Boosting cooperation between agents in diverse groups: a dynamical model of prosocial behavior, free-riding and coercive solutions.

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Abstract

Cooperation is usually stronger towards in-group members, because giving an upright signal about themselves implies higher possibilities of reciprocity among members with the same social identity. We examine the case where collaboration between two groups is a mandatory condition to achieve success in a particular project, but in the first one, the social identity is quite strong. We show that the existence of a small share of prosocial players in the first group can create a sort of "imitation effect" so that each new member puts more effort in cooperating with the outsiders. On the other side, to avoid free-riding effort should be conditional to the other's commitment. This way to boost cooperation is usually more efficient than a coercive strategy in the presence of significant sized majorities or feelings of resentments. Our analysis suggests that it is appropriate, under some circumstances, to stimulate a multicultural paradigm devoted to value and manage diversity through an acculturation process emphasizing adaptation, interdependence, and mutual appreciation of different cultures.

Keywords: Cooperation, Dynamical Analysis, Groups, Identity

JEL codes: C61,C71,D71.

1 Introduction

It is commonly believed that people act more prosocially towards members of their group than with those outside. There is a broad range of interdisciplinary literature (Everett et al. 2015 and bibliography therein cited), interested in explaining such in-group bias. Everett et al.(2015) explore in particular to what extent this behavior is driven by preferences for the welfare of the one own's group or from the beliefs of future reciprocal action by their own, as well as the outside group.

In this context, a key concept is that of social identity (Taifel, 1974), according to which a social group is defined as the collection of individuals who perceive to be a member of the same category sharing common objective or subjective criteria (nationality, gender, jobs, etc.). Bidirectional actions define the social identity, i.e. cooperation, which implies the payment of a cost regarding the efforts devoted to realizing a common outcome which will benefit all members, namely themselves and the other group members (Dovidio et al., 2006).

The whole outcome of this cooperation is strongly related to the agents' effort and therefore to the potential team members showing to work synergistically (Alchian and Demsetz, 1972). The individual benefits, instead, can be perceived as immediate or related to reputational concerns. In the literature on the reputation-based cooperation (see Everett et al. 2015, as well as their bibliography), the most relevant input to push cooperative actions are the beliefs that the others will reciprocate now or later. In this context, it is important to give a signal to be perceived as a trustworthy person.

Milinski et al. (2002) show that with the goal of building a good reputation people cooperate more when they have to contribute to the public good formation, and the Tragedy of Commons never applies. This cooperation is usually stronger towards in-group members, as giving a good signal about themselves implies higher possibilities to be reciprocated from those who share the same social identity (Everett et al.,2015).

Apparently this in-group bias can generate negative externalities for the outside group as the preferential in group treatments are usually done at the expenses of the outsiders, also concerning reduced cooperation. According to Sheremeta (2015), in order to succeed people tend to cooperate more with the others in the same group but, as the effort is not

costless, they may tend to free–ride with the members of the same group and become more competitive towards the outside groups. The author argues that the main factors affecting these results are related to group size, sharing rule, interactions context and social impact function, heterogeneity of players. As pointed out by Everett et al. (2015), it is unclear whether the cause of this in–group bias is to be found in preferences related the welfare of in–group members or in beliefs about the behavior of in–group and out–group members.

In this work, by analyzing cooperation between and within groups, we focus on the issue of reputational concerns and indirect reciprocity (Alexander, 1987; Nowak and Sigmund, 1998, 2005). Naturally, indirect reciprocity happens when individuals decide to make cooperative and helpful actions towards others in a strategic way to build up a positive personal reputation because they will need help, at some point, from the others. As Nietzsche will put it, it is *the selfishness of the generous*.

Harris et al. (2015) show that when in–group bias is dangerous towards the outsiders, some mechanisms of punishment are necessary to set up and share broader ethical social norms across groups. Nevertheless other authors, by incorporating social preferences into the economic approach, show that some individuals do help others even when their help is not in their interest (Camerer and Fehr, 2004). In other words, other-regarding preferences do drive individuals (at least some of them) in their choices towards the well-being of others, as well as fairness and reciprocity (Fehr and Schmidt, 1999; Charness and Rabin, 2002; Camerer, 2003). In this work, we try to enlighten some additional insights about reputation-based in-group favoritism. We investigate through a dynamical model the effect of a share of in-group members with a pro-social attitude towards the outsiders. In particular, we analyze a situation where two groups in society must cooperate to realize a joint project, which needs the effort of both groups to be completed successfully in a given period. Some typical examples of this situation are the cooperation among sectors in the same organization, departments of a University, ethnic majorities and minorities (e.g. migrants) living in the same country, and so on.

