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Prosociality, reciprocity and identity: social foundations of economic activity

Dennis J Snower, Blavatnik School of Government, University of Oxford

Assar Lindbeck, University of Stockholm

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Prosociality, Reciprocity and Identity: Social Foundations of Economic Activity[*]

Assar Lindbeck and Dennis J. Snower

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Abstract

The paper shows how economic cooperation rests on social cooperation and vice versa. We show how social cooperation is generated by prosociality, reciprocity and identity. Our model covers three interrelated domains of behavior: a psychological domain where people's motives are determined, given the size of the social groups; a social domain where the size of the social groups is determined; and an economic domain where motives of group members and the sizes of these groups shape economic activity. In this contexxt, we explore how people's willingness to make each other better off in economic markets. Furthermore, social cooperation is affected by economic cooperation, since economic rewards contribute to the social rewards from cooperation. Thus economic activity may be understood as the outcome of a reflexive relation between economic and social cooperation. The more fragmented the society is, the less efficient the economy becomes.

1 Introduction

From time immemorial, human sociality has rested on three essential human capacities: prosociality, reciprocity and identity.[1] "Prosociality" is the desire to promote the welfare of others. It is built on the principle of kin selection, i.e. altruistic behavior is exhibited in proportion to the number of genes that are shared with the others. In the course of our cultural evolution, the care in band-level societies, comprising small groups of genetically related individuals, came to be extended in tribal-level societies to affiliates that were genetically unrelated. Thereby care became a motive generally exhibited to family and friends.

"Reciprocity" involves an exchange of favors or disfavors among unrelated individuals: I will help you proportionately to the help I receive from you;

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[1]For example, Ale, Brown and Sullivan (2013), Yamamoto and Tanaka (2009) and Simpson (2006).

similarly, if you hurt me, I will reciprocate. We extend such direct reciprocity to various forms of reputation-based indirect reciprocity: By helping others, I gain the reputation for being helpful, thereby attracting the help of third parties, who hope to benefit from my helpfulness.

It is clear why care and reciprocity are play such a central role in promoting cooperation among humans. The motive of care not only induces individuals to internalize one another's wellbeing, it also induces care in the objects of one's altruistic attention. Reciprocity not only encourages benevolent act by eliciting a proportional reward; it also discourages harmful acts by eliciting a proportional punishment.

These two drivers of cooperation are not sufficient to ensure that cooperation is forthcoming reliably under unforeseen circmstances, particularly in the presence of some severe social dilemmas, when there is a sharp tradeoff between self-interest and prosociality. Such reliable cooperation – extending beyond the short-term psychic rewards from care and reciprocity – is essential for the generation of trust, i.e. the confidence that one will receive cooperation independently of the incentives generating such cooperation. In the process of cultural evolution, humans have managed to promote the reliability of their cooperation through institutions, defined broadly as "integrated systems of rules that structure social interactions,"[2] leading to "stable, valued, recurring patterns of behavior."[3] Social identity formation is a basic social process that promotes the institutionalization of cooperation. "Social identity" refers to the aspect of a person's self-concept that arises from perceived membership of a particular social group.[4] We focus on one aspect of social identities that make recurrent patterns of cooperation persist: the costs of switching into and out of identities. A social identity deliniates an in-group, within which people people provide rewards for cooperation and punishments for refusals to cooperate and thus people have a higher propensity to cooperate with their in-group members than they do with out-group members. Since it is costly to join the in-group and costly to leave it, in-group cooperation becomes more persistent than the opportunistic incentives of its members would dictate. Of course social identities are by no means the only mechanism that promotes the temporal stability of cooperation. Humans have evolved many other systems of formal and informal rules for promoting cooperation, including legal and political systems, as well as customs and conventions. Ostrom's Core Design Principles for managing the commons exemplify such formal and informal institutions.[5] As these are also costly to enter into and exit from, they too share the aspect of identities that our analysis captures.

This paper explores how the above three human capacities – prosociality, reciprocity and identity – create social foundations for cooperation that underlie most economic transactions. The reasons why economic transactions generally require social cooperation is straightforward. First, most economic transactions

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[2] Hodgson (2015 p. 501).
[3] See Huntington (2006, p.12).
[4] See Turner and Oakes (1986) and Tajfel and Turner (1979, 1986).
[5] For example, Wilson, Ostrom and Cox (2013).

involve incomplete contracts, i.e. contracts that do not specify every possible contingency, making it impossible to ensure that all potential Pareto-efficient gains from trade are exploited. Second, the exploitation of such gains from trade require that the transacting parties are able to take each other's perspectives sufficiently to permit the recognition of mutually beneficial payoffs. Perspective-taking requires cooperative social interactions. Third, people who are hostile to one another or seeking status relative to one another cannot be expected to exploit all potential Pareto-efficient gains from trade, since harming one another or gaining advantage over another may be considered desirable. Hostility and status seeking are failures of social cooperation. Finally, the inefficiencies associated with externalities can be overcome when people display socially cooperative behavior, on account of prosociality (the desire to promote the wellbeing of others), social affiliation (the desire to gain the approval of others) or costs of leaving cooperative institutional arrangements – all of which are drivers of social cooperation.

