Social Distance and Self-Enforcing Exchange

Peter T. Leeson

ABSTRACT

This paper models social distance as endogenous to the choices of individuals. I show how large numbers of socially heterogeneous agents can use signals that reduce social distance to capture the gains from widespread trade. Although traditional reputational mechanisms of multilateral punishment break down where large populations of socially diverse agents are involved, ex ante signaling can make widespread trade self-enforcing. Intergroup trade in precolonial Africa provides evidence for this mechanism.

1. INTRODUCTION

Social distance poses a problem for would-be traders. As individuals venture beyond their small, homogeneous social networks, uncertainty about potential trading partners' credibility rises. This uncertainty limits agents' ability to realize the gains from exchange. Since most of the gains from trade lie outside homogeneous social groups, agents face a severe predicament.

Government is usually called on to reduce uncertainty so that socially distant agents can secure the gains from widespread exchange. However, in our less-than-perfect world, contracts are incomplete and costly to enforce, the legal system fails, and the state's eye cannot be everywhere

PETER T. LEESON is BB&T Professor for the Study of Capitalism, George Mason University. I thank Pete Boettke, Jim Buchanan, Bryan Caplan, Erik Chmelar, Tyler Cowen, Chris Coyne, Avner Greif, J. R. Minkel, Fred Sautet, Jesse Shapiro, Richard Wagner, the participants of seminars at Harvard University and New York University, the editors, and an anonymous referee for helpful comments and suggestions. I also thank the Suntory and Toyota International Centres for Economic and Related Disciplines (STICERD) and the F. A. Hayek Fellowship at the London School of Economics, where this research was partly conducted. I am grateful for the financial support of the Kaplan Fund.

[*Journal of Legal Studies*, vol. 37 (January 2008)]
 0047-2530/2008/3701-0005$10.00

all the time. Furthermore, as Fearon and Laitin (1996, p. 718) point out, in "most places where ethnic groups intermingle," such as Africa and Eastern Europe, "a well-functioning state and legal system do not exist." Nevertheless, interaction between socially distant individuals in these places is commonplace and overwhelmingly peaceful.

A burgeoning literature highlights the success of self-enforcing exchange relationships between socially homogeneous agents. Inside small, homogeneous social groups, in which the social distance between actors is minimal, individuals can rely on reputational mechanisms of ex post enforcement to ensure cooperation. The smallness and homogeneity of the group enables the effective flow of information about individuals' past conduct among its members. If an agent cheats, this fact can be communicated throughout the rest of the group, which can punish the cheater by refusal to exchange with him or her ever again.

Provided that individuals are sufficiently patient, multilateral punishment creates cooperation. Landa (1981, 1994), Carr and Landa (1983), Friedman (1979), Bernstein (1992, 1996, 2001), Ellickson (1991), Greif (1989, 1993, 2002), Clay (1997), Zerbe and Anderson (2001), and others provide evidence illustrating this claim.[1]

Almost no work, however, has examined self-enforcing exchange among socially heterogeneous agents.[2] On the contrary, the literature suggests that self-enforcing exchange is ineffective when large numbers of socially distant agents are involved (see, for example, Greif 1989, 2002; Landa 1994; Zerbe and Anderson 2001).[3] In large, socially diverse populations, the reputational mechanism of multilateral punishment breaks down (in addition to those cited above, see also Dixit 2003). Information about cheaters cannot be effectively communicated throughout large populations because their sheer size makes commu-

1. For an excellent discussion of nonlegal sanctions inside tight-knit groups, see also Posner (1996). Leeson (2007b) considers arrangements of self-enforcing exchange under conditions in which multilateral punishment fails.

2. Fearon and Laitin (1996) and Leeson (2006) provide two notable exceptions. Greif (2004), Greif, Milgrom, and Weingast (1994), and Milgrom, North, and Weingast (1990) examine self-enforcing institutions of anonymous exchange. I should also note that an interesting strand of literature addresses the effectiveness of self-enforcing arrangements among agents with differing discount rates. See, for instance, Fafchamps (2002). Of course, I am concerned with agent heterogeneity in a completely different sense.

3. A related vein of literature points to the negative impact of agent heterogeneity on the provision of public goods and the quality of institutions. See, for example, Alesina and Spolaore (2003), Alesina and La Ferrara (2002, 2000), Alesina, Baqir, and Easterly (1999), Easterly and Levine (1997), Cutler, Elmendorf, and Zeckhauser (1993), and Goldin and Katz (1999).

nication to each of their many members prohibitively costly or outright impossible.

When these members are socially distant, the problem is even worse. Social distance makes the transmission of relevant information more difficult in two ways. First, it raises the cost of communication with others. Second, it makes it harder for individuals to converge on social norms that stipulate what constitutes cheating and how cheating should be punished.[4] Under these circumstances, the threat of eternal boycott in the event of cheating is no longer credible, and cooperation is undermined.

Given these problems, it would appear that the applicability of self-enforcing exchange is severely limited.[5] Despite this, I argue that self-enforcing exchange is in fact effective among large numbers of socially distant agents. Where multilateral punishment breaks down because of the number and social distance of individuals involved, agents employ ex ante signaling to make exchange self-enforcing.

Existing discussions of social distance in the self-enforcement literature treat the extent of homogeneity between individuals as exogenously determined and social distance between actors as fixed. However, a literature addressing the economics of identity led by Akerlof (1997) and Akerlof and Kranton (2000) points out that individuals can and do manipulate their social distance from others.[6] Building on their insight, this paper treats social distance as a variable of choice that is endogenously determined by actors themselves.

In my model, socially distant agents adopt degrees of homogeneity with outsiders with whom they desire to trade. Doing so signals their credibility to one another. The use of signals that reduce social distance separates cheaters from cooperators, ensuring that in equilibrium only cooperators exchange. In extending the workability of self-enforcing arrangements to large numbers of socially distant individuals, I pick up

4. Greif (1993) considers the role of social norms in defining and punishing dishonest conduct in the context of a small, homogeneous group. For a discussion of how social norms can be used by communities to punish cheaters, see Kandori (1992).

5. Greif's (1994) discussion of Maghribi and Genoese traders is especially illustrative of this argument. The Maghribi traders' coalition constituted a small, socially homogeneous network within which informal mechanisms of ex post enforcement ensured cooperation. The informal nature of enforcement, however, limited exchange opportunities to those with other group members. In contrast, the presence of formal enforcement in Genoa enabled the Genoese to trade with outsiders, yielding them greater gains from exchange.

6. Outside of economics, Burt (1992) has pointed this out as well.

where Greif (1989, 1993, 2002), Landa (1994), and Zerbe and Anderson (2001) leave off.

This paper is most closely connected to Posner (1998, 2002), which examines social signaling in the context of politics and the law.[7] Building on that framework, I model how individuals use social-distance-reducing signals to create self-enforcing exchange. My paper is also connected to McElreath, Boyd, and Richerson (2003) and Bowles and Gintis (2004).[8] Like those papers, this one does not rely on social affinity to support cooperation through altruistic feelings among similar individuals. Instead, I consider the role of social distance in supporting cooperation through its ability to alter the information structure of interaction between agents.

2. SIGNALING WITH SOCIAL DISTANCE

2.1. Formally Defining the Degree of Homogeneity between Individuals

Social distance is the extent to which individuals share beliefs, customs, practices, appearances, and other characteristics that define their identity (Akerlof 1997). Socially distant individuals share few or none of these categories; they are heterogeneous. Individuals who are socially close, in contrast, share many or all of these categories. They are comparatively homogeneous.

Homogeneity is multidimensional. There are innumerable potential dimensions across which individuals may have commonality. For instance, two agents might share some of the same categories of belief, like religion or political persuasion. They may share appearance, such as the way they dress, or practices, like how they settle disputes. Individuals might also share customs, such as the way they greet strangers, the way they deal with colleagues, or other social rules that guide their behavior. Clearly some dimensions of homogeneity are more significant

7. See also Carmichael and MacLeod (1997), who investigate costly gift giving as one norm that creates cooperation between individuals.

