'Us' and 'Them': The Origin of Identity, and its Economic Implications

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ABSTRACT

We investigate the origins of identity and the innate proclivity to draw a distinction between 'insiders' and 'outsiders'. We propose an evolutionary explanation: we argue that identity arises because it facilitates survival. In an evolutionary setting we endogenize preferences and demonstrate that the evolutionarily stable preferences fashioned by natural selection would draw a distinction between insiders and outsiders. We then work out the implications of such preferences in two contemporary scenarios, one entailing rent-seeking behavior and the other involving public good provision. Our results are in conformity with empirical evidence.

Key Words: Identity, evolutionarily stable preferences, rent-seeking, public good provision

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A nation is a society united by delusions about its ancestry and by a common hatred of its neighbors. – William Ralph Inge (1860 - 1954)

1 Introduction

The ability to make sharp distinctions between 'Us' and 'Them' appears to be a universal trait that is well-entrenched in the human psyche. Whether in the tribal warfare in Rwanda, the religious wars of the Crusades, modern trade negotiations, or the manifold and storied rivalries between different sports teams representing different communities, there is a clear distinction in the minds of everyone involved between those who are seen as insiders and those who are seen as outsiders. Further, in the utility calculus of any one person, the wellbeing or success of insiders appears to receive a positive weight and that of outsiders a negative weight.

In this paper we attempt to do two things. We first develop an evolutionary explanation of this proclivity that is driven by certain key features of the hunter-gather technology that prevailed in the savannas of Africa when human preferences were forged. While the tendency to distinguish between insiders and outsiders in certain situations survives today, the technological features that gave birth to it no longer characterize the technology by which we now support ourselves. So we next explore some of the unfortunate consequences of this proclivity in today's world.

Modern humans evolved in hunter-gather societies over a period of tens of thousands of years in the savannas of east Africa. Small bands or teams of people were, in effect, exploiting a common access resource. There were, we argue, three key features of the hunter-gatherer technology: competition between teams was localized; within teams, the productive efforts of different individuals were plain and strategic complements; across teams, the productive efforts of different individuals were plain and strategic substitutes. As regards the fitness of a representative individual in this environment, the second and third features of the technology give rise to quite different externalities among individuals. In Section 2, we show that these externalities engender evolutionarily stable preferences that put a put a positive weight on the fitness of members of one's own team and a negative weight on the fitness of members of competing teams. So the paper can be seen as a contribution to the literature on the forces that shape our preferences. See, for example, Bester and Guth (1998), Bolle (2000), Possajennikov (2000), Kockesen, Ok, and Sethi (2000a, 2000b), Ely and Yilankaya (2001), Eaton and Eswaran (2003), Eswaran and Kotwal (2004), Dekel, Ely and Yilankaya (2007).

We are not suggesting that tens of thousands of years ago humans formed rigid definitions of insiders and outsiders that have subsequently become fossilized. Rather, we argue that humans have an *evolved capacity* to instinctively define these groups, depending on the context in which interaction among them takes place. Our view is that we humans are hardwired with psychological machinery that induces us to classify the people with whom we interact as insiders in situations where interests are complementary and as outsiders in situations where interests are opposed. Importantly, this view seems to be entirely consistent with the empirical evidence in the psychological literatures on contact and conflict. The contact literature demonstrates the proposition that merely putting people in contact with one another in a situation where their interests are complementary promotes a sense of identity among them even when they are drawn from distinct groups that are seen as opposed [Dovidio et al (2002), Pettigrew (1998), Pettigrew and Tropp (2000)]. In contrast, the conflict literature demonstrates that when groups of individuals with distinct identities are put in situations of conflict the prevalence of in-group biases in decision making increases significantly [Brewer (1999)].

The human proclivity to make 'Us' and 'Them' distinctions would seem to be a major part of what we mean by identity, for embeded in these distinctions are at least partial answers to the questions 'With whom do I identify?' and 'Who do I take myself to be?'. In economics, Akerlof and Kranton (2000, 2005) were the first to address the issue of identity, illustrating why identity is important in economic matters and how it may be incorporated into economic analysis.[1] In this paper, we address a different, logically prior question 'What are the evolutionary origins of identity?'. Our position is, of course, that identity was fashioned by natural selection because it enhanced survival. This claim is transparent when we consider the most fundamental form of identity: the awareness of one's body and mind as a distinct entity. Beyond that, an evolutionary theory of identity must indicate both the individuals with whom we identify (or see as insiders) and those whom we see as outsiders, must articulate the way in which we relate to them and the way in which this relational behavior enhances fitness. As will be clear, this is precisely what we do in Section 2 of this paper. So the behavioral prescriptions which define identity in Akerlof and Kranton (2000, 2005) can, we believe, be linked to a process of evolution which honed preferences that led us to put a positive weight on the wellbeing of others whose interests are complementary with our own and a negative weight on others whose interests conflict with our own.

The fact that Nature, through natural selection, contrives different preferences over insiders and outsiders suggests a theory of ethnic identity that does not rely on kinship. Hamilton (1964a, 1964b) resolved the biological puzzle of how altruism may be sustained in an evolutionary world by introducing the notion of 'inclusive fitness', capturing the idea that sacrifices towards kin may be warranted and sustained if the beneficiaries carry some genes that are common with the altruists. Evolutionary psychologists have recently been applying this idea of kin selection to explain the emergence and persistence of ethnic loyalties [Goetz and James (2004)]. But the population sizes of ethnic communities can run into the millions,

[1] More recently, Fang and Loury (2005) have examined how dysfunctional identities may actually serve long-run interests. Darity et al (2006) have investigated the formation of racial identities in an evolutionary setting.

and it stretches credulity to imagine that kinship could sustain altruism in the manner suggested. Naturally, such explanations have been met with skepticism.[2] Our theory proposes that the roots of ethnicity lie, not in kinship, but rather in the economics of team production and exploitation of common access resources, and externalities that exist in environments of this sort. Team activity has been modeled here as appropriation from the commons, which involves conflicts with rival teams, and processing activities. A more elaborate model could very well include defense of the band against other bands as another team activity. Arguably, these more elaborate models would result in the evolution of similar preferences.

Clearly, we humans now operate in environments that are substantially different from the environment in which human preferences were forged, so one must expect human preferences to be maladaptive in certain circumstances. Akelof and Kranton (2000) and Oxoby (2004), for example, focus on the maladaptive preferences of gang members who revel in underaccomplishment. In Section 3 we explore some of these siutuations. Using a simple rent-seeking model in which people have different preferences over insiders and outsiders, we show how and why rent-seeking is exacerbated in societies with heterogeneous groups. Our analysis is consistent with the empirical findings on corruption [Mauro (1995)], Lederman, Loayza, and Menendez (2002)], on pollution [Sigman (2002)], on depletion of common resources [McWhinnie (2006)], and political lobbying [Banerjee, Iyer, and Somanathan (2005)]. We also reconsider the public goods problem in the presence of insiders and outsiders, both when there is a social planner who chooses the optimal allocation of resources to public and private goods, and when there is no planner. We show that societies that are not homogeneous will have fewer public goods than those that are. This is consistent with the empirical findings of [Alesina, Baqir, and Easterly (1999), Alesina, and Ferrara (2000), Banerjee, Iyer, and Somanathan (2005), Easterly and Levine (1997), Luttmer (2001), Miguel, and Gugerty (2005), and Vigdor (2004). More broadly, we show how evolutionarily stable preferences

[2] See, for example, Hislope (1998) and Harvey (2000) for critiques of this approach.

from our hunter-gatherer past can explain the pervasive effects of ethnic fragmentation and polarization.

2 The Emergence of 'Us' and 'Them'

In this section, we use the tools of evolutionary game theory to examine the emergence of the 'Us versus Them' distinction. We have spent almost 99% of our evolutionary history as hunters and gatherers, so if our contention that we are saddled with preferences that have been shaped in our evolutionary past is correct, then this particular organization of economic activity is the one most relevant for determining those preferences.

We assume there are many players in an environment that supports hunting and gathering. In each period players are matched to form teams of size two which compete for a common access resource. This minimal team size is chosen as a matter of convenience, and is not crucial to our results. Competition is localized, so each team competes with just one other. Localized competition is not an unreasonable assumption since, in any geographical setting, only a few teams can compete for the local biota. After appropriating some of the resource, each team then processes the resource, generating a consumption good which the team members share equally. Effort, then, is involved both in both the appropriation of the resource and in the processing of the resource to produce the consumption good.