This paper examines not only how the economic cooperation through economic transactions rests on social cooperation, but also how social cooperation is affected by economic cooperation. Our analysis thereby shows how economic activity may be understood as the outcome of a reflexive interaction between economic and social cooperation. People's willingness to make each other better off through economic transactions generally requires a willingness to promote one another's welfare in the pursuit of common social goals. On this account, social fragmentation – which generates obstacles to social cooperation – comes to play an important role in shaping economic activities.

Conventional economic theory ignores the role of social cooperation in economic activity. The First Fundamental Theorem of Welfare Economics states that, in the absence of externalities, free market activity leads to the achievement of a Pareto optimal general equilibrium and the Second Fundamental Theorem of Welfare Economics states that any socially desirable distribution of consumption can be generated through appropriate lump-sum transfers of wealth. Thus it is the presence of externalities and the absence of lump-sum transfers – not deficient social cooperation – that prevent the achievement of the social welfare optimum.

Our analysis calls these claims into question. We argue that social cooperation – driven by prosociality, reciprocity and identity – can alleviate the allocation problems generated by externalities and the distribution problems generated by the absence of lump-sum transfers. Furthermore, we argue that social fragmentation creates negative social externalities, quite distinct from the externalities commonly identified in standard economic analysis, and these social externalties generate their own inefficiencies and inequities. Social fragmentation also hurts perspective-taking and thereby reduces people's ability to recognize potential gains from trade. The more fragmented the society is – as may be the case among people of different religions, ethnicities, nationalities or ideologies – the less efficient the economy becomes.

We present a simple, widely applicable model with three interconnected domains. The first is the psychological domain, in which individuals' objectives

depend on which psychological motives are driving them. The motives of an individual belonging to a particular social group depends on her social context, described in terms of the motives of out-group counterparts. Second, there is the social domain, in which the relative size of the social groups is determined through the identity-formation process. And finally, there is the economic domain, in which economic activity is depends on the relative size of the social groups and the distribution of motives within each group. Our analysis of the psychological domain describes the role of prosociality and reciprocity in generating social cooperation, given the membership of social groups. The analysis of the social domain portrays the role of identity formation in shaping group membership. In describing how economic activity rests on cooperation in the social domain, we show how prosociality, reciprocity and identity generate economic cooperation.

In our analysis, the level of economic activity depends on the degree of social cohesion, which in turn depends on the level of economic activity. Social cohesion is central to the current public debates concerning immigration, national security, protectionism, climate action, and many other policy issues. Social cohesion is also central to identity politics, nationalism, religiosity, ethnicity and populism – social and political phenomena that have significant economic causes and consequences. Our analysis suggests that social cohesion and macroeconomic performance are closely related to one another, though traditional economic analysis has thus far given it little attention. It also helps explain why corporate culture has such a strong influence on the economic performance of firms. While the degree of social cooperation has implications for economic activities in many domains, including the management of the commons and the provision of public goods, the analysis below examine the implications for the acquisition of skills.

In the popular debates concerning social rifts – such as those between immigrants and natives, or between disparate national and religious groups – ethics usually plays a significant role. The utilitarian ethics that underlies much of neoclassical and behavioral economics is starkly individualistic, apart from the assumption that everyonen's utility should count equally in the assessment of social welfare. The phenomenon of social cohesion require us also to consider ethics of community. We show that that the notions of prosociality and reciprocity in our analysis correspond to well-known principles of community ethics. They also correspond to major political principles for good governance. Our analysis suggests that several time-tested ethical and political principles, arising in diverse nations and cultures, serve to promote the social cooperation that is essential to well-functioning societies and economies.

The paper is organized as follows. Section 2 presents underlying ideas. Section 3 presents a simple model of social cooperation by examining the psycho-social-economic behavior or a small group. Section 4 investigates the psycho-social-economic interactions among social groups. It also examines the comparative static properties of this social system, deriving the multiplier effects of changes in prosociality and reciprocity. Section 5 extends our analysis through consideration of nonlinear systems in which large social shocks can have effects

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that are difficult to reverse and large temporary shocks can have permanent effects. Section 6 shows how our analysis sheds light on well-known ethical and political principles. Finally Section 7 concludes.