8. This paper is also somewhat connected to Smith, Bowles, and Gintis (2001), which uses costly signaling to explain the evolution of cooperation among unrelated members of the same social group for the purpose of activities like hunting and gathering.

than others.[9] For instance, social rules may be a relatively significant dimension, while style of dress may be relatively insignificant.[10]

Homogeneity is also continuous. For each dimension of homogeneity, individuals may share various margins within that dimension. Consider the dimension of language.[11] If some individual has a complete understanding of English and some other individual has, say, a 5 percent understanding of English, the two share marginal homogeneity over the dimension of language. Like with multidimensionality, there are also innumerable margins of homogeneity over each dimension. Individuals need not completely share a dimension of homogeneity for there to be some commonality over it.

Although some dimensions of homogeneity, for instance, gender and ethnicity, are exogenously fixed for agents by nature, many others, for instance, religion, language, and customs, are not. These dimensions of homogeneity are alterable and thus are choice variables for individuals. This means that to a great extent, individuals can affect their position vis-à-vis others in social space. In particular, they can reduce the social distance between themselves and outsiders through the choices they make.[12]

Before exploring how heterogeneous individuals use social-distance-reducing signals to promote exchange, I formally define social distance, or the degree of homogeneity, between agents. For any two individuals, j and k, let $\boldsymbol{H}$ be an n-dimension vector of variable characteristics that j and k may share. Since I am interested in how individuals may manipulate their social distance from others to facilitate trade, I consider only those dimensions of homogeneity that are alterable and thus subject to individual choice. As discussed, ethnicity, for example, is fixed and so is not an object of choice. Ethnicity is therefore not a characteristic of vector $\boldsymbol{H}$. Language, on the other hand, is alterable and may be

9. The significance of various dimensions is largely determined by the context in which two strangers are interacting. For example, at a football game, the team one is cheering for may constitute a rather significant dimension of potential homogeneity with a stranger. Outside this context, however, an individual's favorite team may be considered a relatively unimportant dimension of commonality.

10. Rafaeli and Pratt (1993), however, find that in many cases dress does in fact constitute a significant dimension of homogeneity.

11. Lazear (1999) examines the incentives of minority populations to adopt the language of majority populations as a means of enabling cooperative interaction.

12. Clay's (1997) important work alludes to this fact as well. She notes how in Mexican California, American traders gained access to Mexican communities' internal contract enforcement institutions by investing in Mexican identities. For example, American traders married locally, spoke Spanish in the home, and accepted Catholicism.

manipulated by individuals for their purposes. This dimension of potential homogeneity is therefore included in $\boldsymbol{H}$.

Each of the alterable potential dimensions of homogeneity between two individuals, h_i, compose the elements of $\boldsymbol{H}$ and go from h_1 to h_n. Since not all dimensions are equal, dimensions of homogeneity that compose $\boldsymbol{H}$ are weighted. Multiplying $\boldsymbol{H}$ by an $n \times n$ matrix of dimension weights where $0 \leq w_i \leq 1$ yields the weighted vector $\boldsymbol{H}_w$.

Definition 1. The term $\boldsymbol{H}_w$ is thus defined as $\boldsymbol{H}_w = [w_1 \times h_1, w_2 \times h_2, \ldots w_n \times h_n]$, $0 \leq w_i \times h_i \leq 1$, where $w \times h \in \Re$, a real number between and including zero and one that describes the weighted fraction of margins of homogeneity between j and k over a dimension h_i percentage normalized to one.

When $w_i \times h_i = 0$, j and k are perfectly heterogeneous with respect to one another over dimension h_i. There are no margins of homogeneity between them over this dimension. When $w_i \times h_i = 1$, j and k are perfectly homogeneous with respect to one another over dimension h_i. When, say, $h_i \times w_i = .6$, there is 60 percent marginal homogeneity over dimension h_i.

There is some function f that maps the n-dimension vector $\boldsymbol{H}_w$ to a single real number, $f: \Re^n \rightarrow \Re$.

Definition 2. The term $\overline{H}$ is therefore defined by $f(\boldsymbol{H}_w) = \overline{H} = (1/n)\sum_{i=1}^{n} w_i \times h_i = [(w_1 \times h_1) + (w_2 \times h_2) + \ldots (w_n \times h_n)]/n$, $0 \leq \overline{H} \leq 1$, where $\overline{H}$ is a single real number that describes the total degree of homogeneity, or social distance, between j and k percentage normalized to one.

When $\overline{H} = 0$, j and k are completely heterogeneous with respect to one another: there is zero degree of homogeneity between them, and their social distance from one another is maximized. When $\overline{H} = 1$, j and k are completely homogeneous with respect to one another: there is no social distance between them. When $0 < \overline{H} < 1$, j and k share some (less than complete) degree of homogeneity. Social distance between them is strictly positive but not at its maximum.

2.2. A Simple Signaling Model

To understand the role that variable social distance plays in enabling widespread trade, I use a simple signaling game. My signaling model has the familiar features of all signaling games but is unique in endogenizing a feature that standard versions take as exogenous: social dis-

tance. I model the situation in which there are only two distinct social groups, P and Q. Each group is composed of n individuals, p and q, respectively. Where $P = \{p_1, p_2, \ldots p_n\}$, let $p = p_i \in P$, and where $Q = \{q_1, q_2, \ldots q_n\}$, let $q = q_i \in Q$. Suppose the members of each group are completely heterogeneous with respect to the members of the other group and are highly homogeneous with respect to the members of their own group. That is, $\overline{H} = 0$ for any p and q, and $\overline{H} \approx 1$ for any p and p and for any q and q.

If multilateral punishment can sustain cooperation among the members of the combined population $2n$, the problem I aim to overcome is already solved. The point, however, is to explain the emergence of cooperation in the case in which the population is too large and diverse for multilateral punishment to work. Assume then that the combined population of both groups, $2n$, is too large and diverse to permit the effective flow of information about individuals' histories throughout it, making multilateral punishment ineffective for intergroup interactions.

Large population size and significant population heterogeneity, however, do not impinge the flow of information about traders' past conduct within an in-group since in-group members are relatively few (n) and socially close ($\overline{H} \approx 1$). Information about cheaters can thus be spread inside a group but not outside its bounds, where increased population and social heterogeneity prevent this.[13] Thus, if any q cheats any p, each member of P becomes aware of this, but no member of Q does. This could be the case, for instance, because the members of P and Q do not share a common language, have different notions about what constitutes dishonesty, and so on. Multilateral punishment is therefore effective inside each social group but ineffective outside of it. Punishment for cheating involves only forgoing trade opportunities with the members of the social group one cheated but not the members of the other.

Although this partial multilateral punishment cannot create the same level of cooperation as full-scale multilateral punishment (involving the entire population $2n$), it can secure some. Sufficiently patient agents who value the discounted stream of indefinite future trades with their trading partner's group more than the one-shot payoff of cheating will cooperate. They always trade honestly with those who are outside their group. Sufficiently impatient agents, however, do not. Because these individuals

13. Iannaccone (1992), for example, considers religious sacrifice as a mechanism of securing intragroup cooperation. As I discuss, religious sacrifice has also been used as a form of social-distance-reducing signaling to facilitate intergroup cooperation.

value the one-shot payoff of cheating more than the payoff of future trade with their trading partner's group, they always defraud exchange partners outside their group.

My concern is not with this standard application of the "folk theorem" but rather with how socially distant individuals confronted with this limited punishment capability (owing to the size and diversity of the population) can overcome the uncertainty inherent in interacting with anonymous outsiders who may be patient but may also be impatient and thus prone to one-off cheating. I therefore assume that the members of an in-group multilaterally punish those who cheat any of their members by never trading with them again. However, rather than examine this mechanism of ex post enforcement, my analysis deals with how individuals who are part of a large, socially heterogeneous population overcome the fear of interacting with outsiders and being cheated in the first place.