Let x_{ij} denote the *appropriative effort* of Player $i \in \{1,2\}$ in Team $j \in \{1,2\}$. The amount of the resource captured by Team j, R_j, is

$$R_j = (x_{1j}x_{2j})^{1/2}\left[\gamma - \delta(x_{1k}x_{2k})^{1/2}\right] \quad k \neq j, \gamma > 0, \delta > 0, \tag{1}$$

where γ parameterizes resource abundance (a larger γ implies more abundant resources) and δ parameterizes the congestion externality Team k imposes on Team j in the appropriation of the common access resource. That is, greater appropriative effort by either member of

Team k lowers the marginal productivity of the appropriative effort of members of Team j by an amount that is proportional to δ.[3]

The consumption good is produced by combining the appropriated resource with the processing efforts of team members. The output, Q_j of team $j \in \{1, 2\}$ is given by the linearly homogeneous production function:

$$Q_j = (R_j)^{\alpha} (y_{1j} y_{2j})^{\beta/2}, \quad \alpha > 0, \beta > 0, \alpha + \beta = 1, \tag{2}$$

where y_{ij} is the *processing effort* of Player i of Team j. The greater the amount of resource appropriated, the higher is the marginal product of a player's processing effort.

The biological fitness, F_{ij}, of Player i in Team j is given by

$$F_{ij} = \frac{1}{2} Q_j - \frac{\theta}{2} (x_{ij} + y_{ij})^2, \quad \theta > 0, \tag{3}$$

where the first term on the right hand side is the player's consumption (one half of team output) and the second is the player's cost of effort (appropriative and processing) and θ parameterizes the cost of effort which, in the context of biological fitness, can be regarded as the extent to which effort dissipates calories.

Subsequently, we presume that Nature endows humans with preferences. We will assume that these preferences (which determine behavior) are transmitted genetically, and we will seek the evolutionarily stable preferences. In this context, natural selection works by promoting the preferences that induce behavior which generates the highest fitness [Weibull (1995)].

[3] This parameter can also reflect the extent to which the productivity of appropriation effort in the commons is affected by physical violence by the rival team. Among hunter-gatherers, war was often motivated by the need for resources [see Gat (2000a, 2000b)].

2.1 Evolutionarily Stable Preferences

We posit individual utility functions which differ from fitness functions, and suppose that players maximize utility by choice of their appropriative and processing effort levels. As opposed to focusing on strategies, we examine the evolution of preferences, building on the approach pioneered by Bolle (2000), Possajennikov (2000) and used in Eaton and Eswaran (2003) and Eswaran and Kotwal (2004).

We assume that player i inherits, as part of his genetic make-up, a utility function that puts a weight of 1 on his own fitness, a weight of μ_i on the fitness of his teammate, and a weight of ν_i on the fitness of the players on the opposing team. That is, the utility function of an Player i in Team j is given by

$$U_{ij} = F_{ij} + \mu_i F_{-ij} + \nu_i (F_{1k} + F_{2k}), \quad k \neq j,$$

where the subscript $-ij$ stands for the member other than i in Team j. While these weights are exogenous to particular players, they are subject to natural selection. Individuals choose the behaviors (effort levels) that maximize utility and, via natural selection, evolution ensures the survival of those preferences that induce equilibrium behaviors yielding higher levels of fitness. Given this framework, a player's fitness is determined by his own preferences and those of the others with whom he interacts.

We denote player i's preferences by the weights (μ_i, ν_i) he assigns to others' fitness levels. The evolutionarily stable preferences (ESP) given by (μ^*, ν^*) have the following property: if all players in the population, save one whom we will call the mutant, adopt (μ^*, ν^*), then the preferences that maximize the mutant's fitness are also (μ^*, ν^*). This property guarantees that if all players are using ESP, it is impossible for a mutant to achieve higher fitness by adopting different preferences. This property tells us how to find the ESP.[4]

[4] Eevolutionarily stable *strategies* are a different concept. Denote a player's strategy as (x_{ij}, y_{ij}). The

Assume that all players other than the mutant have identical preferences, (μ, ν), and denote the mutant's preferences by (μ_1, ν_1). Without loss of generality, we can assume that the mutant, after being randomly matched with another individual, is Player 1 of Team 1. Utility functions can then be written as

$$U_{11} = F_{11} + \mu_1 F_{21} + \nu_1 (F_{12} + F_{22}), \tag{4}$$

$$U_{21} = F_{21} + \mu F_{11} + \nu (F_{12} + F_{22}), \tag{5}$$

$$U_{12} = F_{12} + \mu F_{22} + \nu (F_{11} + F_{21}), \tag{6}$$

$$U_{22} = F_{22} + \mu F_{12} + \nu (F_{11} + F_{21}), \tag{7}$$

where U_{11} is the utility function of the mutant.

To find (μ^*, ν^*) we proceed in stages. In the first stage, we find equilibrium effort levels, given (μ, ν) and (μ_1, ν_1); that is, we find the Nash equilibrium effort levels for the game in which these four players each choose their appropriative and processing efforts to maximize own utility given their preference parameters. Utility maximization yields eight equations in the eight effort levels. However, since the utility functions of the players on Team 2 are symmetric, there are 6 distinct equilibrium effort levels and they can be characterized by the first order conditions for the players on Team 1 and the first order conditions for one of the players on Team 2. Regrettably, there is no closed form solution to these equations, so we have used numerical techniques to solve them. Substituting the equilibrium effort levels into the mutant's fitness function, we can express the equilibrium fitness of the mutant as a function of the 4 preference parameters. Denote the mutant's equilibrium fitness by

evolutionarily stable strategy $ESS = (x_{ess}, y_{ess})$ has the following property: if all players in the population except the mutant, adopt (x_{ess}, y_{ess}), then the strategy that maximizes the mutant's fitness is (x_{ess}, y_{ess}). This property guarantees that if all players are using ESS, it is impossible for a mutant to achieve higher fitness by adopting another strategy [Hamilton (1964a, 1964b), Weibull, 1995].

$\widehat{F}_{11}(\mu_1, \nu_1, \mu, \nu)$.

In the second stage, to find (μ^*, ν^*) we use the property that $(\mu_1, \nu_1) = (\mu^*, \nu^*)$ is the solution to the following maximization problem:

$$\max_{\mu_1, \nu_1} \quad \widehat{F}_{11}(\mu_1, \nu_1, \mu^*, \nu^*).$$

To determine the evolutionarily stable values of these preference parameters, we first find two best response functions, $\mu^{br}(\nu)$ and $\nu^{br}(\nu)$, defined by:

$$\mu^{br}(\nu) = \mu \quad \ni \quad \arg\max_{\mu_1} \quad \widehat{F}_{11}(\mu_1, \mu, \nu, \nu) = \mu, \tag{8}$$

and

$$\nu^{br}(\mu) = \nu \quad \ni \quad \arg\max_{\nu_1} \quad \widehat{F}_{11}(\mu, \mu, \nu_1, \nu) = \nu. \tag{9}$$

These are the best responses of the mutant's preference parameters to the population paramters (μ, ν) . Given the aforementioned defining property of ESP, the evolutionarily stable preference parameters (μ^*, ν^*) will satisfy

$$\mu^* = \mu^{br}(\nu^*) \quad and \quad \nu^* = \nu^{br}(\mu^*). \tag{10}$$

In our model, there are two distinct sources of moral hazard that natural selection may "attempt" to resolve by selecting mutations in preferences: the moral hazard in the appropriation activity and the moral hazard in processing or production activity. From equations (1) and (2) we see that the appropriative effort of Player 1 is a strategic complement of the appropriative effort of Player 2; likewise for processing efforts. Since the marginal worth of each player's effort increases with that of his teammate, the scope of both forms of moral hazard can be reduced by Nature if it bequeaths preferences that put a positive weight on insiders' fitness levels ($\mu^* > 0$).

On the other hand there are strategic considerations with regard to the rival team. From equation (1) the appropriative efforts of members of team j reduce the productivity of the appropriative efforts of members of team k. In other words, the appropriative effort levels of players on opposing teams are strategic substitutes. Therefore, if Nature bequeaths preferences in which members of team j put a negative weight on the fitness of their rivals ($\nu^* < 0$), this would shift out the reaction functions (in effort space) of members of team j, and in the Nash equilibrium the equilibrium appropriative efforts of Team j would be higher, implying that they appropriate more of the resource from the commons.