As the returns can be different from the two groups, taking too much care just to the in-group reputation may be counterproductive, leading to low efforts to cooperate with the outside group. This "narrow rep thinking" will result in a less cohesive social aggregation,

preventing the realization of a multicultural social paradigm. Nevertheless, according to the literature on other-regarding preferences, when there exists at least a minimal share of in-group members, reputational concerns can be driven in the direction of a more frequent cooperation with external groups.

The paper is divided into five Sections, including Introduction and Conclusions. In Section 2 we introduce the basic features of our dynamical model and discusses the primary variables affecting between and within group cooperation. In part 3 we explore how the existence of this minimal share can boost specific between-group efforts for the realization of a joint project. We find that two effects are at work: it can either boost between–group cooperation and outsiders free-riding. This suggests a more cautious altruism requiring a threshold for the effort from the outsiders to activate this minimal share of altruistic people. In Section 4 we also compare this effect with the case of coercive cooperation by applying a penalty on the returns of the less cooperative agent in the first group. We find that this way to boost cooperation is usually inefficient in the presence of the significant sized majorities or feelings of resentments. Section 5 concludes.

2 The model

We consider two groups of n_1 and n_2 individuals, who are engaged in a common project which needs the joint efforts of both groups to be completed in a given period of time T. Each group is characterized by his social identity, which is stronger in the first one so that we may assume that only the first group utility depends on reputational concerns.

We assume that two new individuals entering in the project must decide how much effort put in the in-group or between–groups cooperation, as the full return from the project for each new agent can be measured as the sum of shares of the single additional returns r_1 and r_2, due to their marginal contribution, related to within–groups cooperation. The action of making an effort has clearly a cost, which we assume to be constant over time, denoted by a_1 and a_2 for a representative agent in the first and in the second group, respectively. We also assume in time that $\overline{u}_1$ and $\overline{u}_2$ are the maximum exogenous level of effort for the agent

in each group.

According to these assumptions we solve a dynamical game between the agents in the two groups where the first one solves:

$$\max_{u_1} \int_0^T e^{-\rho t}[r_1 n_1 u_1(t) u_2(t) - \alpha_1 u_1^2(t) - \alpha_2 u_2^2(t) + n_1 R(t) + r_2 n_2(\overline{u}_1 - u_1(t))(\overline{u}_2 - u_2(t)) - \alpha_1(\overline{u}_1 - u_1(t))^2 - \alpha_2(\overline{u}_2 - u_2(t))^2]dt, \quad (1)$$

where the control u_1 takes values in $[0, \overline{u}_1] \in \mathbb{R}$, u_2 in $[0, \overline{u}_2] \in \mathbb{R}$ and the state R is ruled by

$$\begin{cases} R'(t) = -\delta R(t) + c u_1(t) - k u_2(t) \\ R(0) = R_0 > 0 \end{cases} \quad (2)$$

In the above equation c and k are positive constants, while δ is the depreciation rate. This last measures the individual's needs for distinctiveness and differentiation from others (For instance, according to Brewer, 1991, individuals also avoid self-construals that are either too personalized or too inclusive and instead define themselves in terms of distinctive category memberships) and also the needs to be awarded for their own skills and original contribution w.r.t. the project, or to avoid alienation, etc.

The term ku_2 measures the *disruption* effect on the Social identity of the first group. In other words, we assume that a social identity is disrupted when the other group is highly cooperative, so that integration and reciprocity towards it is higher and there is the threat of rejection for those in the majority who on turn do not reciprocate with the outsider. This is a sort of bridging (or inclusive) social capital(Putnam, 2000) that, unlike the bonding social capital which may be more inward looking and have a tendency to reinforce exclusive identities and homogeneous groups, instead it may be more outward-looking and encompass people across different social divides.