Consider a specific member of P, whom I will simply call p, and a specific member of Q, whom I call q. There are mutual gains from trade, r, between any cooperative member of P and any cooperative member of Q, and q desires to exchange with p. Furthermore, it is common knowledge that q can be one of two types: a cooperator, t_1, or a cheater, t_2, and that Ψ proportion of Q are cooperators (that is, sufficiently patient) and $1 - \Psi > 0$ proportion of Q are cheaters (sufficiently impatient). All members of P are cooperators.

The social distance between p and q is measured by their total degree of homogeneity, $\overline{H}$, and $\overline{H}$ is subject to choice by q. Nature (N) moves first and selects q's type, t, where $t = t_1$ (cooperator) with probability Ψ and $t = t_2$ (cheater) with probability $1 - \Psi$. Then q privately observes his type, t_1 or t_2, and selects a degree of homogeneity, $\overline{H} \geq 0$, with p. In addition, p observes $\overline{H}$ and on the basis of $\overline{H}$ updates her beliefs about whether q is type t_1 or t_2. Her updated beliefs determine whether or not she trades with q.[14]

Note that since the members of p's social group, P, are socially close

14. In a richer version of this model, q's type would lie somewhere on a continuum of credibility. On one end of this continuum, q always cheats. On the other, he cooperates all the time. In between, he cheats sometimes and cooperates at other times to varying extents. Moreover, p would respond to various observed levels of $\overline{H}$ with q with a willingness to engage in various levels of exchange with q, resulting in various payoffs. To simplify the discussion, however, I make q's type binary and p's decision about what level of exchange to engage in with q binary as well. Thus, on observing $\overline{H}$, p updates her beliefs and either trades with q or does not.

($\overline{H} \approx 1$), any degree of homogeneity that q creates between himself and p he also creates between himself and the other members of P.[15] To the extent that q desires to trade with the other members of P as well and also approaches them for exchange, the other members of P, after observing the same $\overline{H}$, similarly update their beliefs about q's type and also decide whether or not to trade with q. Since all members of P will update their beliefs about q's type in the same way after observing the same $\overline{H}$, when p decides to trade with q, all members of P decide to trade with q, and vice versa when p decides not to trade with q.

The variable $\overline{H}$ satisfies two important criteria that make it an effective signal of q's credibility in exchange. First, $\overline{H}$ is observable. Attributes of q that p shares, for instance, what religion q practices, the social rules he follows, and so on, can be learned by p. Second, $\overline{H}$ satisfies the single crossing property that allows for information-revealing equilibria in signaling games. Stated plainly, it costs q more to create homogeneity with p over such dimensions if q is a cheater than if he is a cooperator.

The reason for this is suggested by Posner (1998), which discusses signaling in the context of politics and the law. In the presence of the partial multilateral punishment discussed above, patience is correlated with the cost of investing in reducing social distance. The payoff from creating some degree of homogeneity with an outsider is long-term. In other words, the costs of investing in "homogeneity capital" with an outsider are recouped only through repeated play over time.

Cheaters, however, have higher discount rates than do cooperators. Because they discount the gains from future exchange more heavily than cooperators do, cheaters find it relatively more costly to invest in creating some degree of homogeneity with an outsider, the value of which will

15. In some cases, decreasing one's social distance with an outsider will increase social distance with the members of one's in-group. Although this could reduce the scope for intragroup exchange in certain cases (for example, converting to an outsider's religion, which could sever some ties with in-group members who practice an opposing religion), in general it should not. In-group members have very good information about the credibility of one another. Unless the practice an agent adopts from an outsider reduces his or her patience (and thus credibility), his or her in-group members should be equally willing to trade with him or her after adopting this practice. In fact, adopting costly behaviors of outsiders should, if anything, indicate an agent's greater patience (and thus greater credibility), making him or her a more attractive trading partner among in-group members. But again, this relies on agents placing greater weight on monetary payoffs, which are unchanged or increase with respect to an in-group member who reduces social distance from outsiders, over psychic payoffs, which may decline if in-group members believe it is important to maintain one's own customs.

be recouped only sometime down the road. Following this logic, the more impatient the agent, the more costly he or she finds the investment. It is easy to prove this formally.

Proposition 1. In the presence of partial multilateral punishment, patience is correlated with the cost of investing in reducing social distance. Specifically, ceteris paribus, the cost of investing in reducing social distance is higher for impatient agents than it is for patient agents.

Proof. Let θn be q's 1-period payoff from trading with the n members of p's group and z be his 1-period payoff from cheating, where $z > \theta n > 0$. In addition, δ is q's discount factor, where $\delta \in (0, 1)$. To prove proposition 1, I first show that if q is a cheater, he is less patient than if he is a cooperator.

Under the partial multilateral punishment strategy, q's discounted total payoff of cooperating is $\sum_{t=0}^{\infty} \theta n_t \delta^t$, and his payoff from cheating is z. Therefore, q cooperates only when $\sum_{t=0}^{\infty} \theta n_t \delta^t \geq z$. Rewriting this expression gives $\delta \theta n (1 - \delta) \geq z$, and solving for δ yields $\delta \geq z/(\theta n + z)$.

If q is a cooperator, that is, for him $\sum_{t=0}^{\infty} \theta n_t \delta^t \geq z$, we know from the previous expression that his discount rate must satisfy $\delta \geq z/(\theta n + z)$. If q is a cheater, we know that for him $\sum_{t=0}^{\infty} \theta n_t \delta^t < z$, which from the previous expression means that his discount rate must be $\delta < z/(\theta n + z)$. Therefore, if q is a cheater, he is less patient (has a smaller values of δ) than if he is a cooperator.

Next I show that patience is correlated with the cost of investing in reducing social distance. Specifically, if q is impatient $[\delta < z/(\theta n + z)]$, investing in reducing his social distance with p is more costly than if he is patient $[\delta \geq z/(\theta n + z)]$.

Let δ_h be q's discount factor when he is patient $[\delta_h \equiv \delta \geq z/(\theta n + z)]$ and δ_l be his discount factor when he is impatient $[\delta_l \equiv \delta < z/(\theta n + z)]$. Finally, let c be q's cost of some activity that reduces social distance with p, where the payoff of this activity is realized at some point in the future (that is, c is an investment).

The discounted cost for q of investing in reducing social distance is the forgone value of the investment sum c in present uses: $c(1 - \delta)$. Since $\delta_h > \delta_l$, then $c(1 - \delta_n) < c(1 - \delta_l)$. The cost of investing in social distance is higher for q if he is impatient than if he is patient. Q.E.D.

On this basis, if in order to trade p requires q to create some degree of homogeneity with her that is costly enough (specifically, if this cost is greater than the 1-period payoff from cheating), q will not undertake

this investment in reducing social distance unless he is patient, and thus a cooperator. Since only cooperators will adopt this degree of homogeneity, this signal can be successfully used to determine a sender's credibility. (The proofs of propositions 2–4 will demonstrate this formally.)

Of course, this does not mean that every person who modifies his or her social appearance in any context is in the colloquial sense "patient." Movie actors, for instance, have a low cost of changing their social appearances and yet are not particularly known for their patience. However, in the context of trade, if the degree of homogeneity agents look for to evaluate the credibility of potential trading partners constitutes a sufficiently costly investment ($c > z$), no agent, movie actor or otherwise, will undertake this investment unless he or she has a low enough discount rate [$\delta \geq z/(\theta n + z)$] to make it profitable.

Preferences for changing social appearances affect the cost threshold a successful signal must satisfy to separate cooperators from cheaters but not the effectiveness of the signaling mechanism. For example, in a society populated by a large number of individuals who happen to find substantially changing their social appearances less costly, say because they enjoy behaving like others, for instance, movie actors, the degree of homogeneity agents look for to evaluate the suitability of potential trade partners must be higher to effectively sort agents. Conversely, in a society of individuals who happen to find behaving like others especially displeasurable, the degree of homogeneity required by agents to separate cheaters from cooperators will be lower.

I return to this issue in proposition 3, in which I show that a range of degrees of homogeneity with a range of investment costs supports the equilibrium in which cheaters are separated from cooperators. This range explains why social-distance-reducing signaling can create a separating equilibrium in the face of agents who find becoming like others inherently less costly (for example, actors) and those who find doing so inherently more costly (for example, those who are "stuck in their ways").