2.1.1 Results

The reasoning outlined above suggests that, in order to respond to different features of the economic environment, we would expect the evolutionarily stable preferences to exhibit *intragroup* solidarity ($\mu^* > 0$) and *intergroup* hostility ($\nu^* < 0$). In this section we explore comparative statics with respect to resource abundance (γ), the common access externality (δ), and the relative importance in production of the consumption good of appropriation and processing (α).

Analytic solutions for the evolutionarily stable preference parameters are unavailable, so we use numerical techniques to find stable preferences and to explore comparative statics. In Figure 1, we illustrate the best response functions $\mu^{br}(\nu)$ and $\nu^{br}(\mu)$ for the parameter values indicated at the bottom of the Figure. Both curves are upward sloping. The evolutionarily stable value μ^* is positive and ν^* is negative. The larger is μ the larger is equilibrium production effort, and the smaller (more negative) is ν the larger is equilibrium appropriative effort. The fact that μ^* is positive means that through natural selection people in this environment are led to put a positive weight on the fitness of their teammate, which ameliorates the moral hazard problem that arises within teams. In contrast, the fact that ν^* is negative means that people are led to put a negative weight on the fitness of members of the other team, which exacerbates the moral hazard problem that arises across teams. So there is waste involved in Nature as a result of the competition for resources: the establishment of property rights over resources that are commonly owned requires effort.

In Figure 2, we illustrate the response of (μ^*, ν^*) to changes in resource abundance (that is, the parameter γ increases). We see in Figure 2 that, when γ is low (that is, when the common access resource is scarce), ν^* is quite negative. In these circumstances, Nature finds it expedient to induce aggressive appropriation effort by contriving considerable intergroup hostility. Since it is important for effort to be diverted towards appropriation, Nature favors only a mild feeling of intergroup solidarity: though positive, μ^* is small. As the resource becomes more abundant, the extent of intergroup hostility falls, and to counteract free-riding in processing effort (which now becomes the more important constraint on fitness), Nature brings about an increase in intergroup solidarity.

These effects provide evolutionary arguments that bolster the claims of Homer-Dixon (1991, 1994). He has persuasively argued that environmental scarcities brought about, for example, by increasing population densities, environmental disasters, etc. tend to generate violent conflicts, sometimes by making ethnicity more salient as a result of mass migrations.[5] While conflicts can be explained on the basis of self-interest stemming from purely egoistic preferences ($\mu = \nu = 0$), preferences that draw a distinction between 'Us' and 'Them' facilitate the process by lowering the threshold beyond which violence becomes a credible option. In fact, the savagery that frequently accompanies the appropriation of resources suggests that more than pure self-interest is at work—it seems to require the perpetrators to dehumanize outsiders to some extent (that is, $\nu < 0$).

Carneiro (1970, 1988) has proposed that the "state" as an entity arose only around 4,000 B.C. and had its origins in land scarcity. He argues that, when the extensive margin of settlements is well-defined ('circumscribed'), war ensues frequently as a means of appropriating

[5] That population pressures may feed expansionist tendencies in nations is an idea that has a long history. As far back as 1938, Hankins (1938) attributed the Japanese invasion of Manchuria in 1937 to population pressures in Japan.

land. In response, previously independent villages consolidated themselves into chiefdoms for greater strength, and these subsequently further consolidated themselves into empires. If this is true, the very origins of countries would have harnessed different feelings towards insiders and outsiders that would have been shaped in hunter-gatherer bands.

Figure 3 displays the effect on evolutionarily stable preferences of increases in the parameter δ (capturing the extent of the intergroup externality in the commons). We see that higher δ increases intergroup hostility, raising appropriation effort for strategic reasons and, to facilitate this, lowering intragroup solidarity. The results in Figures 2 and 3 suggest that intragroup solidarity and intergroup hostility are negatively related. If warfare between groups is simulated as an increase in δ, then these results suggest that this would lead to intergroup hostility, consistent with the finding of Cashdan (2001).

Figure 4 shows the effects of an increase in the exponent, α, of the resource input in the Cobb-Douglas production function of the consumption good [equation (2)]. An increase in α implies that appropriation effort is more important relative to processing effort. As one would expect, this is accompanied by an increase in intergroup hostility at the expense of intragroup solidarity. Equivalently, the more important within-group teamwork is (the higher is $\beta \equiv 1 - \alpha$), the more will Nature curtail the dissipation of effort in strategic expenditures in the commons.

3 Implications

We may interpret the preferences derived above as the foundation of what is known as social identity theory. Central to social identity theory is an individual's sense of membership or non-membership in various social groups in the sense that individuals use their group membership to define the 'Us' and 'Them' in any given situation [Tajfel (1982), Tajfel and Truner (1979)]. This is to be distinguished from the notion of an individual's personal identity deriving from the individual's unique characteristics. In this literature, it is group membership that motivates inter-group discrimination [Tajfel and Turner (1979), Turner (1982), Brewer (1999)]. This sort of behavior is usually perceived as discrimination in favour of the in-group, although it can often equally well be seen as discrimination against the out-group. Clearly, a sense of group membership lies at the heart of the literatures of conflict and contact [Brewer (1999), Pettigrew (1998), Pettigrew and Tropp (2000)]. A central focus of the contact literature has been the creation of environments wherein individuals develop a group identity in order to motivate cooperation or build 'bridging social capital' [Putnam (2000, 2007)].

With this in mind we turn our attention to some of the implications of preferences that put a positive weight on insiders ($\mu > 0$) and a negative weight on outsiders ($\nu < 0$). In doing so, we take preferences as given and explore the effects of these preferences first in an environment where rent seeking is an issue and then in the provision of public goods. The weights μ and ν have natural interpretations in the psychological literature as identity. The parameter μ (> 0) captures the extent to which one identifies with her own group and it induces the associated in-group favoritism that is seen to accompany identity in laboratory experiments. On the other hand, the parameter ν (< 0) captures the extent to which the out-group is disliked and it induces the out-group discrimination which is seen in many studies of identity.

3.1 Rent Seeking with Insiders and Outsiders

Corruption, crime, competition for transfer payments, and the exploitation of the commons all involve an element of rent seeking and consequent rent dissipation. Empirically, there is evidence that these activities are more prevalent in fragmented and polarized societies. In our jargon, these would be societies in which we observe more activation of the 'Us and Them' proclivities arising from our evolutionary model. With respect to societies marked by strong identities within subgroups, Mauro (1995) has shown that corruption is positively correlated with ethnolinguistic fractionalization.[6] In the U. S., Alesina et al (1999) have found that in areas with greater ethnic fragmentation government spending tends to be financed more by intergovernmental transfers than by local taxes, suggesting that ethnically fragmented societies tend to display more rent-seeking behavior. Finally, Glaeser et al (2000) and Hardin (2002) find that trust and trustworthiness, important components of social capital, increase when individuals are socially "closer" and decreases with ethnic fragmentation.[7]

In this section we introduce insider/outsider preferences into the Tullock (1980) model of rent seeking in an attempt to explain these patterns. We take preferences ($\mu > 0, \nu < 0$) as given, and explore the effect of these preferences in two simple rent seeking environments.

3.1.1 Version 1: Seeking A Private Good

There are $J \in \{1, 2, ...J\}$ groups each with n members. By expending resources the members of each group pursues an exogenously fixed prize, the worth of which is normalized to unity. In version 1 of our rent seeking model, the prize is a private good. Let x_{ij} denote the amount of resources expended by person i of group j. Denote by X_j the aggregate amount of resources spent by group j: $X_j = \sum_k x_{kj}$. The probability, p_{ij}, that member i of group j wins the prize is given by

$$p_{ij} = \frac{x_{ij}}{X_j + X_{-j}}, \tag{11}$$

where X_{-j} denotes the aggregate expenditure of all groups other than j. Note that the prize is individual specific, accruing to only one agent in one group. We assume that group members' expenditures are not coordinated.

[6] Shleifer and Vishney (1993) have argued that corruption is more dissipative in non-homogeneous societies because it is conducted inefficiently.

