Journal of Economic Behavior & Organization 69 (2009) 213–225

Contents lists available at ScienceDirect

Journal of Economic Behavior & Organization

journal homepage: www.elsevier.com/locate/econbase

Cooperation when *N* is large: Evidence from the mining camps of the American West

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ARTICLE INFO

Article history:
Received 20 July 2006
Received in revised form
30 September 2008
Accepted 1 October 2008
Available online 14 October 2008

Keywords:
Cooperation
Collective action
Social norms
Property rights
Large groups
Mining camps
American West

ABSTRACT

The sources of cooperation in small groups are well documented. There is, however, less understanding about cooperation in large groups. I study the enforcement of property rights in the mining camps of the American West. Miners demanded secure property rights and protection from violence to exploit the region's mineral wealth. In the model, miners must divide their labor between mining and supporting property rights institutions. The main prediction of the model is that cooperation in property rights enforcement emerges only when social norms of cooperation are sufficiently widespread. The model also predicts that social norms are less effective in mining camps with large populations or high labor productivity. I test these predictions against detailed evidence from the letters, diaries, and reminiscences of miners in 25 camps in California, Colorado, and Montana and find that the evidence supports the predictions. The results show that social norms can significantly lower the costs of collective action in large groups.

1. Introduction

Most research on cooperation has focused on groups that are small and homogeneous. The basis for cooperation in small groups is well understood and usually involves institutions based on repeated interactions (for example, Greif, 1993; Clay, 1997; Dixit, 2005; Hejeebu, 2005). However, cooperation also arises in large groups. For instance, in politics, special interest groups depend on the participation of hundreds or thousands of members (Olson, 1965; Bendor and Mookherjee, 1987; Esteban and Ray, 2001). Similarly, in agriculture, large numbers of producers may collude to limit output and raise prices. Also, in developing or war-stricken economies in which government is absent, populations must sometimes cooperate in the provision of public goods such as defense, public health, or the enforcement of property rights.[1] In these examples, cooperation must be elicited from large numbers of individuals with strong incentives to free-ride. In large groups, however, relationships are not personal or repeated, so reputation mechanisms cannot, in general, serve as the foundation for cooperation.[2]

However, a potential source of cooperation in large groups is social norms, the informal but widely accepted rules of behavior that people expect and believe ought to be followed (Elster, 1989, pp. 98–100, Bendor and Mookherjee, 1990, pp. 33–34, Ellickson, 1991; Ostrom, 2000). Social norms often operate alongside more formal institutions and raise the incentives for cooperation in two main ways. First, norms can be internalized, and individuals can feel guilt or shame for violating them,

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[1] See, for example, "In Iraq's Mayhem, Town Finds Calm through Tribal Links." New York Times, 10 July 2006. Section A, p. 5.

[2] However, if a large group can divide itself into subgroups, it can create monitoring and sanctioning institutions and then rely on repeated interactions. See Hardin (1982) and Bendor and Mookherjee (1987).

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doi:10.1016/j.jebo.2008.10.001

increasing the psychic costs of opportunism. Second, norms can induce third parties (those not directly injured by a selfish act) to punish opportunists, raising further the costs of non-cooperation. The ability of social norms to promote cooperation has been well documented in small groups (Ostrom, 1990; Ellickson, 1991; Fehr and Gachter, 2000, p. 165, Ostrom, 2000), but there is growing evidence they can do the same in large groups as well (Putnam, 1993; Knack and Keefer, 1997; La Porta et al., 1997).

This paper advances our understanding of how social norms promote cooperation in large groups. I study the enforcement of property rights in the mining camps of the American West. After the discovery of gold in California in 1848, thousands of miners settled remote regions of the western U.S., far beyond the reach of established centers of authority. Miners were without customary laws and institutions, but their need for economic and social controls was great. As a result, miners organized their own governments to uphold property rights and to preserve order.