Observing her social distance from q is costly for p, ξ, where $0 \leq \xi \leq r\Psi$; ξ is bounded this way because the cost of observation can never be negative and because p will never consider even the possibility of exchange with q if the cost of observing $\overline{H}$ is greater than the expected benefit of observing $\overline{H}$. For values of $\xi > r\Psi$, p's expected payoff of interacting with q is negative. Since I am interested in the case in which mutual gains from intergroup trade exist, I restrict ξ in such a way that p does at least no worse by contemplating intergroup trade than she

would if she did not entertain this possibility at all (and thus did not play the game I am interested in analyzing).

Within this range, ξ's size depends on the ease with which p can observe q's degree of homogeneity with respect to herself. The ease of observability depends on the dimension(s) of homogeneity adopted by q to signal his credibility. For instance, where q creates a degree of homogeneity with p by adopting p's daily hygiene routine (if q were somehow able to come to know this), values of ξ would be relatively high. It stands to reason that for p, establishing this fact would not come cheaply. On the other hand, where, for example, q creates some degree of homogeneity with p by adopting p's language, values of ξ would be relatively low. The fact that q speaks p's language is easy for p to observe.

If p trades with q and q is a cooperator, q receives rn $(\sum_{t=0}^{\infty}\theta n_t\delta^t)$, the sum of the discounted value of indefinite future trades with the members of P for patient agents, and p receives $r-\xi$. If p trades with q and q is a cheater, q receives z, the one-shot payoff of cheating, and p receives $-z-\xi$. Note that if q is a cheater, his one-shot payoff from cheating p is not multiplied by n the way that his payoff from trading with p is if he is a cooperator. This is because the effectiveness of within-group multilateral punishment prevents q from having the opportunity to trade with additional members of p's group if he cheats p. Finally, if p does not trade with q, p receives $-\xi$ and q receives 0, where $rn > z > 0$.

To effectively screen q, p is looking for some degree of homogeneity that q would adopt if he were cooperative but not adopt if he were a cheater. Let c be the cost of adopting some degree of homogeneity $\overline{H}$, where c may be either monetary or psychic and c is increasing in $\overline{H}$ such that $\partial c/\partial\overline{H} > 0$ and $\partial^2 c/\partial\overline{H}^2 > 0$, $c(0) = 0$ and $c(1) = rn$. The degree of homogeneity with q that p is looking for to determine if q is cooperative or a cheater is therefore easy to tabulate. In this case, p is looking for some $\overline{H}$, $\overline{H}^*$, where $\overline{H}^*$ costs $c > z$. No q, regardless of type, will adopt any $\overline{H}$ with cost $c > rn$. Therefore, p is looking for some $0 < \overline{H}^* < 1$ with cost $rn > c > z$. Figure 1 depicts this game.

3. EQUILIBRIA

The equilibrium concept in this dynamic game of incomplete information is perfect Bayesian. To find the equilibria, we must check for separating and pooling equilibria. I consider only equilibria in pure strategies. Checking for these is straightforward. Let $\mu(t_i \mid \alpha)$ be the probability that

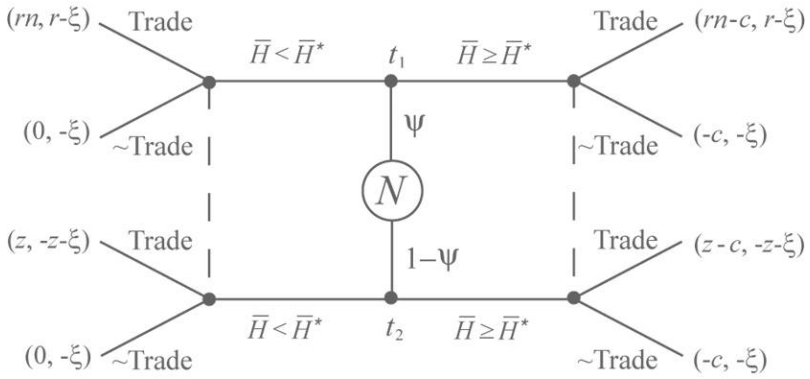

Figure 1. Social-distance-reducing signaling game

p assigns to type i after observing action α. The only beliefs p can hold consistent with Bayes's rule involve assigning a probability of one to q being a cooperator (t_1) after observing $\overline{H} \geq \overline{H}^*$ and assigning a probability of one to q being a cheater (t_2) after observing $\overline{H} < \overline{H}^*$. This results from the fact that choosing $\overline{H} \geq \overline{H}^*$ is a strictly dominated strategy for qs of type t_2. If a separating equilibrium exists, it must therefore involve t_1 choosing $\overline{H} \geq \overline{H}^*$ and t_2 choosing $\overline{H} < \overline{H}^*$. That is,

$$\sigma_q(t) = \begin{cases} \overline{H} \geq \overline{H}^* & \text{if } t = t_1 \\ \overline{H} < \overline{H}^* & \text{if } t = t_2. \end{cases}$$

Proposition 2. The separating equilibrium of the game in Figure 1 has the following profile:

$$\sigma_q(t) = \begin{cases} \overline{H} \geq \overline{H}^* & \text{if } t = t_1 \\ \overline{H} < \overline{H}^* & \text{if } t = t_2, \end{cases}$$

$$\sigma_p[\alpha_q, \mu(\alpha_q)] = \begin{cases} \text{Trade} & \text{if } \alpha_q = \overline{H} \geq \overline{H}^* \\ \sim \text{Trade} & \text{if } \alpha_q = \overline{H} < \overline{H}^*, \end{cases}$$

and

$$\mu(\alpha_q) = \begin{pmatrix} \mu(t1 | H \geq H^*) \\ \mu(t1 | H < H^*) \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}.$$

Proof. See Appendix A.[16]

The equilibrium profile in proposition 2 characterizes an infinite number of separating equilibria in which an infinite number of degrees of homogeneity may be adopted by both cheaters and cooperators in equilibrium. Cooperators may choose any value of $\overline{H}$ for which $1 > \overline{H} \geq \overline{H}^*$. Cheaters may choose any value of $\overline{H}$ for which $0 \leq \overline{H} < \overline{H}^*$. This multitude of separating equilibria results from a failure to restrict p's beliefs off the equilibrium path. If we require that p have reasonable beliefs out of equilibrium, the set of separating equilibria is reduced to one.

Proposition 3. Requiring p to hold reasonable out-of-equilibrium beliefs restricts the set of separating equilibria in the game from Figure 1 to a unique equilibrium in which t_1 chooses $\overline{H} = \overline{H}^*$ and t_2 chooses $\overline{H} = 0$.

Proof. Imagine, for instance, that a cooperative q adopts some degree of homogeneity with p, Θ, where $1 > \Theta > \overline{H}^*$. To sustain Θ as the equilibrium degree of homogeneity adopted by cooperative qs, p must assign a positive probability to any q, with $\overline{H} < \Theta$ being a cheater. However, consider any degree of homogeneity $\Omega \in [\overline{H}^*, \Theta)$. A cheater q could never earn more by adopting any degree of homogeneity $\overline{H} \geq \overline{H}^*$, no matter what p believes about his type after observing this. The only reasonable belief that p can have after observing a degree of homogeneity $\Omega \geq \overline{H}^*$ is therefore $\mu(t_1) = 1$. If this is true, the payoff of adopting Ω must be $rn - c$. This experiment could be performed again for some degree of homogeneity $\Phi \in [\overline{H}^*, \Omega)$. Since adopting more than $\overline{H}^*$ degrees of homogeneity is more costly but produces no offsetting benefit, the only degree of homogeneity that can be chosen by cooperative qs in a separating equilibrium that involves reasonable beliefs is $\overline{H} = \overline{H}^*$. Similarly, since choosing $\overline{H} \geq \overline{H}^*$ is strictly dominated for cheater qs, and adopting $\overline{H}^* > \overline{H} > 0$ is more costly than adopting $\overline{H} = 0$ but yields no offsetting benefit, the only degree of homogeneity that can be chosen by cheater qs in a separating equilibrium that involves reasonable beliefs is $\overline{H} = 0$.[17] Q.E.D.