The second player solves

$$\max_{u_2} \int_0^T e^{-\rho t}[r_1 n_1 u_1(t) u_2(t) - \alpha_1 u_1^2(t) - \alpha_2 u_2^2(t) - n_1 R(t) + r_2 n_2(\overline{u}_1 - u_1(t))(\overline{u}_2 - u_2(t)) - \alpha_1(\overline{u}_1 - u_1(t))^2 - \alpha_2(\overline{u}_2 - u_2(t))^2]dt, \quad (3)$$

where again the state R is ruled by (2).

We remark that for the second agent we subtract $n_1 R$ since it represents an opportunity cost that is not necessary for the project itself.

We consider the Hamiltonian function, given u_2 associated to (1)–(2)

$$H(t, u_1, R, \lambda) = r_1 n_1 u_1 u_2 - \alpha_1 u_1^2 - \alpha_2 u_2^2 + n_1 R +$$

$$r_2 n_2 (\overline{u}_1 - u_1)(\overline{u}_2 - u_2) - \alpha_1 (\overline{u}_1 - u_1)^2 - \alpha_2 (\overline{u}_2 - u_2)^2 + \lambda(-\delta R + c u_1 - k u_2).$$

Maximizing the Hamiltonian function with respect to u_1 we obtain that it is maximized at u_1^* given by

$$u_1^*(t) = C_1 + C_2 u_2(t) + C_3 \lambda(t) \tag{4}$$

where

$$C_1 = \frac{\overline{u}_1}{2} - \frac{r_2 n_2 \overline{u}_2}{4\alpha_1}, \quad C_2 = \frac{r_1 n_1 + r_2 n_2}{4\alpha_1} \quad \text{and} \quad C_3 = \frac{c}{4\alpha_1}. \tag{5}$$

Therefore, the optimal level of the effort for the first group to cooperate with their own members mainly depends:

- Positively on the own–group size (and negatively on the outside–group size). In the literature, the exact effect of group size is controversial enough. According to some theoretical predictions, large numbers facilitate free-riding behaviors among their members. In this case, the enhancement of cooperation with outsiders and the reduction of reputation concerns could be more probable. On the contrary, other experimental results show that for large sized majorities the social identity is stronger and cooperation within group higher, while it is nearly impossible to be well integrated for minorities (see Sheremeta 2015 for a survey on both theoretical and empirical analyses). Our theoretical result shows a positive effect of the group size which strongly depends on the relevance of reputation concerns if returns from the first group are consistent.

- Positively on the effort of the other group proportionally to their full returns. This means that the more is Group 2 cooperative with Group 1, the higher is the incentive of the latter to reciprocate and produce within this group while the cooperation with the outside group lessens. We can hence see how the outsiders are considered as a support to the improvement of the "small closed society" rather than a possible partner to cooperate.

- As the maximum possible effort of the second group increases, the optimal u_1 decreases, because when it is high enough the first group can free–ride when cooperating with the second one, also when returns r_2 are large enough.

- Positively on the reputational concerns c through the shadow price λ.

The co-state λ solves:

$$\lambda'(t) = \rho\lambda(t) - \frac{\partial H}{\partial R} = (\rho + \delta)\lambda(t) - n_1, \tag{6}$$

together with the transversality condition

$$\lambda(T) = 0. \tag{7}$$

From (6) and (7) we find

$$\lambda(t) = \frac{n_1}{\rho + \delta}[1 - e^{(\rho+\delta)(t-T)}]. \tag{8}$$

As far as the second agent is concerned, substituting (4) in (3) we maximize with respect to u_2 the Hamiltonian function

$$H(t, u_2, R, \mu) = r_1 n_1 u_1^* u_2 - \alpha_1 u_1^{*2} - \alpha_2 u_2^2 - n_1 R +$$

$$r_2 n_2(\overline{u}_1 - u_1^*)(\overline{u}_2 - u_2) - \alpha_1(\overline{u}_1 - u_1^*)^2 - \alpha_2(\overline{u}_2 - u_2)^2 + \mu(-\delta R + cu_1^* - ku_2).$$

Hence we get the F.O.C.