[7] Lederman, Loayza, and Menendez (2002) show that the extent to which people believe others can be trusted is inversely correlated to the incidence violent crime.

Since the value of the prize is 1, the expected earnings of person i of group j is just $p_{ij} - x_{ij}$. Individuals put a weigh of 1 on their own expected earnings, a positive weight μ on the expected earnings of other members of their own group, and a negative weight ν on the expected earnings of members of other groups. Thus the choice problem of member i of team j is

$$\max_{x_{ij}} \quad p_{ij} - x_{ij} + \mu \left(\sum_{k \neq i} (p_{kj} - x_{kj}) \right) + \nu \left(\sum_{m \neq j} \sum_{k} (p_{km} - x_{km}) \right). \tag{12}$$

The first order condition for this problem under Nash conjectures is

$$\frac{1}{X_j + X_{-j}} - \frac{x_{ij} + \mu \sum_{k \neq i} x_{kj}}{(X_j + X_{-j})^2} - \frac{\nu \sum_k \sum_{m \neq j} x_{km}}{(X_j + X_{-j})^2} - 1 = 0. \tag{13}$$

We consider a symmetric equilibrium in which we denote by x^* the equilibrium expenditure of any peron in the model. Equation (13) yields

$$\frac{1}{n\,x^* + (J-1)nx^*} - \frac{[1 + (n-1)\mu]\,x^*}{[n\,x^* + (J-1)nx^*]^2} - \frac{(J-1)n\nu x^*}{[nx^* + (J-1)nx^*]^2} - 1 = 0, \tag{14}$$

and the solution

$$x^* = \frac{(J\,n - [1 + (n-1)\mu] - (J-1)\,n\,\nu}{J^2 n^2}. \tag{15}$$

In equilibrium, the aggregate rent dissipation, $D^* \equiv nJx^*$, is then

$$D^* = 1 - \frac{[1 + (n-1)\mu] + (J-1)\,n\,\nu}{Jn}. \tag{16}$$

The comparative statics with respect to μ and ν are readily obtained:

$$\frac{dx^*}{d\mu} < 0, \frac{dD^*}{d\mu} < 0 \text{ and } \frac{dx^*}{d\nu} < 0, \frac{dD^*}{d\nu} < 0. \tag{17}$$

Although insiders are also viewed as competitors for the prize, intra-group solidarity tempers competition. An increase in this solidarity (i.e. an increase in μ), results in an individual internalizing part of the externality he imposes on his group members. This leads individual group members to reduce the resources they expend in appropriating a prize for themselves. On the other hand, greater inter-group hostility (i.e. a more negative ν) induces an individual to become more aggressive in his rent-seeking, incurring larger costs to reduce the probability that someone outside his group receives the prize.

Setting $\mu = \nu = 0$, we obtain for comparison the corresponding aggregate rent-seeking expenditure, $D^*_{Tullock}$, for the Tulllock model:

$$D^*_{Tullock} = 1 - \frac{1}{Jn}. \tag{18}$$

Relative to the Tullock model, a positive weight placed on insiders' earnings ($\mu > 0$) lowers aggregate rent dissipation and a negative weight placed on outsiders' earnings ($\nu < 0$) increases aggregate rent dissipation.

When the number of groups, J, increases individuals see more and more people as outsiders. Thus for any $\mu > 0$ and $\nu < 0$, as J becomes sufficiently large the aggregate expenditure will necessarily exceed that in the Tullock model. Interestingly, since $\nu < 0$, the aggregate dissipation can exceed unity (the value of the prize).

Proposition 1 *If inter-group hostility is sufficiently great, the aggregate amount of rent dissipated can exceed the size of the prize.*

Proof. Follows directly from (16) when $\nu < -(1 + (n-1)\mu)/((J-1)n)$. ■

Fractionalization As we have remarked earlier, there is a growing literature on the effect of ethnic diversity on economic development arguing that fractionalization promotes rent-seeking, corruption, ethnic conflict, and lowers provision of public goods [e.g. Easterly and Levine (1997)]. *Fractionalization* is typically defined as the probability that two individuals drawn at random will come from different groups. Our simple model generates some of the effects of fragmentation in a minimalist framework. Formally, the natural index of fractionalization in our model is J since (when n is large) the probability of encountering another from one's own group approaches $1/J$. Writing the total number of people in the society,

$J\,n$, as N, so that $n = N/J$, we may rewrite equation (16) as

$$D^* = 1 - \frac{1-\mu}{N} - \frac{\mu}{J} + \left(1 - \frac{1}{J}\right)|\nu|\,. \tag{19}$$

We see from the above expression that, holding population constant, an increase the number of groups increases aggregate rent dissipation. The more fractionalized a society is (the higher the J), the greater is the waste attributable to rent-seeking behavior.

Proposition 2 *In an economy with a fixed population divided into J groups of equal size, the aggregate rent-seeking expenditure is increasing in the number of groups:*

$$\frac{dD^*}{dJ} > 0.$$

Polarization *Polarization* refers to the disparity between groups along a single dimension, for example average wealth of group members, or the preferred policy of the group (in some spectrum of policies). Indices of polarization have been derived and utilized to understand ethnic and distribution conflicts [Esteban and Ray (1994, 1999)]. Recently, Montalvo and Reynal-Querol (2005) have proposed an index of polarization along ethnic and religious lines. They empirically demonstrated that polarization can explain conflict (civil wars).

The parameters μ and ν afford a measure of polarization that is somewhat richer than than other measures used in the literature (which depend only on the proportional sizes of the groups comprising the society). In our model, a high value of μ combined with a high value of $|\nu|$ (indicating considerable perceived heterogeneity *across* groups), captures much of what Esteban and Ray (1994) have emphasized as the hallmark of polarized societies. When both μ and $|\nu|$ are large, individuals draw trenchant distinctions between 'Us' and 'Them'. Such societies would conform to any intuitive notion of high polarization since there is high solidarity within groups and strong alienation across groups.

Suppose $\mu = |\nu| = \xi$. Then ξ (the distance between μ and ν) is an index of polarization. Then we have the following:

Proposition 3 *In a society comprising J groups in which all agents have identical preference parameters, with $\mu = |\nu|$, the aggregate rent-seeking expenditure increases with the index of polarization:*

$$\frac{dD^*}{d\xi} = \frac{(J-1)n - (n-1)}{Jn} > 0.$$

Proof. Follows from equation (16). ■

This proposition considers an increase in intra-group solidarity accompanied by an increase of equal magnitude in inter-group hostility; the former lowering and the latter increasing rent seeking expenditures. Since for groups with equal numbers there are fewer insiders $(n-1)$ than outsiders (at least $(J-1)n$), the aggregate rent dissipation on balance rises. In general, the direction of this result depends on the number of insiders and outsiders, but it has been argued in the literature that polarization is at a maximum when there are only two groups with roughly the same number of members [Montralvo and Reynal-Querol (2005)]. In this scenario, higher ξ certainly increases aggregate rent-seeking expenditure in our model.

3.1.2 Version 2: Seeking a Public Good

Here we adapt the previous model to a situation where different groups vie for a public good. The public good could be the location of a public facility in one's neighborhood (e.g. a hospital, school, or library), or the absence of an undesirable public facility in one's neighborhood (a NIMBY good), or funding for some group activity.

To adapt the model to this purpose, we assume that each member of a group sees the prize (still normalized to unity) as a non-rivalous good that is enjoyed by all members of his group . Initially we assume that there are two groups with n_1 and n_2 members, respectively.