Returning for a moment to the issue of movie actors—those with an innately low cost of reducing social distance—it is easy to see here why

16. This proof is adapted from Ellison (2002).
17. This proof is similar to that of Mas-Colell, Whinston, and Green (1995).

they do not pose a problem for social-distance-reducing signaling. Namely, there are only two restrictions on the cost of $\overline{H}^*$, the degree of homogeneity adopted by cooperative qs in the equilibrium that separates them from cheaters. First, $c > z$: $\overline{H}^*$ must cost more than the 1-period payoff from cheating. Second, $c \leq rn$: $\overline{H}^*$ cannot cost more than the payoff of trading for cooperative types. Within this range, however, c may take any value and still support the separating equilibrium. As noted previously, in a society of movie actors, where creating any $\overline{H}$ is relatively cheaper than in a society of individuals who strongly dislike the practices of outsiders, values of $\overline{H}^*$ will simply be higher. This will lead c to be closer to the maximum part of its possible range (rn) than to its minimum (z), where it would be in a society of nonactors who strongly dislike the practices of outsiders.

It is equally easy to show that there are no pooling equilibria in this game. There are two possibilities here: all qs choose $\overline{H} < \overline{H}^*$ and all qs choose $\overline{H} \geq \overline{H}^*$. The second possibility can be quickly excluded because choosing $\overline{H} \geq \overline{H}^*$ is strictly dominated by choosing $\overline{H} < \overline{H}^*$ for type t_2 qs. The deviation of type t_2 qs in this case prevents it from being a pooling equilibrium. If a pooling equilibrium exists then, it must involve both types of q choosing $\overline{H} < \overline{H}^*$; that is,

$$\sigma_q(t) = \begin{cases} \overline{H} < \overline{H}^* & \text{if } t = t_1 \\ \overline{H} < \overline{H}^* & \text{if } t = t_2. \end{cases}$$

Proposition 4. The equation

$$\sigma_q(t) = \begin{cases} \overline{H} < \overline{H}^* & \text{if } t = t_1 \\ \overline{H} < \overline{H}^* & \text{if } t = t_2 \end{cases}$$

cannot constitute an equilibrium of the game from Figure 1 where p is required to have reasonable beliefs out of equilibrium.

Proof. Since choosing $\overline{H} \geq \overline{H}^*$ is strictly dominated for qs who are cheaters (t_2), it is not reasonable for p to assign a positive probability to q being a cheater (t_2) if she observes $\overline{H} \geq \overline{H}^*$. If q is cooperative (t_1), he can therefore earn more by deviating from this strategy and adopting a degree of homogeneity with p, $\overline{H} = \overline{H}^*$, reestablishing the separating equilibrium from proposition 3. Q.E.D.

The unique equilibrium of this game is therefore the one described in proposition 3. In equilibrium, q, if cooperative, chooses $\overline{H} = \overline{H}^*$ and p and q exchange, and q, if a cheater, chooses $\overline{H} = 0$ and they do not exchange. Since all members of P respond identically to the same ob-

served $\overline{H}$, this means that when q is cooperative and chooses $\overline{H} = \overline{H}^*$, q and all members of P exchange, and when q is a cheater and chooses $\overline{H} = 0$, q does not exchange with any member of P. The gains from intergroup exchange are therefore exhausted, which makes this equilibrium socially efficient.

4. TESTABLE IMPLICATIONS

This model delivers at least three testable predictions. First, it predicts that socially heterogeneous agents will use social-distance-reducing signals to facilitate intergroup trade. Historical evidence for this is considered in Section 5. Obviously, where the gains of such exchange are larger (and thus the gains from cheating are larger too), the degree of homogeneity required between agents to make cooperation possible will be larger and thus more costly as well.

Second, the model tells us something specific about the particular form of social-distance-reducing signals that individuals are likely to use. Posner (1998) points out that "norm entrepreneurs" largely guide the process by which specific signals come to be used and recognized as such. These individuals lead the discovery and establishment of particular costly activities as signals, which other individuals eventually come to follow. Among the costly activities that may eventually be selected as signals through this process, however, some are more likely to be selected than others.

As discussed in Section 2, there are innumerable potential dimensions of homogeneity that agents may use to signal credibility. Although most dimensions of homogeneity are easily observable, some are easier to observe than others. As values of ξ get larger, p's payoff from trading with q falls; the unique gains from intergroup trade shrink when it is more costly to observe $\overline{H}$. Ceteris paribus, we should therefore expect agents to signal using those dimensions of homogeneity that are easier and thus cheaper to observe. These will be more prominently employed as signals than dimensions that involve personal tastes and private habits, which could in principle serve as degrees of homogeneity between two agents but tend to be more difficult, and therefore more costly, to observe.

In other words, those dimensions of homogeneity that have some public element to them in that they are openly displayed will tend to be used as signals, while those that are exclusively or predominantly private,

and thus for the most part observed only by the individual and those to whom he or she is close, will not be used. It is therefore not surprising that while individuals are often inclined to interact more with those who share the same religion, they are not (at least under normal circumstances) inclined to interact more with those who have the same color carpet in their homes as they do. This prediction is corroborated by the historical evidence I consider in the next section in which public dimensions of homogeneity are adopted by individuals to enable trade with outsiders.

Third, the model suggests that for the purpose of facilitating intergroup trade, social-distance-reducing behaviors are privileged over other costly behaviors that could in principle be used to separate high and low types. There are several reasons for this. Where individuals are socially homogeneous, there is little room for social-distance-reducing signals to play a role in conveying credibility. Adopting the behaviors and practices of someone you are already like is not costly. Adopting the behaviors and practices of someone unlike you, however, is, which makes adopting degrees of homogeneity with an outsider a signal of the sender's credibility. Social-distance-reducing signals are therefore uniquely suited to intergroup interactions. When members of disparate social groups are involved, we should therefore expect to see social-distance-reducing signals used to facilitate cooperation.

Social-distance-reducing activities are also used to facilitate intergroup trade instead of other costly actions because of what Bliege Bird (1999), Smith and Bliege Bird (2000), and Smith, Bowles, and Gintis (2001) call "broadcast efficiency." As discussed above, since in-group members are socially close, degrees of homogeneity adopted by an individual from one group to enable trade with an individual from another group also create degrees of homogeneity with the other members of that group. Social-distance-reducing actions interpreted by one member of this group as signals of credibility are therefore interpreted as signals of credibility by the other members of the group as well. This means that the adopting agent benefits through his or her social-distance-reducing actions not only by the trade with the particular individual initially approached for exchange but also by the trade consequently enabled with every other member of that individual's social group. Because of this, agents gain more by engaging in social-distance-reducing behaviors, which have a wider audience, to enable exchange with outsiders than by using other costly behaviors for this purpose.

5. HISTORICAL EVIDENCE

This section examines historical evidence for the operation of social-distance-reducing signaling modeled above. It analyzes intergroup interactions between the populous and diverse inhabitants of precolonial Africa.[18] "Long before the Europeans appeared on the scene," precolonial Africans had established domestic and "international trade, with developed systems of credit, insurance [and] arbitration. Law and order were normally maintained and strangers honored their business obligations." Intergroup exchange brought "about intensive social interaction between various ethnic groupings" and involved "extensive credit arrangements often between total strangers from different tribes" (Cohen 1969, p. 6).

This is especially notable since much of precolonial Africa was effectively without formal governments to enforce exchange agreements (see, for instance, Curtin et al. 1995; Evans-Pritchard 1940; Bohannan 1968; Leeson 2007b). In light of this, individuals frequently had to rely on self-enforcing exchange arrangements to facilitate intergroup trade instead. To do so, agents invested in the customs and practices of the outsiders with whom they wanted to exchange. I focus on three specific potential dimensions of homogeneity that individuals used as social-distance-reducing signals to enable intergroup exchange: their relationship to authority, practices involving land, and religious practice and association.