$$\frac{\partial H}{\partial u_2} = [2(r_1 n_1 + r_2 n_2)C_2 - 4\alpha_1 C_2^2 - 4\alpha_2]u_2 +$$

$$(2\alpha_2 - r_2 n_2)\overline{u}_2 + (2\alpha_1 C_2 - r_2 n_2)\overline{u}_1 + + cC_2\mu = 0,$$

the co-state μ solves

$$\mu'(t) = \rho\mu(t) - \frac{\partial H}{\partial R} = (\rho + \delta)\mu(t) + n_1, \tag{9}$$

and satisfies the transversality condition

$$\mu(T) = 0. \tag{10}$$

From (9) and (10), we find

$$\mu(t) = \frac{n_1}{\rho + \delta}[e^{(\rho+\delta)(t-T)} - 1]. \tag{11}$$

Notice that $\mu = -\lambda$ as expected, having the first group reputational concerns R opposite effects on the two similar players in diverse group. In fact, it represents a cost for the second group and a benefit for the first one.

Recalling that $4\alpha_1 C_2 = r_1 n_1 + r_2 n_2$ we have

$$\frac{\partial H}{\partial u_2} = 4(\alpha_1 C_2^2 - \alpha_2)u_2 + (2\alpha_2 - r_2 n_2 C_2)\overline{u}_2 + (2\alpha_1 C_2 - r_2 n_2)\overline{u}_1 + (cC_2 - k)\mu = 0$$

In order to maximize H we assume $C_2^2 < \frac{\alpha_2}{\alpha_1}$ (which implies that the costs of effort to cooperate with the first group are higher enough w.r.t the returns to still make convenient cooperate with the one own's group, otherwise the player 2 would put the maximum effort only in the first one) and we derive that the maximum is attained at u_2^* defined as

$$u_2^*(t) = \frac{(2\alpha_2 - r_2 n_2 C_2)\overline{u}_2 + (2\alpha_1 C_2 - r_2 n_2)\overline{u}_1 + (cC_2 - k)\mu(t)}{4(\alpha_2 - \alpha_1 C_2^2)} \tag{12}$$

- Notice that for the representative agent in the second group, for high values of $n_2 r_2$, the highest costs of effort may reduce the amount of it that the player wants to provide. In general, these costs can be very high for minorities due to extrinsic factors (for instance diverse infrastructure for people in different countries, difference in language for minorities ethnical groups, etc.). Removing these unfair costs, through a multicultural paradigm promoting more integration, could be convenient for the organization when better minority performance can recover them and realize a more common profitable project.

- Moreover, for higher values of r_2 (e the group size n_2) the outsider may free–ride w.r.t his own group and contribute more with the other one.

- On the other side, the disruption effect k is negative because it needs less effort to have great influence on the behaviour of the first group and weaken his social identity, so that the outsider can cooperate more with his own group.

- Finallly, as expected, the positive effect of c on the optimal level of the efforts, concerns both the first and the second group and this last through the shadow price μ. For high values of r_1 and n_1, people in the minority group must contribute with higher efforts with the first group to be integrated but u_2 increases also because that group

is working hard only with their peers and cooperation with them become the main way to realize the project, instead of working with their own group.

3 Cooperation among groups may be boosted by small shares of individuals with pro-social attitudes towards the outsiders.

As the possible maximum effort of the second group increases, the optimal u_1 decreases, because when it is high enough the first group can free–ride when cooperating with the second one, even if returns r_2 are large enough.

Cooperation among groups may be boosted by small shares of individuals with pro-social attitudes towards the outsiders.

Our results found in the previous Section show that also when the second group is highly productive, and it could be efficient to cooperate more with it, this cooperation may be sharply limited because of the first group reputational concerns c. If we imagine a more cohesive society, with a hypothetical social planner who sets up the levels of the efforts that both the agents should provide to realize a shared profitable project, it will solve a simple intertemporal maximization problem without any small hint of motion on R. In this way, the optimal values of u_1 and u_2 would depend only on the returns, costs and size of both groups(more details on these results are available upon request).

According to some authors (see for instance Sheremeta, 2015 and bibliography therein cited) when this is the case, a mechanism of punishment could enforce cooperation between groups. In this paper we want to explore another less coercive solution to build a more cohesive society where the only relevant concerns are about the project realization by each member. In particular, we aim to investigate a case where cooperation among groups can be pushed up by small shares of individuals with pro-social attitudes towards the outsiders.