A comparison of the mining camps shows, however, some were much more successful than others at securing property rights. In some camps, miners cooperated in the enforcement of property rights, while in others they did not. In the former, law and order was, for the most part, maintained, while in the latter, there were periods of anarchy, crime, and violence lasting weeks or months and ultimately leading to new means of enforcing property rights. These differences occurred despite strong similarities in institutions and rules between the camps.

Why did miners in some camps, but not in others, cooperate in the enforcement of property rights? Anecdotal evidence suggests the existence or absence of social norms of cooperation was responsible (Shinn, 1948; Zerbe and Anderson, 2001). According to one miner, "[t]he great mass of miners are actuated by a sense of right, and gravitate most surely towards justice. If their laws are disobeyed or their customs disregarded the mass of miners will assert their authority, compel obedience to their laws, and correct abuses of their customs."[3] However, the hypothesis about social norms in the mining camps has not been formally tested. A model of social norms in property rights enforcement (an application of the natural resource use model of Sethi and Somanathan, 1996) shows that if social norms of cooperation are widely held, a large group can enforce property rights collectively despite the incentives for free-riding. The model also predicts that social norms are less effective at eliciting cooperation in mining camps with high productivity of labor (a measure of the opportunity cost of contributing to collective institutions) and very large populations.

Using evidence taken from the diaries, letters, and reminiscences of miners in 25 camps in California, Colorado, and Montana between 1848 and 1864, I test these predictions. Although the size of my sample is small and not representative of all mining camps, my approach has advantages over both case studies and other cross-community comparisons of cooperation in collective action. Unlike case studies, there are multiple observations against which the predictions of the model can be tested, but unlike many comparative studies there are not significant unobservable institutional differences between the observations in my sample. As a consequence, the focus can be on the characteristics of the group (social heterogeneity, size, etc.) that influence the effectiveness of social norms in promoting cooperation.[4]

The evidence largely affirms the predictions of the model about the sources of cooperation in large groups. Structural estimation of the model confirms the probability of cooperation was increasing with the share of miners bound by social norms and decreasing with the size of the population. Also, reduced form regression analysis shows miners bound by norms were 37 percentage points more likely to enforce property rights collectively, and an additional 1000 miners in the population reduced the likelihood of cooperation by 8 percentage points. Overall, the evidence suggests social norms are an important basis for cooperation in large groups.

The rest of the paper is organized as follows. In the next section, I discuss the institutions of the mining camps and the dilemma of free-riding in property rights enforcement. Section 3 describes the model in which social norms promote cooperation. The following section describes the data. The fifth section derives the empirical model and tests the model's predictions. Because the theoretical model is sufficiently general, the empirical framework could be applied to other contexts in which social norms might have facilitated cooperation in collective action. Section 6 concludes.

2. The mining frontier of the western U.S. and property rights institutions

> "This territory is very strongly democratic & a man can say & do as he pleases."—Montana miner, 1864.[5]

The mining frontier offers researchers an unusual opportunity to study cooperation in large groups. The absence of property rights institutions meant that new ones had to be formed. Moreover, the cooperation of hundreds or thousands of individuals would matter, since for new institutions to take hold, sufficiently many miners would have to follow them. The mining camps are therefore an ideal setting for the study of cooperation in large groups.

The gold rushes in the western U.S. are well documented. When gold was discovered and word of the discovery spread, hundreds or thousands of miners would rush to stake claims. For instance, there was a rush to what became Central City, Colorado in May, 1859, after gold was discovered in a nearby gulch. The population of Central City grew rapidly and by mid-

[3] "Letter from the Highlands—A Miner's View on Miners' Law." *Montana Post*, 31 March 1866. All citations from 1866 and earlier are available in the Archival and Unpublished Historical Sources at the Montana Historical Society, Helena.

[4] See Bandiera et al. (2005). The authors control for institutional differences between groups and identify the group characteristics influencing cooperation.

[5] Letter to Dennis Hedges from Cornelius Hedges, Highland District, 4 December 1864. Cornelius Hedges Papers, Montana Historical Society, Master Collection 33, Box 1.