From (11), it follows that the probability, P_j, that group j is awarded the public good is given by

$$P_j = \frac{X_j}{X_j + X_{-j}}. \tag{20}$$

Assuming, as before, that members of each group do not coordinate their actions, member i of group j chooses x_{ij} to solve

$$\max_{x_{ij}} \quad [1 + (n_1 - 1)\mu]P_j - x_{ij} - \mu\left(\sum_k x_{kj}\right) + \nu[n_2(1 - P_j) - \sum_{m \neq j} X_m]. \tag{21}$$

In the equilibrium, within a group all members will have identical expenditures. Let $x_j^\dagger$ denote the equilibrium expenditure of a member of group j. The equilibrium is characterized by the following first order conditions:

$$\frac{1}{n_1 x_1^\dagger + n_2 x_2^\dagger} - \frac{[1 + (n_1 - 1)\mu]x_1^\dagger + n_2 \nu x_2^\dagger}{(n_1 x_1^\dagger + n_2 x_2^\dagger)^2} - 1 = 0,$$

and

$$\frac{1}{n_1 x_1^\dagger + n_2 x_2^\dagger} - \frac{[1 + (n_2 - 1)\mu]x_2^\dagger + n_1 \nu x_1^\dagger}{(n_1 x_1^\dagger + n_2 x_2^\dagger)^2} - 1 = 0.$$

Solving these equations we get the equilibrium values.

$$x_i^\dagger = \frac{[1 + (n_i - 1)\mu + n_{-i}\nu]^2(1 + (n_{-i} - 1)\mu + n_i\nu)}{n_i[2 + (n_i + n_{-i})(\mu + \nu)]^2}, \quad i = 1, 2. \tag{22}$$

If we have J identical groups, each with n members, an individual's equilibrium expenditure, $x^\dagger$, is

$$x^\dagger = \frac{[1 + (n - 1)\mu - (J - 1)n\nu](J - 1)}{J^2 n}. \tag{23}$$

The aggregate dissipation, $D^\dagger$, in this symmetric case is

$$D^\dagger = [1 + (n - 1)\mu - (J - 1)n\nu]\left(1 - \frac{1}{J}\right). \tag{24}$$

The comparative statics with respect to μ and ν are readily obtained:

$$\frac{dx_i^\dagger}{d\mu} > 0 \text{ and } \frac{dx_i^\dagger}{d\nu} < 0 \tag{25}$$

Now an increase in intragroup solidarity μ increases rent-seeking expenditure as group members do not perceive one another as competitors. Of course, the free-riding inherent in public good situations tends to lower each member's expenditure, so depending on the relative group sizes and the relative magnitudes of μ and $|\nu|$, individual expenditures could be higher or lower when the prize is a public good compared to when it is a private good. When it is a public good, the standard free-rider problem plaguing groups is countered by intragroup solidarity (positive μ), so much so that for sufficiently high μ an individual's expenditure may be higher than when the prize is a private good. As before, greater inter-group hostility (a more negative ν) increases rent-seeking expenditures for strategic reasons. Thus goodwill towards insiders and malevolence towards outsiders both work to increase rent-seeking expenditures when the good is public.

Figure 5 displays, for the case with two groups, the probability that someone in Group 1 (with $n_1 = 3 > n_2 = 2$) wins the good as a function of intragroup solidarity, μ. This probability is declining in μ (but is always remains higher than 0.5) when the good is private. Stronger feelings of group solidarity lower the larger group's aggregate expenditure for the private good by more and so the probability that the prize accrues to someone in this group is reduced. But when the good is public, this probability starts out lower than 0.5 (due to greater free-riding in the larger group) but is increasing in μ.

Figure 6 displays, again for the case with two groups, the probability that someone in Group 1 (the larger group) wins the prize as a function of the inter-group hostility, ν. The probability is declining in $|\nu|$, irrespective of whether the good is private or public, but when it is public the probability falls below 0.5 for sufficiently large $|\nu|$. Thus *smaller* groups may have a higher probability of winning the prize. This is not possible in the standard version of the Tullock model. When $\mu = \nu = 0$, we see from equation (22) that the aggregate expenditures of the two groups are the same, irrespective of their sizes, and so they have an equal probability of winning.[8]

With respect to aggregate rent seeking we have the following:

Proposition 4 *If $\mu > 0$ and $\nu < 0$, there exists a J such that the aggregate rent-seeking expenditure exceeds n.*

Proof. *Follows directly from (24).* ■

This proposition indicates that if the number of groups is sufficiently large, aggregate expenditure exceeds the value of the prize to the group that wins it, which is just n. For example, if $\mu = 0.2$, $\nu = -0.1$, $n = 3$, and $J > 7$, then $D^\dagger > 3$. The level of J such that rent-seeking exceeds the value of the prize to the group is increasing in μ and decreasing in $|\nu|$, implying that in societies with greater polarization rent-seeking will also be exacerbated. This suggests that large and ethnically diverse populations (like those in India and in African countries) will witness a great deal of rent-seeking relative to the stakes available. In contrast, in the Tullock (1980) model (in which $\mu = \nu = 0$) for a finite population the aggregate rent-seeking expenditure is always less than the prize.

3.1.3 Interpretation

These insights have important implications. Osborne (2000) argues that multiculturalism in societies invites rent-seeking and has examined this in the model of Tullock (1980) . We find the view compelling that, by validating ethnic groups' ingrained sense of identity, multiculturalism promotes rent-seeking. Our model here makes the further point that openly promoting multiculturalism in societies characterized by strong group identities (strong feelings of 'Us' and 'Them') would increase the rents dissipated relative to what is suggested by the Tullock (1980) model. This follows in the above framework where the size of the prize available

[8] If we allowed for heterogeneous preferences, it would be easy to demonstrate that small groups with well-honed feelings of 'Us' and 'Them' (large μ and $|\nu|$) may well have higher rent-seeking expenditures individually and in aggregate than larger groups with more diffused preferences.

to rent-seekers in aggregate is assumed to be fixed. The problem confronting governments committed to multiculturalism, however, could be far worse: the amount of funds available to promote multiculturalism is likely to be endogenous and would almost surely increase to accommodate lobbying by various cultural groups. This waste is compounded by our result above that the aggregate rent-seeking expenditure can exceed the amount of funds dispensed by the government (even greatly, if there are many groups vying for funds).

Our model also sheds light on the detrimental effects of social capital and identity. The moral hazard inherent in collective action that Mancur Olson (1965) first discussed in his *Logic of Collective Action* is partly resolved by a strong feeling of group identity. Following the broad definition of social capital as social interactions in Putnam (2000), feelings of group identity would certainly be deemed an integral part of a nation's or group's social capital. Recent literature on social capital has identified it as an important contributor to nation-building. Our model also shows that moral hazard in the collective action of a group is also partly resolved, perversely, by a common feeling of malevolence towards other well-identified groups in society. History provides ample evidence of nations that have mobilized their citizens' efforts by drawing on their common antipathy for minorities or for citizens of other nations. In the model of rent-seeking considered here, both benevolence towards group members and malevolence towards members of other groups work to the detriment of the society of which they form a part. The social capital within groups, in this context, is a curse for the nation.[9] In the political arena, strong bonds between people with common

[9] This is consistent with the spirit of the critique of the social capital literature by Portes and Landolt (1996) in that there is a downside to social capital that is not adequately appreciated. In their investigation of the effect of social capital on violent crime (homicides), Lederman et al (2002) find that social capital as measured by membership in religious and social organizations does not yield unambiguous effects. They speculate that this may be because such membership does not necessarily reflect society-wide social capital. They find, in sharp contrast, that homicide rates are unambiguously correlated negatively with trust—a different measure of social capital which captures a general characteristic of the entire society, not just of

interests that help mobilize them to lobby for rents dispensable by the government is another example of the negative effects of social capital.[10] Social capital of this sort, however, would be beneficial to societies that are homogeneous because it would unambiguously lead to a decline in rent-seeking.

3.2 The Provision of Public Goods

Recent literature has drawn attention to the fact that regions with greater ethnic fragmentation also tend to have lower levels of public goods. A seminal paper by Easterly and Levine (1997) attributed much of the tragic failure of African countries in living up to their considerable growth potential to the fact that core public goods are under-provided as a result of ethic fragmentation. Alesina et al (1999) have shown that in the U.S. ethnic fragmentation tends to reduce levels of public goods provision, which they explain with a theory based on the premise that different ethnic communities have preferences for different public goods.

Alesina and Ferrara (2000) have argued on theoretical grounds that greater racial or ethnic heterogeneity may lead to lower participation in group memberships (which is a frequently used measure of social capital) and have provided empirical evidence for this using U.S. data. Vigdor (2004) has shown that participation in the U.S. Census, which has substantial localized public benefits (but almost no private benefits) in terms of receipts of Federal grants, is inversely related to the ethnic fragmentation in the geographical area. Luttmer (2001) has shown that self-reported attitudes towards welfare spending in the U.S. favor greater spending in areas where a greater proportion of local recipients are from the respondent's race. All these papers propose theories that draw a distinction between preferences for

specific groups.

