F_j)] \quad (3)$$

When $\eta_i = \eta_j$ and neither actor invests in fighting effort, collective income is divided equally (i.e., $p_i = 0.5$). Neary (1997) examined how an unequal distribution of resources ($R_i \neq R_j$) affects allocation decisions while setting $\eta_i = \eta_j$. The main effect of the η term in this case is to create a drag on what fighting effort can get you as η increases (p. 492). He found that there are only four possible equilibrium outcomes: 1) communal, in which neither party invests in guns; 2) Hobbesian, in which both parties invest in guns; 3) suzerainty, in which the more wealthy player (presumably the state) divides his resources between productive and predatory investments while the less wealthy player puts all of his resources in productive investments; and 4) banditry, in which again the more wealthy player divides his resources between productive and predatory investments while the less wealthy player invests all of his resources in arms. Neary argues that these four equilibria “exhaust the possibilities of the model” (1997: 493).

But there may be any number of reasons for collective income being divided unequally *without* conflict. Consider two families each farming a communal plot. One family has ten members while the other has four. Assuming everyone works equally, then one fair division would entail each individual getting an equal share of the harvest. Thus, the larger family would get more than the smaller family.

We argue more generally that in situations of no conflict, the division of income would be premised on an expected division of collective income based on boundaries or norms. In this regard, the ratio $\eta_i / (\eta_i + \eta_j)$ can be interpreted as

¹This alters Neary’s (1997) CSF by subscripting the η terms. Also, there is usually a “military decisiveness” parameter included in such CSFs as an exponent on each fighting effort parameter. As the effects of this parameter are not a focal concern and add considerable complexity to the mathematics, we essentially assume that this parameter is unity throughout.

the status-quo division to group i when $F_i = F_j = 0$. This status quo is offset in practise by investments in fighting effort.

2.3 Model Analysis

Both groups are assumed to make their allocation decisions simultaneously. Group i 's reaction curve is found by taking the derivative of (3) with respect to F_i and then solving for F_i .

$$F_i = \sqrt{(F_j + \eta_j)(R_i + R_j + \eta_i + \eta_j)} - F_j - \eta_i - \eta_j \quad (4)$$

This can be also expressed as follows by grouping the terms.

$$F_i + \eta_i = \sqrt{(F_j + \eta_j)(R_i + R_j + \eta_i + \eta_j)} - (F_j + \eta_j) \quad (5)$$

Group j 's reaction curve is found by the same process. Substituting group j 's reaction curve into (4) and solving for F_i again, we find group i 's equilibrium level of fighting effort as a function of initial resources and the η terms. This holds so long as the joint equilibrium is an interior solution. If F_i^* and F_j^* is jointly an interior solution (i.e., $F_i^* \in (0, R_i)$ and $F_j^* \in (0, R_j)$), then

$$F_i^* = \frac{(R_i + R_j - 3\eta_i + \eta_j)}{4} \quad (6)$$

$$F_j^* = \frac{(R_i + R_j - 3\eta_j + \eta_i)}{4} \quad (7)$$

From this we state our first three propositions. The first proposition capitalizes on the fact that the equilibrium fighting efforts both have $R_i + R_j$ in the numerator.

Proposition 1 *As total resources rise, ceteris paribus, F_i^* and F_j^* both increase.*

The implication of this proposition is that as the total resources of a society increase *without* attendant increases in enforcement (represented by the η terms), total conflict should be expected to increase. This result runs counter to some of the case study work that links scarcity and conflict,² but it does more closely reflect the only large-N cross-national analysis of scarcity and communal violence (Theisen & Brandsegg, 2007).³ The result also reflects the central argument of the resource curse – that “honeypots” without institutional regulation will attract conflict (de Soysa, 2002). The next two propositions examine the relationship between the η terms and equilibrium fighting effort.

²See for example, Homer-Dixon (1999) and Kahl (2006). These types of case studies, however, have been criticized on grounds of methodological and research design flaws (Gleditsch, 1998; 2001; Lomborg, 2001). In contrast see Witsenburg and Roba (2007) for a detailed large-N analysis of communal conflict in Kenya; they find that scarcity induces cooperation rather than conflict.