Specifically, in this Section, we analyze how the dissemination of good practices between groups by a small proportion of individuals with other-regarding preferences can boost cooperation through a kind of "imitation effect". Such a result may arise since it pushes

collaboration with different types of stakeholders (Becchetti, 2007). This promotion towards hybrid collaboration can happen at the corporate level, i.e. the so-called "social market enterprises" like fair traders(Becchetti, 2007); but also at a social level when migration policies or social incentives are put in place to smooth social conflicts and push individuals towards integration. Similarly, in our case we can see how this share of individuals with other-regarding preferences can limit the reputational concerns, hence encouraging collaboration with outsiders.

Under these assumptions, in this revised version of the model the two players solve the same maximization problems as in the previous Section but where R is now ruled by:

$$\begin{cases} R'(t) = -\delta R(t) + cu_1(t) - ku_2(t) + s(\overline{u}_1 - u_1(t)) \\ R(0) = R_0 > 0. \end{cases} \tag{13}$$

where s is a positive constant measuring the share or the sensitivity of the first group members to the cooperation with the outsiders(between group reciprocity).

Proceeding as in the previous Section, we find:

$$u_1^{**}(t) = C_1 + C_2 u_2(t) + C_3 \lambda(t) \tag{14}$$

where the costate variable λ is the given by (8), the constants C_1, C_2 are defined in (5) and recalling C_3 we set

$$C_3 \equiv \frac{c-s}{4\alpha_1} = C_3 - \frac{s}{4\alpha_1}$$

Therefore it is:

$$u_1^{**}(t) = u_1^*(t) - \frac{s}{4\alpha_1}\lambda(t) \tag{15}$$

Similarly, for the second player, we get:

$$u_2^{**}(t) \equiv \frac{(2\alpha_2 - r_2 n_2 C_2)\overline{u}_2 + (2\alpha_1 C_2 - r_2 n_2)\overline{u}_1 + [(c-s)C_2 - k]\mu(t)}{4(\alpha_2 - \alpha_1 C_2^2)}, \tag{16}$$

where the costate μ is defined in (11).

1. *The share s of altruistic agents in the group boosts cooperation towards the outsiders*: as expected, it reduces the optimal value of u_1 through a decrease in the reputational concerns by an amount $c - s$, and consequently it increases the optimal effort to contribute with the outside group.

2. *The share s of altruistic agents may also boost outsiders' free-riding.* The effect of a reduced u_1 is controversial as it depends also on the reaction of the other agent, that is on the new optimal level of the endogenous variable u_2. This depends on the existence of free-riding towards the first group. In other words, the effect of the share s on the optimal value of u_2 is not unambiguous: this value decreases as $c - s$ raises. Therefore the ousider representative agent contributes less in the first group, as the effect of reputational concerns and social identity is weaker and he can free-ride from the others' augmented cooperation-integration (in this context by free-riding we mean that the outsider becomes more competitive in the first group and more cooperative with his own group). This effect is lower for low values of the disruption variable k.

The issue of the free riding problem inside a group has been broadly analyzed in Olson's work (1965), who claims that free riding in a group is more likely to happen if a group endeavors collective action to provide public goods. On the contrary, individuals will not freeride against the efforts of the others, if the group will procure benefits to active members. Indeed, when freeriding happens, collective action is impossible, even if there are common interests and dependance among group members. Olson identified incentives like selective rewards and coercive participation as the only ways to solve out the free-riding problem.

In this Section instead, we show that there exists the possibility to have a freeriding issue between groups. In fact, we see that the share of altruistic people in the first group may boost free-riding behavior from the outsiders towards the first group itself. Our results show that the full effect depends on two combined forces acting in the same direction, i.e. increased cooperation from the first group versus the outsiders can count either on the "imitation effect" of the generous people or the increased free-riding from the second one. The first effect prevails for very low values of k, holding other things constant.