[10] Osborne (2001) offers a persuasive rent-seeking explanation for why reservations along caste lines of seats in parliament, educational institutions, government jobs, etc. has persisted in India despite the increasing economic irrelevance of caste since independence.

one group over another. Miguel and Gugerty (2005) have found that school funding in Kenya is lower in areas that exhibit greater ethnic diversity, which they explain by positing that free-riding is more easily controlled in ethnically homogeneous communities because imposing sanctions against non-contributors is easier. Banerjee and Somanathan (2007) have shown using district-level data from India that regions exhibiting higher levels of social fragmentation also have lower access to public goods. Finally, Lee and Roemer (2004) and Alesina et al (2001) find that differences between the welfare and redistribution systems in the US and Europe are attributable to a particular type of fragmentation, namely, racism.

As a matter of empirical fact, then, it appears to be the case that in a cross section of societies the quantity of public goods is inversely related to social fragmentation and possibly polarization. In the model laid out below, fragmentation and polarization sap the willingness of societies to provide public goods and so in our model the inverse relationship is causal.

As before, there are J groups, each with n members. Every person has the same income, z, which is allocated to consumption of a composite private good or the public good. The *private* utility function of member i of group j, $u_{ij}(G, c_{ij})$, is

$$u_{ij}(G, c_{ij}) = P(G) + H(c_{ij}) \tag{26}$$

where G is the quantity of the public good and c_{ij} is the quantity of a private composite good (which is assumed to be essential). The functions P and H are increasing, strictly concave, and differentiable in their arguments. Using the budget constraint, we can express the individual's contribution to the public good as $g_{ij} = z - c_{ij}$, so quantity of the public good is $G = \sum_{l,m} g_{lm}$. The *full* utility function of member i of group j, $U_{ij}(G, c_{ij})$, is

$$U_{ij}(G, c_{ij}) = u_{ij}(G, c_{ij}) + \mu(n-1)G + \nu nJG \tag{27}$$

In this model, concern for insiders and outsiders works though the quantity of the public good. When one's insiders (outsiders) enjoy more of the public good, one's utility increases (decreases). We consider two standard mechanisms for providing the public good, one where there is a welfare maximizing social planner and another where individuals noncooperatively choose their contributions to maximize their own utility.

3.2.1 The Planner's Solution

The planner will choose the allocation of income to private consumption and the public good that maximizes the full utility of the representative person in the society. We assume that the public good is financed by a lump sum tax, and that everyone pays an equal share of the cost of the public good, G/N, where as before $N = nJ$ is the population of the society. Using the definitions and relationships set out above, we can then drop subscripts and write the full utility, $U_R(G)$, of a representative person in this society as a function of G:

$$U_R(G) = P(G) + H(z - G/N) + \mu(n-1)G + \nu(N-n)G. \tag{28}$$

The planner chooses G to maximize $U_R(G)$, so the following derivative is of interest.

$$\frac{dU_R(G)}{dG} = [P'(G) + \mu(n-1) + \nu(N-n)] - (1/N)H'(z - G/N).$$

The term in square brackets on the right hand side is the representative person's marginal benefit of the public good, and the second is his marginal opportunity cost. The marginal benefit term includes the effect on the representative person's private utility, $P'(G)$, an effect driven by his positive concern for insiders, $\mu(n-1)$, which works to increase his marginal benefit, and an effect driven by his negative concern for outsiders, $\nu(N-n)$, which works to decrease his marginal benefit.

Let G^* denote the planner's optimal choice of the public good. If $dU_R(G)/dG < 0$ when evaluated at $G = 0$, the planner will naturally set $G^* = 0$. The following proposition characterizes the planner's choice:

Proposition 5 *(a) If* $P'(0) + \mu(n-1) + \nu(N-n) < (1/N)H'(z)$, *then* $G^* = 0$.

(b) If $P'(0)+\mu(n-1)+\nu(N-n) \geq (1/N)H'(z)$, then G^* is characterized by the following condition

$$P'(G^*) + \mu(n-1) + \nu(N-n) = (1/N)H'(z - G^*/N).$$

(c) If $G^* > 0$, the comparative statics are given by

$$\frac{dG^*}{d\mu} > 0, \frac{dG^*}{d\nu} > 0, \frac{dG^*}{dN} \gtreqless 0.$$

The first two comparative static results in the proposition are intuitive. Increasing either μ or ν increases the marginal benefit of the public good, and therefore the optimal quantity of the good. The ambiguity of the third result is perhaps surprising. Increasing the size of the population, while holding constant the size of individual groups, decreases the marginal opportunity cost of the public good because the cost of the good is spread over a larger group. However, because the newcomers are outsiders from the perspective of the existing groups, the marginal benefit of the public good diminishes too. If $|\nu|$ is large enough, the second effect swamps the first and the quantity of the public good decreases as the population increases.

Relative to the standard case of purely egoistic preferences, insider/outsider preferences distort the marginal benefit of the public good, and this distortion can be seen in the above proposition. The magnitude of the distortion, Ω, is given by

$$\Omega = \mu(n-1) + \nu(N-n)$$

which can be either positive or negative, so the qualitative effect of the distortion is uncertain. Using the fact that $N = nJ$, the distortion can be written as

$$\Omega = \mu(n-1) + n|\nu| - Jn|\nu|$$

J is, of course, an index of fractionalization. Since $\partial\Omega/\partial J = -n|\nu| < 0$, it is clear that as fractionalization increases, the planner is less and less inclined to divert resources from private consumption to the public good. So, in this model, the greater is the fractionalization of the society, the smaller is the optimal quantity of the public good.

Further, if the number of groups in this society is such that

$$J > 1 + \frac{\mu}{|\nu|}(1 - \frac{1}{n})$$

then $\Omega < 0$, and the quantity of the public good is less than it would be if preferences were egoistic. This last inequality is satisfied for $J \geq 2$ if $\mu \leq |\nu|$. More generally if $\mu \leq I|\nu|$, then it is satisfied for $J \geq I$. Thus, fractionalization can completely destroy a planner's incentive to provide public goods.

For societies that are even moderately fractionalized, it is also the case that as polarization increases, the planner is less and less inclined to divert resources from private consumption to the public good. If we set $\mu = |\nu| = \xi$ as before, we get

$$\Omega = \xi[1 + n(2 - J)]$$

Notice that the term is square brackets is negative if J is greater than 2, in which case polarization also saps the willingness of the planner to supply the public good.

3.2.2 Private Provision of Public Goods

If there is no social planner with the power and insight to solve the public goods problem, then any public goods that are provided will have to provided in some other way. Here we examine the implications of insider/outsider preferences for the standard private provision mechanism, in which individuals noncooperatively make voluntary contributions to maximize their own utility. In this setting, it is clear that the quantity of the public good will be smaller than when the planner chooses. Beyond that, we will see that the effects of fractionalization and polarization on quantity of the public good are qualitatively the same as when the planner is in charge.

The full utility of member i of group j can be written as a function of his own voluntary contribution, g_{ij}, and the voluntary contributions of all others, $G_{-ij} = \sum_{k \neq i, l \neq g} g_{kl}$.

$$\widetilde{U}(g_{ij}+G_{-ij}) = P(g_{ij}+G_{-ij})+H(z-g_{ij})+\mu(n-1)(g_{ij}+G_{-ij})+\nu(N-n)(g_{ij}+G_{-ij}). \quad (29)$$

Differentiating with respect to g_{ij} we get

$$\frac{\partial \widetilde{U}}{\partial g_{ij}} = P'(g_{ij} + G_{-ij}) + \mu(n-1) + \nu(N-n) - H'(z - g_{ij}). \quad (30)$$

Let g^* denote the contribution of an individual in equilibrium. We have the following characterization of g^*:

Proposition 6 *(a) If $P'(0) + \mu(n-1) + \nu(N-n) < H'(z)$, then $g^* = 0$.*

(b) If $P'(0) + \mu(n-1) + \nu(N-n) \geq H'(z)$, then g^* is characterized by the following condition

$$P'(Ng^*) + \mu(n-1) + \nu(N-n) = H'(z - g^*).$$

(c) If $g^* > 0$, the comparative statics are given by

$$\frac{dg^*}{d\mu} > 0, \frac{dg^*}{d\nu} > 0, \frac{dg^*}{dN} \gtreqless 0.$$

Comparing this proposition with the corresponding proposition for the planner's solution, it is obvious that the private provision mechanism is less likely to generate a positive quantity of the public, and when it does so the quantity will be smaller than in the planner's solution. The reason is also apparent: when the planner is in charge, the individual's marginal opportunity cost is just $(1/N)H'$, but when there is no planner it is H'.