³Theisen (2006) has also conducted a large-N cross-national analysis of civil conflict and finds only limited support for the theory relating civil violence to the degradation of natural resources.

Proposition 2 *Increases in the other's protection (η_j) increase one's own fighting effort (F_i^*).*

Proposition 3 *Increases in one's own protection (η_i) decrease one's own fighting effort (F_i^*) to a greater extent than it increases the fighting effort of the other group (F_j^*).*

An implication of Proposition 3, in particular, is that if one group has a high enough level of protection compared to the other group, then the equilibrium given by (6) and (7) would no longer be an interior solution. If we do not have an interior solution, then we must consider what F_i^* looks like when F_j is at one extreme or the other. When $F_j^* = 0$, group i 's equilibrium fighting effort is found by substituting that value into (4). This given by (8).

$$F_i^* = \sqrt{(\eta_j)}\sqrt{(R_i + R_j + \eta_i + \eta_j)} - \eta_i - \eta_j \quad (8)$$

At the other extreme, one group may have fighting effort equal to its initial endowment. This can occur when its resources are low and its level of protection is also low. When group j has this extreme level of equilibrium fighting effort, group i 's equilibrium fighting effort is found by substituting $F_j = R_j$ into (4). This is given by (9).

$$F_i^* = \sqrt{(R_i + R_j + \eta_i + \eta_j)}\sqrt{(R_j + \eta_j)} - R_j - \eta_i - \eta_j \quad (9)$$

While it makes sense given even a cursory understanding of the world (the poor and disenfranchised are more likely to be thieves and rebels), the analysis of institutional bias and property rights protection does not rely on (9). This is a result also found in Hirshleifer (2001) and Gates and Strøm (2007). One could consider this the “nothing left to lose” result.

While the η parameters allow for some interpretation, we argue here for two different parameters that help us make more sense of (6), (7), and (8). To do so, we return to (3) and recall that the ratio $\eta_i/(\eta_i + \eta_j)$ represents the proportion of collective income that group i gets in the absence of conflict (i.e., zero total fighting effort). If this ratio equals 0.50, then each group gets an equal proportion and there is no bias in the no-conflict outcome. This is the scenario examined by Neary (1997). However, the ratio can also be tilted in favor of or against group i , representing a kind of “institutional bias” in the no-conflict outcome. Hence, we define a bias parameter, β_i , as identical to this ratio. In addition, we will use the identity $(1 - \beta_i) = \eta_j/(\eta_i + \eta_j)$ in other substitutions.

Neary notes (1997: 492) that the η terms in the denominator had the effect of reducing equilibrium fighting effort. We define $\rho = \eta_i + \eta_j$ and interpret this parameter as the strength of property rights protection. Note, therefore, that $\eta_i = \rho\beta_i$ and that $\eta_j = \rho(1 - \beta_i)$. We further simplify the model by assuming that $R_i + R_j = 1$ and that the

difference between R_i and R_j is not so great that (9) is operative. We do examine circumstances where one group has zero equilibrium fighting effort. In combination, this allows us to examine the combined effect of institutional bias and property rights protection on the total level of fighting effort between our two groups.

Using parameters for institutional bias and property rights protection, transforming (6) and (7), and adding them together to find total societal conflict ($TSC = F_i^* + F_j^*$), we find the usual main effect (given by (10)) that is summarized in Proposition 4.

$$TSC = \frac{1 - \rho}{2} \quad (10)$$

Proposition 4 *If the solution is an interior one, then increasing property rights protection reduces total societal conflict.*

Corollary 5 *If the solution is an interior one, institutional bias does not have an independent effect on total societal conflict.*

As we noted in discussing Propositions 2 and 3, if institutional bias is great enough, then the group with greater protection does not invest in fighting effort while the other group *increases* its own fighting effort. This occurs when institutional bias is sufficiently high or sufficiently low. Total societal conflict in these cases is given by (11) and (12).