5.1. Relationship to Authority

In the absence of formal governments, much of precolonial Africa was governed by informal community leaders, or headmen. These leaders were typically village elders or others of high social standing in the community who generally established social rules for community members and resolved disputes that might emerge between them (see, for instance, Middleton 1971). Some informal leaders also acted as community gatekeepers and requested gifts as a sign of good faith from individuals wanting to access their communities.

Refusing to abide by social rules or rejecting the decision of the community leader could in some cases lead to formal punishment, such as imprisonment. More often, however, informal punishment was used to achieve compliance with community custom. In many cases, for ex-

18. For a more detailed analysis of self-enforcing intergroup exchange in precolonial Africa, see Leeson (2005a, 2005b, 2007a).

ample, if an individual "chose to ignore a ruling given by the chief, he could do so with impunity; but if public opinion was behind the chief's decision, he might lose the privileges" of membership in that community (Howell 1968, p. 192). The informal nature of many precolonial communities thus made submission to a leader's authority largely a matter of choice.

Internally, precolonial communities tended to be highly homogenous. Individuals shared the same customs, practices, appearances, religion, language, methods of handling disputes, property arrangements, and many other significant potential dimensions of commonality, which made them socially close. Between groups, however, there could be considerable social distance. Since communities were led by different headmen, and headmen established important social rules in their communities, many of these potential dimensions of homogeneity differed from one community to the next. For this reason, the informal leader one chose to follow was an important part of one's social identity.

In the context of precolonial Africa, both gift giving and submitting oneself to the authority of a community's rulers and dispute resolution procedures reduced social distance between outsiders and in-group members over important potential dimensions of homogeneity: using the same social rules (including the custom of gift giving) and methods of settling disputes and more generally recognizing the authority of the same informal leader.

Both social-distance-reducing activities were costly, and because they constituted investments that could be recouped only over time, they were more costly for impatient agents (cheaters) than for patient ones (cooperators). Adopting the practice of gift giving involved investing physical resources to reduce social distance with the community with which an outsider desired to interact. As long as the value of the gift the outsider was required to give exceeded the one-shot payoff of cheating ($c > z$), by requiring outsiders to adopt this practice, a community could identify patient and thus honest individuals who would adopt this practice and so be admitted to the group and could screen out impatient and thus dishonest individuals who did not adopt this practice and would cheat if admitted.

Submitting to the social rules and authority of the headman could also be costly. Reducing social distance with community members along this dimension involved placing oneself in a vulnerable position vis-à-vis an unknown community leader. For example, a newcomer might be uncertain whether he or she would receive less favorable decisions in

disputes with existing community members, which imposed a cost on him or her of submitting to the leader's rulings. Provided this cost exceeded the one-shot payoff of cheating, the only way an outsider would find this situation profitable would be if either (1) he or she did not expect to encounter any disputes with existing group members or (2) he or she expected to remain in good standing in the group long enough to engage in sufficient exchanges with its members over the long run to offset the cost of receiving less favorable decisions. The only outsiders for whom 1 or 2 were true were cooperative (patient) ones.

With respect to both gift giving and submission to community leaders and their decisions, an outsider who desired to interact with community members, and thus invested in these degrees of homogeneity, stood to lose his or her investment if he or she behaved badly. As noted above, behaving badly could result in rejection by the community, in which case the value of his or her investment would be lost. In the case of gift giving, the outsider would be unable to recover the value of the gift. In the case of submission to the community's informal leader, the outsider would not be able recover the losses incurred as a result of unfavorable dispute rulings. For honest outsiders, however, this was not a concern. Their good conduct would assure repeated play, allowing them to recoup the value of their investment over time.

Because of this, gift giving and subjugation to community leaders and their dispute resolution procedures functioned as effective social-distance-reducing signals of credibility. Through requiring outsiders to make these investments in order to have access to interaction with their members, communities attracted honest outsiders and repelled dishonest ones, which facilitated intergroup trade. As a result, "far from there being a single 'tribal' identity, most Africans moved in and out of multiple identities, defining themselves at one moment as subject to this chief, at another moment as a member of that cult, at another moment as part of this clan, and at another moment as an initiate in that professional guild. These overlapping networks of association and exchange extended over wide areas" (Ranger 1985, p. 248).

5.2. Practices Involving Land

Precolonial Africans also adopted outsiders' costly practices involving land as a means of reducing their social distance to signal credibility and enable intergroup exchange. Precolonial communities did not own the land they used in the sense that they could sell it to others. However, they did often exercise some control over who might use the land they

currently occupied and how it could be used. Informal community leaders often directed community members in this regard. Elsewhere, "earth priests," community leaders representing a link to the historical first user of the land, performed this function.

Land was sometimes seen as having mystical properties, which entailed the performance of ritual customs and taboos established by earth priests. In order to assimilate, outsiders who desired to engage the community agreed to participate in these customs and respect the taboos identified by earth priests. Further, similar to the gift-giving practice described above, outsiders seeking to interact with a particular land-using community often made gifts to the earth priests "as an expression of goodwill" (Colson 1969, p. 54).

Both of these social-distance-reducing activities were costly, and more so for impatient agents than for patient ones. Adopting the community custom of gift giving involved surrendering part of one's stock of wealth, the value of which could be recouped only over time. Impatient agents, who planned to cheat and would be ejected from the community before they had the opportunity to recoup the value of their gift, consequently did not find making such an investment profitable. Patient agents, who intended to cooperate and thus could recoup the value of their gift over time, however, did. Community members could therefore use outsiders' adoption of this custom to screen out cheaters.

Submitting to the earth priest's ritual taboos could also be costly. For example, one of the earth priest's taboos might be a prohibition on cultivating the area's more fertile land because of its sacred status. If this were the case, an outsider who adopted this taboo to gain access to the community would incur a substantial cost in the form of forgone production from cultivating less fertile land. Only by remaining in good standing in the community, which required honest behavior, could the outsider recoup the opportunity cost of cultivating less fertile ground through trade with the community's members. Consequently, only outsiders who intended to behave honestly (that is, patient ones) agreed to adopt a community's ritual land customs and taboos, which made this an effective social-distance-reducing signal of credibility.

Alternatively, if he or she wanted to join a land-using community, an outsider might have to accept the earth priest's decision that directed him or her to work a less productive plot of land on the grounds that he or she was a newcomer or because the more productive land was already in use. In this case too, an outsider could incur a substantial cost by adopting the in-group's custom of following the earth priest's

direction. Adopting these customs and practices therefore signaled outsiders' honesty to the land-using community, which would welcome those who did so. In this way, social-distance-reducing signaling through the adoption of practices involving land facilitated intergroup exchange.

5.3. Religious Practice and Association

Finally, precolonial Africans also used religious practice and association as social-distance-reducing signals to enable intergroup exchange. One way to reduce social distance along these lines was to participate in the religious practices and beliefs of an outsider. Alternatively, one might join an outsider's religious association or completely convert to his or her religion.[19] Each of these social-distance-reducing activities signaled the sender's credibility, facilitating intergroup cooperation.

Cults and fraternal societies, such as the Ekpe, Okonko, and Ogboni, often performed quasi-religious and judiciary functions in precolonial African communities. As one European observer noted, in the absence of "any thing like our establishment of Judges, Police, Prisons, and Penal Servitude," such quasi-religious societies "are simply [the] methods by which law and order is secured" in many African communities (Stopford 1901, p. 95). These societies frequently created religious customs and practices, as well as dispute resolution procedures, which outsiders could adopt to reduce their social distance with in-group members. In some cases, societies like the Ekpe charged a membership fee to join. In others, "cult membership was open to any who wished to join" and agreed to adopt the customs and practices of the society (Colson 1969, p. 59).