2   Underlying Ideas

Our analysis rests on two crucial concepts: motives and identities. We consider each in turn.

2.1   Motives

In motivation psychology, a "motive" is defined as a force that gives direction and energy to one's behavior, thereby determining the objective of the behavior.[6]   All behavior is motivated.   The psychology literature has identified a number of different motives, such as Care[7] (with the objective of promoting the wellbeing of others), Affiliation[8] (aimed at gaining a sense of social belonging by following specified social norms), Status-Seeking[9] (aimed at gaining social rank relative to others), Anger[10] (with the objective of harming others) or Fear[11] (aimed at avoiding harm). In this literature, different environmental stimuli are observed to activate different motives (e.g. a threatening environment may activate the Fear motive). In short, motives – along with their associated behavioral objectives – are context dependent.

   This depiction of preferences is a departure from traditional neoclassical analysis, where preferences are assumed to be unique (rather than invariably context dependent), temporally stable (rather than varying in response to changes in the social context arising from changes in economic behavior) and self-interested (not prosocial, competitive or otherwise other-regarding). In our theory, preferences arise from motives, which depend on (i) identity-driven traits (that are persistent through time, analogous to personality traits), (ii) random motivational variations (described below) and (3) the social context (describing the distribution of motives across the population of individuals with whom one may have social interactions).

   For the purposes of our analysis, it is sufficient to group these various motives into two broad categories: (1) *prosocial motives,* including the Care and Affilia-

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[6] See Elliot and Covington (2001), following Atkinson (1964).

[7] This motive is concerned with nurturance, compassion, and care-giving, e.g. Weinberger et al., (2010). The caring motive is often distinguished from the affiliation motive, e.g. McDougall (1932), Murray's (1938), McAdams (1980), H. Heckhausen (1989), and J. Heckhausen (2000).

[8] McClelland (1967), H. Heckhausen (1989), or Heckhausen and Heckhausen (2010).

[9] For example, McClelland (1967), H. Heckhausen (1989); J. Heckhausen (2000); Heckhausen and Heckhausen (2010), and Reiss (2004).

[10] This motive is related to McDougall's (1932) concept of anger/rage, Murray's (1938) aggression and defendance, Heckhausen's (1989) aggression, and Reiss' (2004) vengeance.

[11] McDougall (1932), Thorndike (1898), Lewin (1936) and Hull (1943) use the term avoidance, as well as Murray (1938) who refers to the concept of harm avoidance, or Trudewind (2000) who refers to anxiety.

tion motives, and (2) *competitive motives,* including not only the Status-Seeking, Anger and Fear motives, but also the asocial motive of self-interested acquisition (the standard consumption motive in neoclassical economics). Prosocial motives induce people to participate in the wellbeing of others and thus confer psychological benefits on them. Under competitive motives, people's wellbeing is negatively associated with the wellbeing of others (as under positional competition) or independent of other's wellbeing (i.e., self-interest).

The payoffs from these motives comprise psychic returns, some of which are generated by economic costs and benefits. With regard to the prosocial and competitive motives considered in our analysis, the individual faces four possible payoffs: (i) the return from mutual prosociality (the individual's prosocial motives are reciprocated), (ii) the return from being suckered (the individual's prosocial motives are not reciprocated), (iii) the return from free-riding (the individual suckers someone else by being competitive in the face of prosociality) and (iv) the return from mutual competitiveness (the individual's competitive motives are reciprocated).

Motives are elicited by expected payoffs: Prosociality is activated when it attracts a higher expected payoff than competitiveness (and vice versa). In our analysis, the expected payoff from a particular motive depends on the social context, which we specify in terms of an individual's probability of encountering people with prosocial motives, conditional on the individual's own motives.

In short, the motives of all individuals in a society determines the social context, and this context in turn affects the elicitation of motives. There thus is a reflexive relation between individuals' motives and their social contexts. In the "*motivation equilibrium,*" individuals' motives are consistent with their social context. This means that people's motives reinforce one another, in the sense that the set of motives across individuals generates a social context that activates the original set of motives.

In practice, individuals are commonly heterogeneous in their motivational appraisal of their social context. Some people may gain a relatively high psychic payoff from encountering prosocially motivated individuals and thus these people will tend have a relatively cooperative appraisal their social context and have a relatively high chance of responding through prosocial motives. There are many reasons for such heterogeneity. People differ in terms of their past affective experiences and thus differ in terms of their pro- or competitive priming, which can affect the appraisal of their current social context due to emotional carry-over.[12] Divergent past experiences also lead to divergent mental associations evoked by the current social context, activating divergent motives.[13] People

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[12] An individual who has been primed for care and affiliation – such as through exposure to family and friends – may experience higher utility from cooperating with others than would otherwise have been the case, by virtue of motivational carry-over (the transfer of motivations from one set of agents to another set). Conversely, an individual who has been primed for positional battles – such as through the experience of competitive or conflictual situations – may experience lower utility from cooperation.