$$TSC = \sqrt{(1 + \rho)}\sqrt{(\beta_i \rho)} - \rho, \text{ if } \beta_i \geq \frac{\rho + 1}{4\rho} \quad (11)$$

$$TSC = \sqrt{(1 + \rho)}\sqrt{(\rho(1 - \beta_i))} - \rho, \text{ if } \beta_i \leq \frac{3\rho - 1}{4\rho} \quad (12)$$

Proposition 6 *When property rights protection is sufficiently high and institutional bias is sufficiently extreme, increasing property rights protection or moving to more extreme values of institutional bias increases total societal conflict.*

Corollary 5 and Proposition 6 are important in the following ways. When (10) holds, changing β_i has no effect on TSC. This follows from Proposition 4. When (11) is operative, increasing β_i for a given level of ρ increases TSC; when (12) is operative, decreasing β_i for a given level of ρ increases TSC.

Taking these last three equations together gives us a topology of total societal conflict for different combinations of institutional bias and of property rights protection. A visualization of this is provided in Figure 1.

In Figure 1, the z axis is TSC , the axis on the left is property rights protection (ρ), and the axis on the right is institutional bias (β_i). Note that the ρ axis is reversed from usual so that the topography of the figure is easier to

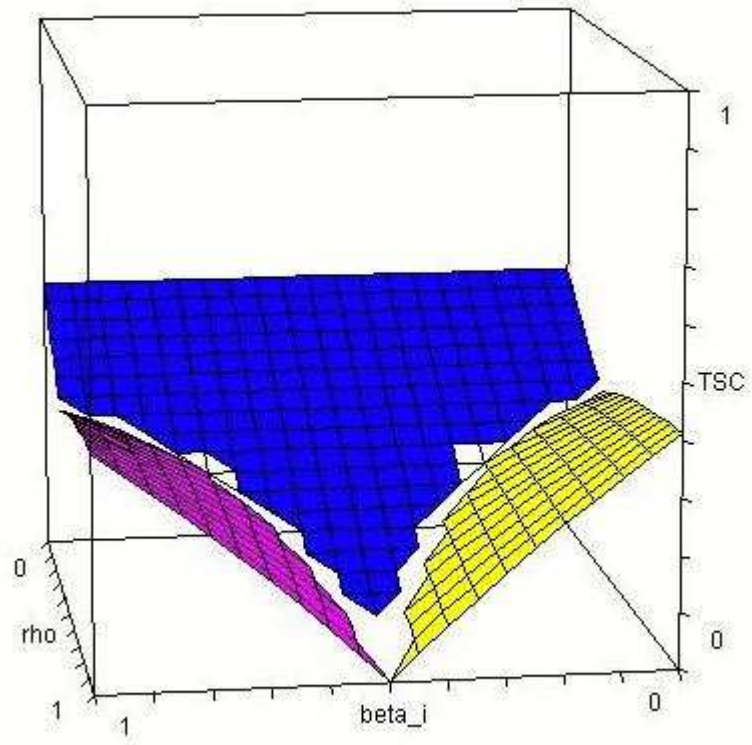


Figure 1: Total societal conflict given ρ and β_i

see. (The β_i axis is also reversed but the figure is symmetrical with respect to the plane $\beta_i = 0.5$) The figure clearly depicts the non-monotonicity associated with increasing property rights protection. When property rights protection is sufficiently low (at the back of the figure), the marginal effect of increasing property rights protection is to reduce *TSC* regardless of the level of institutional bias present in the society. Beyond a critical value of property rights protection, however, further increases in property rights protection can reduce or increase *TSC* depending on the level of institutional bias and the magnitude of the property rights protection increase. If institutional bias is moderate, increases in property rights protection are likely to produce a further decrease in *TSC*. If institutional bias is extreme, however, increases in property rights protection produce an *increase* in *TSC*. Note that if the nature of the change in property rights regime is to increase property rights protection while simultaneously shifting institutional bias toward equity, *TSC* is likely to decrease.