Otherwise, it seems suitable, in such context, to follow Olson's proposal (1965) to be altruistic only with the outsider who will in turn procure benefits to the active members. In our model this implies to add an *activation constraint* such that the law of motion of R becomes

$$R'(t) = -\delta R(t) + cu_1(t) - ku_2(t) + s(\overline{u}_1 - u_1(t))$$

where

$$\begin{cases} s > 0 \quad iff \quad u_2 \geq \tilde{u_2} \\ 0 \quad otherwise \end{cases} \tag{17}$$

The first group sets the value of $\tilde{u_2}$ considering the possibility and necessary contribution to request from the outsiders to be integrated in the first group and to realize the return r_1 from the common project (for instance it could be $\tilde{u_2} = u_2^*$).

4 Coercive vs altruistic cooperation towards the outsiders

In this Section, we consider that different solutions have been proposed to solve out the problem of free riding. In Olson's work (1965) even coercive participation may be a way to remediate to the free-riding problem. Therefore, we wonder if a similar solution can be applied to enhance cooperation from the first group towards the second one.

The usual two different approaches are the coercive and cooperative enforcement strategies. In general, human societies are constituted by a set of collaborative and coercive orders that coexist, sometimes in a harmonic way, other times they conflict. For example, social and institutional innovations that allow individuals to improve their living conditions often develop without the need of coercive power to impose the respect of particular rules. Individuals are aware of the benefits and spontaneously accept them. On the contrary, sometimes a cooperative society cannot exist without a coercive power able to impose some new rules. Furthermore sometimes the intervention of coercive power is necessary to remove barriers to new joint and social stability cooperation (Montani,2008). Functionally, punishment, also referred to as negative reciprocity, coercion, etc., is likely to be essential for maintaining cooperation. Third-party punishment, where the costs are borne by the individual but the benefits accrue to the group, has received recent theoretical interest and has been suggested to be essential to human cooperation (e.g. Fehr and Fischbacher 2003; Fehr and Gachter 2000; Bowles and Gintis 2003; Boyd et al. 2003). This effective punishment can be a fundamental pivot of non-kin cooperation when considering an occurrance

that belongs only to human beings. On one hand, positive sentiments - empathy, generosity and so on can lead individuals to prosocial actions towards strangers; on the other, negative feelings, like spite and sensitivity to unfairness, can play a pivotal role too. In fact, they can push individuals to punishment against free-riders (e.g. Fehr and Fischbacher 2003; Boyd et al. 2005; Tomasello et al. 2005; Hill et al. 2009).

Nevertheless, there is also evidence in the literature showing that commitment to abidance can make sanctions counter-productive, spreading bitter feelings among regulated facilities with the consequent unwillingness to cooperate with regulators in the future (Burby and Paterson, 1993). In many contexts, a coercive response to these events may breed strong resentments. Burby and Paterson (1993) study the best strategy to increase compliance either with the performance standard or with specification standard. According to their findings, a cooperative approach produces a higher impact regarding the compliance with the performance standard. In several cases it is possible to create a collaborative order without coercion but through sequential iterative processes (Axelrod and Hamilton, 1981) which lead to the manifestation of planned and desired cooperative behavior. Also, we can hypothesize situations, described by the prisoner's dilemma, some cases where individuals can change from noncooperation to cooperation by looking at the advantages from the reciprocal cooperation and reach an agreement. Conversely, Batson (1991) finds prosocial feelings, e.g. empathy, a fundamental driver of prosocial actions towards newcomers.

To take into account these considerations, we propose a slightly revised version of the model, where a penalty ϕu_1 is applied on the total return going to the subject of group one, proportional to the effort he puts into his group, and that according to a hypothetical Social Planner it would have to go instead to another group. Hence now the player one solves:

$$\max_{u_1} \int_0^T e^{-\rho t}[r_1 n_1 u_1(t) u_2(t) - \alpha_1 u_1^2(t) - \alpha_2 u_2^2(t) + n_1 R(t) + r_2 n_2(\overline{u}_1 - u_1(t))(\overline{u}_2 - u_2(t)) - \alpha_1(\overline{u}_1 - u_1(t))^2 - \alpha_2(\overline{u}_2 - u_2(t))^2 - \phi u_1]dt, \quad (18)$$

where ϕ is a positive constant and the state R is ruled by (2).