In both cases, religious adoption was costly to outsiders, and more so for impatient and thus dishonest outsiders than for patient and thus honest ones. In the case of a membership fee, the cost was financial. Even when it was not, however, outsiders who participated in or converted to these quasi-religious associations had to adopt costly customs that could include surrendering their goods to spirits, submission to potentially costly procedures for conflict resolution, restrictions on behavior such as diet, and the recurrent investment of their time in society-related activities.

Dishonest outsiders, who were impatient, did not find undertaking these costly activities worthwhile. Since they intended to cheat, and cheating was frequently punished with rejection by the community,

19. Some precolonial Africans, for instance, converted to Christianity to facilitate interaction with European visitors.

cheaters could not profit from investing in the religious activities of in-group members. To recover the cost of this investment, individuals would need to remain in good standing in the group for a protracted period of time. But to remain in good standing, they would need to refrain from cheating. Unless they were sufficiently patient and so planned to behave honestly, it was therefore not in their interest to adopt the religious practices of outsiders.

For honest outsiders, however, things were different. These outsiders were patient and so intended to behave cooperatively. They therefore found adopting these social-distance-reducing signals profitable. Since their honest conduct ensured they would remain in the community long enough to recover the investment cost of engaging in the community's religious practices, they willingly did so. Because of this, outsiders who reduced social distance with in-group members by adopting their religious practices were admitted to the community, which enabled intergroup exchange. Outsiders who did not find this profitable and so were unwilling to do so—that is, impatient agents, who intended to cheat—were not admitted.

Importantly, for each of the social-distance-reducing activities considered, individuals used public degrees of homogeneity as signals of credibility. The reason that social-distance-reducing signals evolved along these dimensions is implied by the model developed above. Recall that p's payoff from intergroup trade with q when q is cooperative is $r - \xi$, where ξ is p's cost of observing $\overline{H}$. Because of this, ceteris paribus, signals that are cheaper to observe will be preferred over those that are more costly to observe. Since dimensions of homogeneity that had a public element to them—for instance, allegiance to a particular authority, land usage and rituals, and religious membership and practice—were cheaper to observe, they tended to be used as signals for intergroup trade in precolonial Africa instead of private dimensions that were also costly but more difficult to observe.

6. CONCLUSION

This paper's analysis leads to three conclusions. First, self-enforcing arrangements for securing cooperation among agents are robust. In addition to homogeneous individuals, socially distant agents can also rely on these arrangements to exchange peacefully. By filtering out agents who pose a threat to cooperation, ex ante signaling can eliminate the

uncertainty and fear that individuals face when interacting with those outside their social networks.

Second, the standard appraisal of government's role in enabling agents to capture the gains from widespread exchange may be overly optimistic. Socially distant agents can and have captured these gains without government via the mechanism I described. This suggests that the importance of formal enforcement in securing peaceful trade has been overstated, even when social distance between agents is significant. The operation of the mechanism considered here points to the spontaneous emergence of private institutional arrangements to solve problems between actors. This observation should strengthen our confidence in the ability of individuals to overcome obstacles (like the problem of social distance) that might otherwise impinge progress.

Finally, the framework presented here provides an alternative to the conventional approach to homogeneity in the self-enforcement literature, which treats social distance as fixed and exogenously determined. In contrast, my analysis views social distance as endogenous to the choices of actors who may manipulate social distance for their purposes. It therefore helps to explain why we often observe individuals adopting the behaviors and customs of those with whom they desire to interact and why individuals typically trust those who are like them over certain dimensions more than they trust those who are not.

APPENDIX A: PROOF OF PROPOSITION 1

Using Bayes's rule, we get $\mu(t_1 \mid \overline{H} \geq \overline{H}^*) = 1$ and $\mu(t_1 \mid \overline{H} < \overline{H}^*) = 0$, and $\mu(t_2 \mid \overline{H} \geq \overline{H}^*) = 0$ and $\mu(t_2 \mid \overline{H} < \overline{H}^*) = 1$. When q chooses $\overline{H} \geq \overline{H}^*$, p's expected payoff from choosing to trade or not to trade, respectively, is therefore

$$EU_p(\text{Trade}, \overline{H} \geq \overline{H}^*) = \mu(t_1 \mid \overline{H} \geq \overline{H}^*) \times U_p(\text{Trade}, \overline{H} \geq \overline{H};\ t_1) + \mu(t_2 \mid \overline{H} \geq \overline{H}^*) \times U_p(\text{Trade}, \overline{H} \geq \overline{H}^*;\ t_2) = r - \xi$$

and

$$EU_p(\sim \text{Trade}, \overline{H} \geq \overline{H}^*) = \mu(t_1 \mid \overline{H} \geq \overline{H}^*) \times U_p(\sim \text{Trade}, \overline{H} \geq \overline{H}^*;\ t_1) + \mu(t_2 \mid \overline{H} \geq \overline{H}^*) \times U_p(\sim \text{Trade}, \overline{H} \geq \overline{H}^*;\ t_2) = -\xi.$$

Therefore, p's best response (BR_p) to q choosing $\overline{H} \geq \overline{H}^*$ is to trade. That is, $\text{BR}_p(\overline{H} \geq \overline{H}^*) = \text{Trade}$.

When q chooses $\overline{H} < \overline{H}^*$,

$$EU_p(\text{Trade}, \overline{H} < \overline{H}^*) = \mu(t_1 \mid \overline{H} < \overline{H}^*) \times U_p(\text{Trade}, \overline{H} < \overline{H}^*;\ t_1) + \mu(t_2 \mid \overline{H} < \overline{H}^*) \times U_p(\text{Trade}, \overline{H} < \overline{H}^*;\ t_2) = -z - \xi$$

and

$$EU_p(\sim \text{Trade}, \overline{H} < \overline{H}^*) = \mu(t_1 \mid \overline{H} < \overline{H}^*) \times U_p(\sim \text{Trade}, \overline{H} < \overline{H}^*;\ t_1) + \mu(t_2 \mid \overline{H} < \overline{H}^*) \times U_p(\sim \text{Trade}, \overline{H} < \overline{H}^*;\ t_2) = -\xi.$$

Therefore, $\text{BR}_p(\overline{H} < \overline{H}^*) = \sim\text{Trade}$.

It is easy to check that this is an equilibrium by verifying that it is never in the interest of q to deviate from the assigned strategy. We already know that a q of type t_2 (a cheater) will not deviate because for him $\overline{H} < \overline{H}^*$ strictly dominates $\overline{H} \geq \overline{H}^*$. What about a q of type t_1? Along the equilibrium path, he receives $U_q(\overline{H} \geq \overline{H}^*, \text{Trade}; t_1) = rn - c$. If he were to deviate and choose $\overline{H} < \overline{H}^*$ instead, consistent with the beliefs specified above, p would assume that he was a cheater and therefore not trade with him, which would yield an inferior payoff of zero. Therefore, q has no incentive to deviate from the prescribed strategy.

REFERENCES

Akerlof, George. 1997. Social Distance and Social Decisions. *Econometrica* 65: 1005–28.

Akerlof, George, and Rachel Kranton. 2000. Economics and Identity. *Quarterly Journal of Economics* 115:715–53.

Alesina, Alberto, Reza Baqir, and William Easterly. 1999. Public Goods and Ethnic Divisions. *Quarterly Journal of Economics* 114:1243–84.

Alesina, Alberto, and Eliana La Ferrara. 2000. Participation in Heterogeneous Communities. *Quarterly Journal of Economics* 115:847–904.

———. 2002. Who Trusts Others? *Journal of Public Economics* 85:207–34.

Alesina, Alberto, and Enrico Spolaore. 2003. *The Size of Nations*. Cambridge, Mass.: MIT Press.

Bernstein, Lisa. 1992. Opting out of the Legal System: Extralegal Contractual Relations in the Diamond Industry. *Journal of Legal Studies* 21:115–57.

———. 1996. Merchant Law in a Merchant Court: Rethinking the Code's Search for Immanent Business Norms. *University of Pennsylvania Law Review* 144: 1765–1821.

———. 2001. Private Commercial Law in the Cotton Industry: Creating Cooperation through Norms, Rules, and Institutions. *Michigan Law Review* 99:1724–88.