3 Historical Evidence

The “Johnson County War” in Wyoming in 1892 in many ways constitutes the culmination of the conflict between the cattlemen and the homesteaders. In the late 1880s a group of prominent cattlemen organized an armed militia with the stated purpose of clearing the area of rustlers, but it was also designed to protect the cattlemen’s access to the open range and to intimidate homesteading farmers who were fencing off the land. They also engaged in an extensive political lobbying effort to end US homesteading policy, whereby public land was granted to homesteading farmers (McFerrin and Wills, 2007). The “war” came to a head on 6 April 1892 when the militia began its march on Buffalo, the seat of Johnson County in northern Wyoming. A big shoot-out between the militia and homesteaders ensued on the way. The fighting ended when the US troops from nearby Fort McKinney intervened and arrested the militiamen. Among those arrested were many prominent Wyoming politicians, including a State Senator, a US Marshall and a Water Commissioner (*New York Times*, 14 April 1892). We highlight this case of pastoral-sedentary agricultural violence because ethnicity played no role in the violence. The dominant ethnic group constituting both sides was Anglo-Saxon Protestant native-born American. The conflict was nearly exclusively over property rights.

The conflict in Wyoming and much of the American West more generally was precipitated by the US Federal government’s policy of homesteading, whereby government land that had been used as open grazing land by the cattlemen was given to homesteaders to convert to farms (Allen, 1991; McFerrin and Wills, 2007: 72). Up until the 1880s the range cattle industry was dominant in Wyoming and most of the American West. Cattle were grazed

communally on the public range and in roundups. User rights were based on a set of informal norms. Despite their informality, these range rights were robust enough to be bought and sold (Anderson and Hill, 1975; McFerrin and Wills, 2007). As such, there was a market for access to range lands. This market depends on a particular area being rival in its usage for a given season and on a tacit excludability.

The nature of homesteading inherently conflicts with the notion of an open communal range. A claim is staked. Land is fenced off. Property is private, both explicitly excludable and rival.

Hollywood films have featured the conflicts between the farmer and the cattleman since *The Virginian* (1914). The dialog between two of the central characters in the film *Shane* (Paramount Pictures, 1953 – quoted from Morriss, 2004: 20–21) highlight the central role of property rights played in pastoral-sedentary agricultural conflict.⁴

Ryker (the Cattleman): We made this country. Found it and we made it . . . Made a safe range out of this. Some of us died doin' it. We made it. And then people move in who've never had to rawhide it through the old days. They fence off my range and fence me off from water. Some of 'em like you plow ditches, take out irrigation water. And so the creek runs dry sometimes. I've got to move my stock because of it. The men that did the work and ran the risks have no rights?

Starrett (the Homesteader): You talk about rights. You think you got the right to say that nobody else has got any. Well, that ain't the way the government looks at it.

Ryker's statement in many ways reflects the key elements of John Locke's theory of property rights – that entitlement to property derives from one's labor.

Though the earth, and all inferior creatures, be common to all men, yet every man has a property in his own person: this no body has any right to but himself. The labour of his body, and the work of his hands, we may say, are properly his. Whatsoever then he removes out of the state that nature hath provided, and left it in, he hath mixed his labour with, and joined to it something that is his own, and thereby makes it his property. It being by him removed from the common state nature hath placed it in, it hath by this labour something annexed to it, that excludes the common right of other men: for this labour being the unquestionable property of the labourer, no man but he can have a right to what that is once joined to, at least where there is enough, and as good, left in common for others. (Locke, 1960: 17–18)

⁴The film is based on a novel by the same name written by Jack Schaefer (1949).

Starrett's counter-argument is more Hobbesian in nature, whereby property rights are established by the sovereign authority of the state. And ultimately in terms of the settlement pattern that shaped the American West, it is Starrett's interpretation of rights that prevails. The state determines, defines, and designs property rights.

The role of the state in protecting property rights has been a major feature in theories of the development of the state. This is particularly evident in neo-institutionalist works (North, 1981; Olson, 2000; Weingast, 1995; Bates, 2001; forthcoming). In turn, the nature of property rights in a society shapes the pattern of state development.