Notice that, relative to the case of egoistic preferences, under both mechanisms insider and outsider preferences distort the marginal benefit of the public good in exactly the same way. Hence, under both mechanisms, the quantity of the public good is inversely related to fractionalization. In addition, if fractionalization is even moderately high, the quantity of the public good is inversely related to polarization as well.

3.2.3 Interpretation

As a matter of fact, it appears to be the case that in a cross section of societies, the quantity of public goods is inversely related to fragmentation and possibly polarization. We would argue the inverse relationship is causal—that fragmentation and polarization dilute the willingness of societies to provide public goods. If this interpretation is accepted, and if the view that this correlation is problematic is also accepted, then the problem would appear to be the preferences themselves. Thus it appears that our insider/outsider preferences, which were forged in an environment very different from the one in which we currently live, do not serve us well in our current environment.

4 Conclusion

In this paper, we have sought to endogenize people's preferences towards those they deem to be insiders and those they identify as outsiders. We accomplish this by realistically modeling hunting and gathering production in the environment of our forebears. We have demonstrated that there are good evolutionary reasons that rationalize why humans are disposed favorably towards insiders and unfavorably towards outsiders. We then showed that, to the extent that we are hardwired with such preferences, there would be greater rent-seeking and less provision of public goods in contemporary societies that exhibit ethnic fractionalization and polarization. This is in line with the consistent findings of recent empirical research.

There are some other implications of our framework which suggest themselves and which can be demonstrated with slight adaptations of our model. One has to do with gender differences in inter-group hostility. Hunting was largely (but not exclusively) the domain of men, and gathering that of women. Since game are mobile, it is likely that in their hunting activities men would have encountered the intervention of rival band members more frequently than did women (that is, the parameter δ may have been higher for men). Despite the fact that hunter-gatherers were nomadic there is evidence that their movements were restricted to circumscribed territories, especially when these are abundant in the resources critical to survival [Dyson-Hudson and Smith (1978)].[11] Given the high nutritional value of meat compared to other food sources, anthropologists expect that hunting was a greater source of violent conflict than was gathering [Gat (2000a, 2000b)]. If this argument is sound, then one would expect that Nature would have evolved greater intergroup hostility in men than in women. The same reasoning would also shed some light on why men display greater proclivity than women for aggression.[12]

As Akerlof and Kranton (2000, 2005) have argued in their pioneering contributions, identity matters in economics. Our paper contributes to an understanding of how humans received the hardwiring that facilitates the shaping of identity. We believe that these ideas have applications in many contexts other than those we have examined here.

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[11] But even in Australia, where the population density was very low, the hunter-gatherer Aborigines had well-defined boundaries [see Gat (2000a)].

[12] To get a sense of the gender disparity in the propensity for violence, consider these statistics: of all homicides committed in the U.S. during 1976-2004, men perpetrated 88.7% and women 11.3% [U.S. Department of Justice, Bureau of Justice Statistics].

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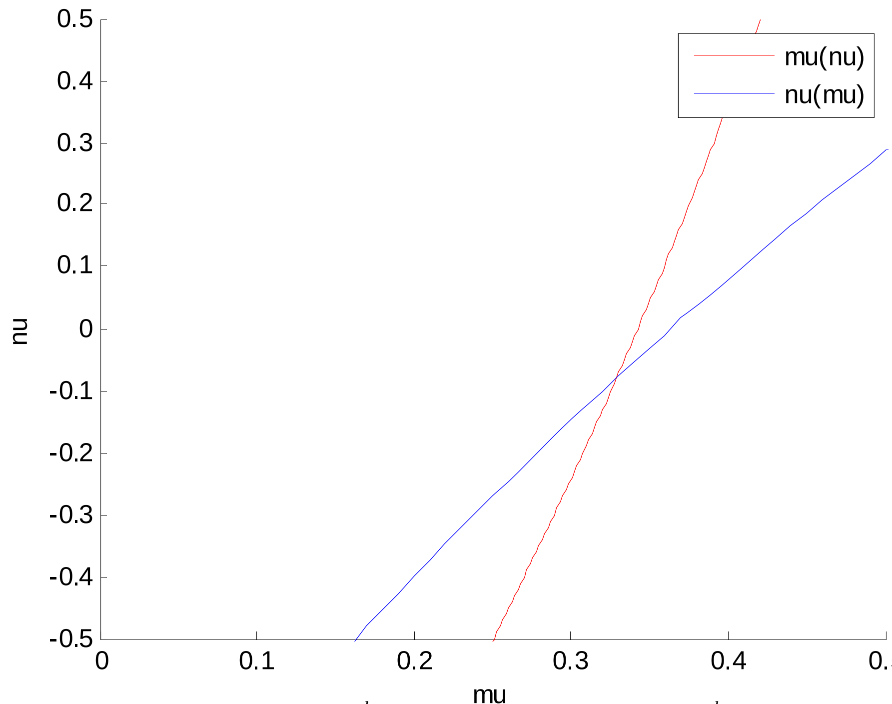

Figure 1: Best response functions $\mu^{br}(\nu)$ (steeper curve) and $\nu^{br}(\mu)$ (shallower curve). [Parameter values: $\alpha = \beta = 0.5$, $\gamma = 1.0$, $\delta = 0.4$, $\theta = 0.1$]

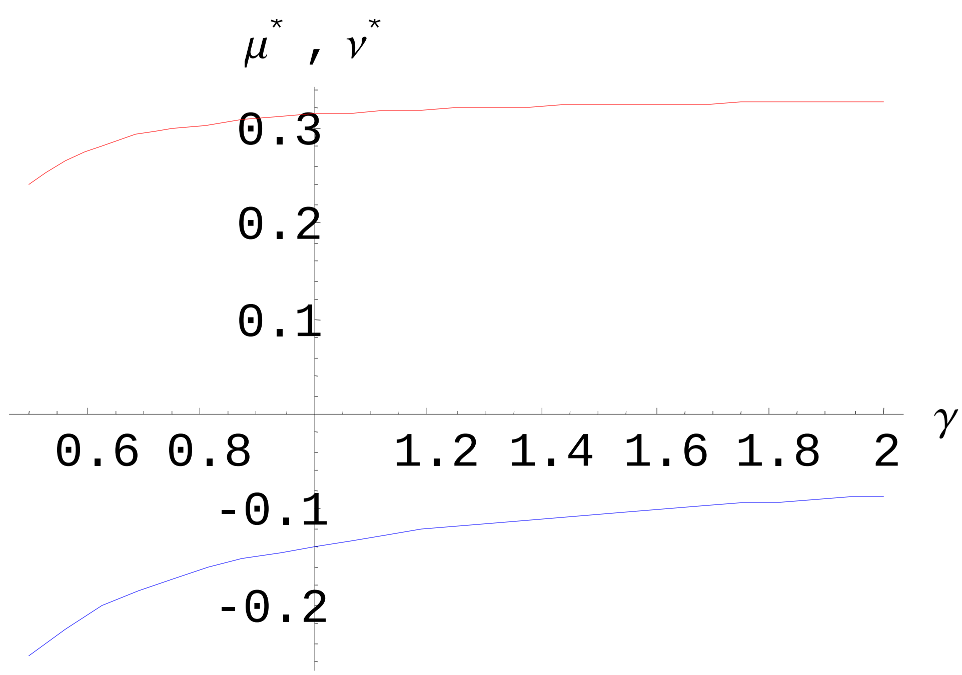

Figure 2: Evolutionarily Stable Preferences as functions of resource abundance (μ^* and ν^* are top and bottom curves, respectively). [Parameters values: $\alpha = \beta = 0.5$; $\delta = 0.3$; $\theta = 0.1$]