Bliege Bird, Rebecca. 1999. Cooperation and Conflict: The Behavioral Ecology of the Sexual Division of Labor. *Evolutionary Anthropology* 8:65–75.

Bohannan, Paul. 1968. Stateless Societies. Pp. 170–72 in *Problems in African History,* edited by Robert Collins. Englewood Cliffs, N.J.: Prentice-Hall.

Bowles, Samuel, and Herbert Gintis. 2004. Persistent Parochialism: Trust and Exclusion in Ethnic Networks. *Journal of Economic Behavior and Organization* 55:1–23.

Burt, Ronald. 1992. *Structural Holes: The Social Structure of Competition*. Cambridge, Mass.: Harvard University Press.

Carmichael, H. Lorne, and W. Bentley MacLeod. 1997. Gift Giving and the Evolution of Cooperation. *International Economic Review* 38:485–509.

Carr, Jack, and Janet Landa. 1983. The Economics of Symbols, Clan Names and Religion. *Journal of Legal Studies* 13:135–56.

Clay, Karen. 1997. Trade without Law: Private-Order Institutions in Mexican California. *Journal of Law, Economics, and Organization* 13:202–31.

Cohen, Abner. 1969. *Custom and Politics in Urban Africa: A Study of Hausa Migrants in Yoruba Towns*. Berkeley: University of California Press.

Colson, Elizabeth. 1969. African Society at the Time of the Scramble. Pp. 27–65 in *The History and Politics of Colonialism, 1870–1914*. Vol. 1 of *Colonialism in Africa 1870–1960*, edited by L. H. Gann and Peter Duignan. London: Cambridge University Press.

Curtin, Philp, Steven Feierman, Leonard Thompson, and Jan Vansina. 1995. *African History: From Earliest Times to Independence*. New York: Longman.

Cutler, David, Douglas Elmendorf, and Richard Zeckhauser. 1993. Demographic Characteristics of the Public Bundle. *Public Finance* 48:178–98.

Dixit, Avinash. 2003. Trade Expansion and Contract Enforcement. *Journal of Political Economy* 111:1293–1317.

Easterly, William, and Ross Levine. 1997. Africa's Growth Tragedy: Policies and Ethnic Divisions. *Quarterly Journal of Economics* 112:1203–50.

Ellickson, Robert. 1991. *Order without Law: How Neighbors Settle Disputes*. Cambridge, Mass.: Harvard University Press.

Ellison, Glenn. 2002. Game Theory 14.122: Finding PBE in Signaling Games. Unpublished notes. Department of Economics, Massachusetts Institute of Technology, Cambridge, Mass.

Evans-Pritchard, E. E. 1940. *The Nuer: A Description of the Modes of Livelihood and Political Institutions of a Nilotic People*. Oxford: Clarendon Press.

Fafchamps, Marcel. 2002. Spontaneous Market Emergence. *Topics in Theoretical Economics* 2(1), art. 2, pp. 1–35. http://www.bepress.com/bejte/topics/vol1/iss2/art2.

Fearon, James, and David Laitin. 1996. Explaining Interethnic Cooperation. *American Political Science Review* 90:715–35.

Friedman, David. 1979. Private Creation and Enforcement of Law—a Historical Case. *Journal of Legal Studies* 8:399–415.

Goldin, Claudia, and Lawrence Katz. 1999. Human Capital and Social Capital:

The Rise of Secondary Schooling in America, 1910 to 1940. *Journal of Interdisciplinary History* 29:683–723.

Greif, Avner. 1989. Reputation and Coalitions in Medieval Trade: Evidence on the Maghribi Traders. *Journal of Economic History* 49:857–82.

———. 1993. Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition. *American Economic Review* 83:525–48.

———. 1994. Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies. *Journal of Political Economy* 102:912–50.

———. 2002. Institutions and Impersonal Exchange: From Communal to Individual Responsibility. *Journal of Institutional and Theoretical Economics* 158:168–204.

———. 2004. Impersonal Exchange without Impartial Law: The Community Responsibility System. *Chicago Journal of International Law* 5:107–36.

Greif, Avner, Paul Milgrom, and Barry Weingast. 1994. Coordination, Commitment, and Enforcement: The Case of the Merchant Guild. *Journal of Political Economy* 102:745–76.

Howell, Paul. 1968. Nuer Society. Pp. 190–210 in *Problems in African History,* edited by Robert Collins. Englewood Cliffs, N.J.: Prentice-Hall.

Iannaccone, Laurence. 1992. Sacrifice and Stigma: Reducing Free-riding in Cults, Communes, and Other Collectives. *Journal of Political Economy* 100: 271–91.

Kandori, Michihiro. 1992. Social Norms and Community Enforcement. *Review of Economic Studies* 59:63–80.

Landa, Janet. 1981. A Theory of the Ethnically Homogenous Middleman Group: An Institutional Alternative to Contract Law. *Journal of Legal Studies* 10: 349–62.

———. 1994. *Trust, Ethnicity, and Identity*. Ann Arbor: University of Michigan Press.

Lazear, Edward. 1999. Culture and Language. *Journal of Political Economy* 107: S95–S126.

Leeson, Peter T. 2005a. Self-Enforcing Arrangements in African Political Economy. *Journal of Economic Behavior and Organization* 57:241–44.

———. 2005b. Endogenizing Fractionalization. *Journal of Institutional Economics* 1:75–98.

———. 2006. Cooperation and Conflict: Evidence on Self-Enforcing Arrangements and Heterogeneous Groups. *American Journal of Economics and Sociology* 65:891–907.

———. 2007a. Efficient Anarchy. *Public Choice* 130:41–53.

———. 2007b. Trading with Bandits. *Journal of Law and Economics* 50:303–21.

Mas-Colell, Andreu, Michael Whinston, and Jerry Green. 1995. *Microeconomic Theory*. Oxford: Oxford University Press.

McElreath, Richard, Robert Boyd, and Peter Richerson. 2003. Shared Norms and the Evolution of Ethnic Markers. *Current Anthropology* 44:122–29.

Middleton, John. 1971. Some Effects of Colonial Rule among the Lugbara of Uganda. Pp. 6–48 in *Profiles of Change: African Society and Colonial Rule,* edited by Victor Turner. Vol. 3 of *Colonialism in Africa 1870-1960,* edited by L. H. Gann and Peter Duignan. London: Cambridge University Press.

Milgrom, Paul, Douglas North, and Barry Weingast. 1990. The Role of Institutions in the Revival of Trade: The Medieval Law Merchant, Private Judges, and the Champagne Fairs. *Economics and Politics* 1:1–23.

Posner, Eric A. 1996. The Regulation of Groups: The Influence of Legal and Nonlegal Sanctions on Collective Action. *University of Chicago Law Review* 63:133–98.

———. 1998. Symbols, Signals, and Social Norms in Politics and the Law. *Journal of Legal Studies* 27:765–98.

———. 2002. *Law and Social Norms*. Cambridge, Mass.: Harvard University Press.

Rafaeli, Anat, and Michael Pratt. 1993. Tailored Meanings: On the Meaning and Impact of Organizational Dress. *Academy of Management Review* 18: 32–55.

Ranger, Terence. 1985. The Invention of Tradition in Colonial Africa. Pp. 211–62 in *The Invention of Tradition*, edited by Eric Hobsbawm and Terence Ranger. Cambridge: Cambridge University Press.

Smith, Eric, and Rebecca Bliege Bird. 2000. Turtle Hunting and Tombstone Opening: Public Generosity as Costly Signaling. *Evolution and Human Behavior* 21:245–61.

Smith, Eric, Samuel Bowles, and Herbert Gintis. 2001. Costly Signaling and Cooperation. *Journal of Theoretical Biology* 213:103–19.

Stopford, J. G. B. 1901. Glimpses of Native Law in West Africa. *Journal of the Royal African Society* 1:80–97.

Zerbe, Richard, and C. Leigh Anderson. 2001. Culture and Fairness in the Development of Institutions in the California Gold Fields. *Journal of Economic History* 61:114–43.