The history of homesteading in the American West shaped the pattern of European settlement. US homesteading policy was driven by several factors. Libecap (1981) emphasizes the role of the General Land Office in obstructing the cattlemen's lobbying efforts. The informal norms and institutions governing communal range property rights were never recognized by the US Federal government. Additional political incentives ensured that property rights in the American West would change despite the economic inefficiencies of homesteading policy.⁵ Allen (1991) contends that homesteading served as a means of enforcing property rights against aboriginal Native American Indian claims and offered a substitute for direct military force. McFerrin and Wills (2007) argue that homesteading policy reflected a desire to populate territories with as many people as possible. Settlement by lots of small-scale farms involves many more people than an open range controlled by a few cattlemen. If the population grew sufficiently large, the admission of a territory as a new state presented a strong incentive for political entrepreneurs. As more farmers moved into a territory, the Congressional delegation could likewise expand.

Linking this case with our model, we have a case where each group expected to generate a livelihood from the land. When homesteading first began, co-existence was possible as the fences were not so numerous to restrict the movement of the cattlemen. At this stage of development, the government bias in favor of the homesteaders protected their property claims while making it harder and harder for the cattlemen to survive. In the short-run, this led to conflict between the cattlemen and the homesteaders until the cattlemen ceased to exist as a group.

The political dynamics were also geared such that the bias in favor of the homesteaders was only going to grow, despite the cattlemen's efforts to lobby for the open range. Political elite in any territory in the US would be eyeing the prize of statehood, thereby enhancing their own power and prestige. To gain statehood required new migrants to the territory. The homesteading policy offered a nice mechanism for enticing people to migrate into a territory. Furthermore, once enough people moved into a territory they would vote. Eventually the farmer's share of the vote

⁵Homesteading's "first come, first served" character creates an incentive to establish property rights too early (Anderson and Hill, 1983).

would exceed that of the cattlemen.

The case of the conflict between the cattlemen and homesteaders in Wyoming relates to several of our propositions. In contrast to many pastoral-sedentary agriculturalist conflicts, both parties were relatively well-off and could devote a fair amount of resources to fighting if necessary. There seems to be no contradiction of Proposition 1. Of course there was limited fungibility to transferring productive resources to fighting, but the point is that neither party was truly constrained by a resource constraint. In Kenya's drylands, where both pastoralists and agriculturalists are woefully poor, Witsenburg and Roba (2007) find that violent conflicts decrease with increasing water scarcity. Violence is associated with increasing wealth.

Moreover, both the cattlemen and the homesteaders engaged in fighting to some degree, implying an "interior solution". Neither party devoted their resources wholly to fighting. Moreover, we see some evidence supporting Proposition 4 – more property rights means less conflict. The eventual privatization of open range lands did eventually result in an end to pastoralism in America as well as an end to the violence. In addition, institutional bias did not seem to affect independently conflict; rather it was "conflict conditions" (i.e. increasing bias in property rights) that lead to the violence. Corollary 5 and Proposition 6 thus appear to be supported in this case. The conflict was engendered by the homesteading policy and the introduction of a group whose use of the land directly challenged the open range.

In northern Kenya, relationships between pastoral and sedentary agriculturalist peoples appears to oscillate between periods of communal warfare and peaceful coexistence. Periods of drought are most strongly associated with adaptive property rights norms with regard to water access, thereby engendering peaceful relations. Under conditions of such hardship, both parties are vulnerable and more or less equal. Changing property rights protection according to our model in such a situation should indeed be pacifying.

4 Conclusion/Broader Implications

In the historical American West and indeed most of the world, the state has been biased against pastoralists. If for no other reason, sedentary agriculturalists are easier to tax. Sedentary agriculture also tends to support larger populations. Our analysis, however, demonstrates that this bias alone is not the precipitating conflict between pastoralists and sedentary agriculturalists. Rather, changes in property rights policy or at least an increasing bias in property right protection is what lead to this form of communal violence.

Changing property rights protection can lead either to greater or lesser degrees of communal violence depending

on the degree of inequality in a society. Thus, simply increasing property rights protection without addressing equity issues can increase the level of conflict in the society. Inequality and property rights protection are intrinsically linked. Encouraging governments to focus on strengthening property rights institutions without addressing the more sensitive issue of inequality is dangerous.

5 References

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