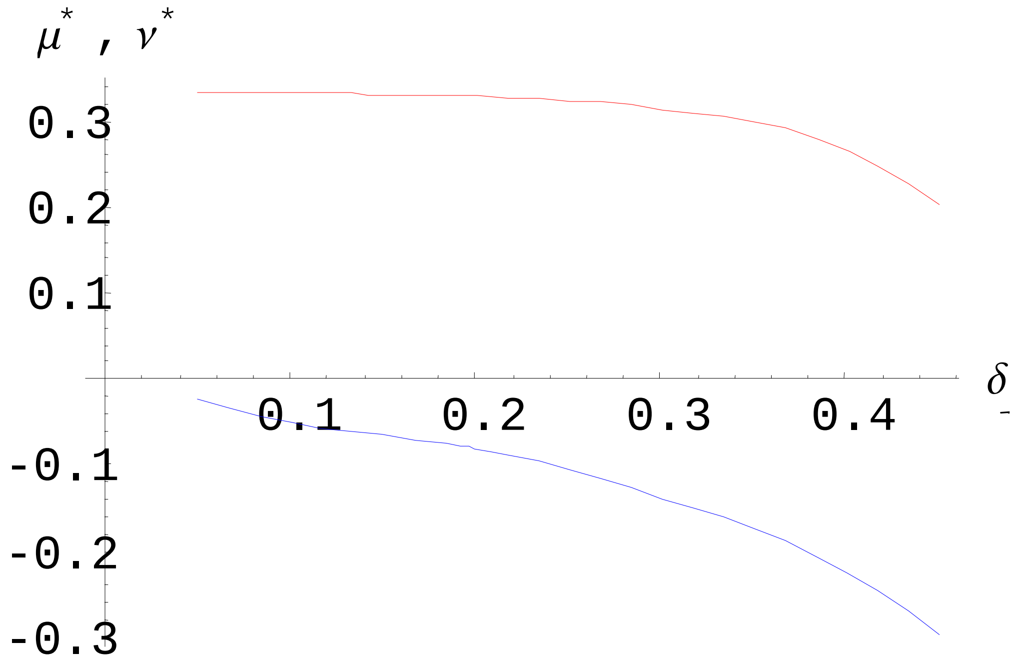

Figure 3: Evolutionarily Stable Preferences as functions of externality parameter (μ^* and ν^* are top and bottom curves, respectively). [Parameters: $\alpha = \beta = 0.5$; $\gamma = 1.0$; $\theta = 0.1$]

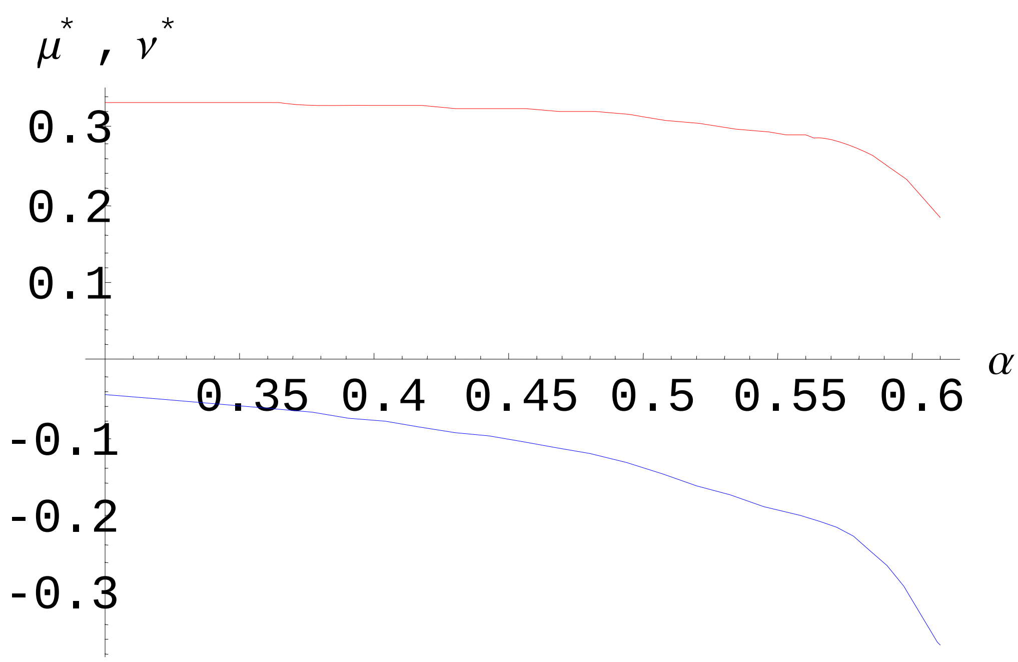

Figure 4: Evolutionarily Stable Preferences as functions of the resource share parameter (μ^* and ν^* are top and bottom curves, respectively). [Parameters values: $\beta = (1 - \alpha)$; $\gamma = 1.0$; $\delta = 0.3$; $\theta = 0.1$]

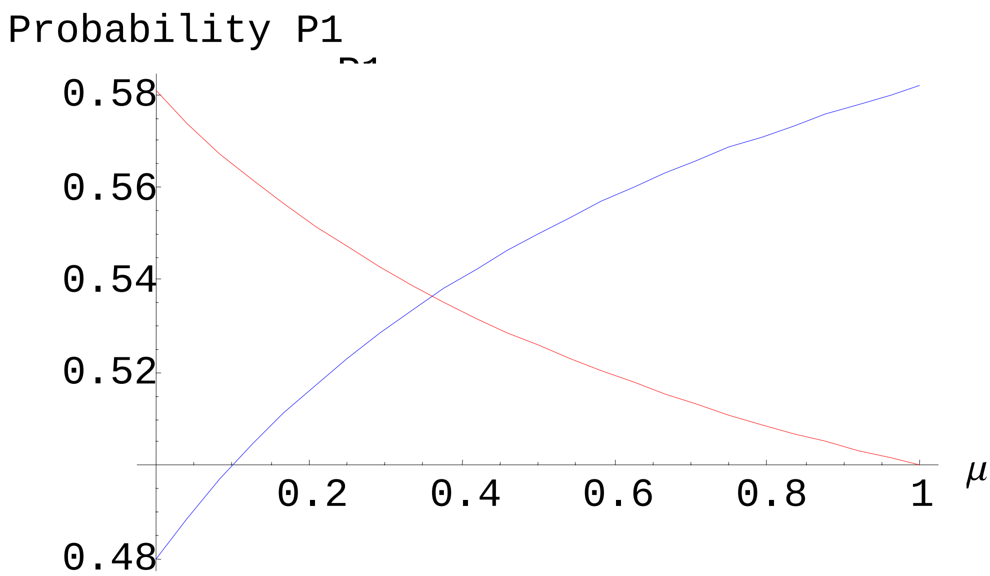

Figure 5: Probability that Group 1 Wins for $n_1 = 3$, $n_2 = 2$, $\nu = -0.1$ (declining curve for private good, rising for public good).

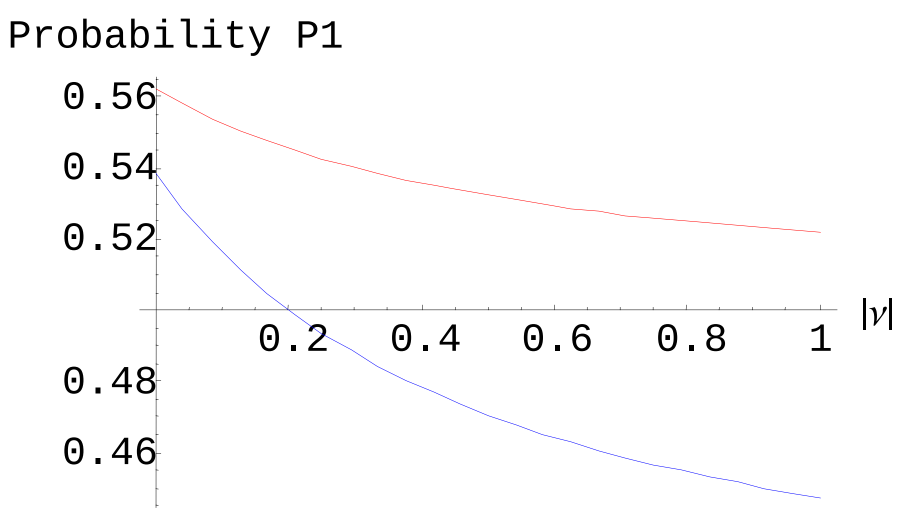

Figure 6: Probability that Group 1 Wins for $n_1 = 3$, $n_2 = 2$, $\mu = 0.2$ (top curve for private good, and bottom for public good).