Solving the above maximization problem and assuming that u_2 is given and fixed at the

necessary level to no make free riding, we get:

$$\check{u}_1(t) = u_1^*(t) - \frac{\phi}{4\alpha_1} \tag{19}$$

Therefore, exploiting (14), we derive that $\check{u}_1(t) > u_1^{**}(t)$ if and only if $\frac{\phi}{4\alpha_1} < \frac{s\lambda(t)}{4\alpha_1}$ or $\phi < s\lambda(t)$.

Recalling $\lambda(t)$ in (8), we obtain

$$\phi < s\frac{n_1}{\rho+\delta}[1 - e^{(\rho+\delta)(t-T)}]. \tag{20}$$

The above inequality, for huge sized majority groups, i.e. for n_1 big enough, always holds true. Hence, in this case, it is satisfied also for very small values of s.

Finally, notice that to take into account also the possibility of resentment, making coercion counterproductive, i.e. the penalty generates aversion towards the outsiders who are indirectly responsible for that, in our model this would imply that k decreases proportionally. That is the case where a coercive approach may even be counterproductive by engendering intransigence the low of motion of R becomes $R'(t) = -\delta R(t) + cu_1(t) - k(1 - v\phi)u_2(t)$ which, by raising the optimal value of u_2^*, will clearly reduce the optimal amount of u_1 the first player would provide to the outsiders.

5 Conclusions

In an increasingly globalized and multicultural society, the promotion of diversity seems a necessary prerequisite when the goal is to create a joint project that requires the effort of different groups.

Using a dynamical analysis, we show that several factors should be taken into consideration to boost cooperation between groups when reputational concerns and social identity play an important role for the majority group. In particular, when minorities have low performance and desire to integrate and high propensity to free riding, then it could be more efficient to choose a low-inclusive model which could also be more effective if the fulfillment of the group is very high. Nevertheless, it is more common to encounter the case where cohesion among group members is pivotal for high performance at work while drifting to a

group think mechanism (Whyte, 1952) can be dangerous. In particular, when the minority has better performance, it would be better to enhance outside group cooperation. Some organizations operate more efficiently with a homogeneous workforce while others are more efficient with a heterogeneous workforce.

Our results suggest that when this is the case strategies for managing multicultural organizations, and a new social multicultural paradigm are necessary. In particular, we show that the existence of a tiny share of prosocial players in the first group can create a sort of "imitation effect" such that each new individual in the group gives less emphasis to personal reputation inside the group and puts more effort in cooperating with the outsiders. On the other side, to avoid free-riding effort should be conditional to the other's commitment. We also show that this way to boost cooperation is more efficient than a coercive strategy in the presence of the significant sized majorities or feelings of resentments. Therefore, according to our analysis, it could be appropriate, under some circumstances to stimulate a multicultural paradigm so as to increase the share of prosocial people in the majority group.

There is substantial literature debating diverse groups and organizations performance advantages and disadvantages (see White, 1999). For instance, this usually happens when multicultural organizations: i)attract the highest quality of human resources, uphold and further the highest percentage of workers from diverse cultural backgrounds; ii) can understand and penetrate wider and enhanced (foreign) markets; iii) display greater creativity and innovation and a better problem-solving ability; iv) are better able to adapt to change and exhibit more organizational flexibility). Apparently, despite the compelling advantages possessed by the multicultural organizations, when diversity is not managed in an efficient manner, it can result in dysfunctional outcomes. Inadequate communication, weak team spirit, long decision timing and less team cohesion are more likely to arise in such cases. This mechanism has the higher probability to happen when the social identity of the first group is unyielding. Therefore cross-cultural training is necessary to enable culturally diverse groups to live up to their potential and overcome communication difficulties. Therefore, managers in an organization or social planners in society should reconcile ambitious objectives, sustain the identity of minority group members, scatter power in a representative way. Additionally, they should take actions when having abundant resources, and cultural diversities are

understood. Furthermore, in a society where diverse groups coincide there is the need for strategies and programs to value and manage diversity through an acculturation process that emphasizes two-way learning, adaptation, interdependence, and mutual appreciation of different cultures. Also, an efficient communication needs to exchange new ideas, grievances, input and feedback. Before new paradigms can be created, however, the cultural environment has to experience greater acceptance, especially for evaluating in a positive way the inevitable change, as well as the challenge of an increasingly diverse society.

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