[13] Some people make mental associations between a particular setting and situations in which they have been rewarded with gratitude, warm glow of giving and good-will; these people will tend to be more cooperative than others who associate this setting with situations in which

also differ in terms of their social norms, moral values and personal contacts, leading to heterogeneous appraisals of a given social context.

In the social motivation equilibrium, the distribution of prosocial and competitive motives across individuals describes a social context, which elicits the original distribution of motives. Such equilibria may have a wide range of welfare properties, ranging from functional (inducing people to cooperate in the pursuit of common social goals) to dysfunctional (discouraging such cooperation). Our analysis explores when a social context is beneficial to its members and when the members of society get stuck in competitive motivation traps.

In our analysis, the social motivation equilibrium is shown to depend on two parameters: (1) "*unreciprocated prosociality*," measuring the propensity to be prosocial in face of competitiveness, and (2) "*reciprocity,*" defined in an unconventional way, as the sum of reciprocated payoffs (prosocial and competitive) minus the sum of unreciprocated payoffs (prosocial and competitive). Thereby we explain how prosociality and reciprocity play conceptually distinct roles in generating social cooperation.

In this context, it is easy to understand why economic cooperation rests on social cooperation. First, the individuals' payoffs comprise psychic returns that are conditional on the social cooperation (in the form of prosociality or competitiveness) of their counterparts. For example, the return from being suckered often involves betrayal aversion[14] and envy;[15] and the return from free riding may involve guilt[16] or pride.[17] Second, the psychic returns depend on individuals' motives that are elicited by the social context (the proportion of prosocial individuals in the counterpart population).

2.2 Identities

While motives generate incentives for social cooperation through prosociality and reciprocity, identity formation can promote the temporal stability of this cooperation. Most instances of social cooperation – in families, workplaces and communities – are not simply equilibria of repeated games in which individuals are free to walk away from one another whenever it suits them. Such equilibria are often too fragile to generate the sustained cooperation that many human enterprises require. In practice, such fragility is reduced through social rewards and punishments, often supported through social norms or formal institutions, that make it costly to withdraw cooperation once one has committed to it. Specifically, individuals associate themselves with social groups by acquiring distinctive social identities. The group members commonly provide rewards and punishments that discourage the members from switching identities. These switching costs make identities temporally persistent[18]; they are the rigidities

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they have been suckered.

[14] See, for example, Bohnet, Greig, Herrmann and Zeckhauser (2008).

[15] For example, Fehr and Schmidt (1999).

[16] Also Fehr and Schmidt (1999).

[17] For example, Snower and Bosworth (2017).

[18] This temporal persistence makes people's patterns of cooperation more predictable than they would otherwise be, thereby promoting trust.

that bolster social cooperation within social groups.

Within a social group, people share a common social identity, giving them a sense of belonging and self-esteem.[19] A common identity engenders bonds of affiliation and care among group members, promoting cooperation among them. In identity economics,[20] such cooperation is promoted through group norms, whose observance generates utility gains and whose violation occasions utility losses. These gains and losses can arise from rewards and punishments by other group members or from the internalization of the norms. Cooperation among group members can also arise from care-driven prosociality.

Members of different social groups, by contrast, are not bound by bonds of affiliation and care. They need not share the same norms and, even when they do, sanctioning and internalization mechanisms to preserve the norms may not be present. Whether groups cooperate or compete depends on the returns from group cooperation and competition, analogously to the opportunistic returns at the individual level. For example, Christians and Muslims may cooperate with one another when members of both groups adopt identities that give them a positive psychic payoff from interfaith cooperation, from rewarding interfaith cooperation of others, or punishing interfaith defection. On the other hand, when these religious groups define their respective identities in opposition to one another (such as through the image of the threatening "infidel"), then cooperation is absent.

In our analysis, a social identity may be understood as a propensity to adopt particular motives under a given set of social circumstances. Specifically, people with a prosocial identity have a higher probability of responding to a given set of environmental stimuli with prosocial motives than do people with a competitive identity. Whereas motives can change abruptly in response to environmental changes, identities can more slowly on account of identity-switching costs. These costs – such as the costs of switching religions or nationalities – are largely psychic, but often also include economic components. Thus social identities may be viewed as crystalized motives.

Since members of a social group have heterogeneous motivational states, they also have heterogeneous incentives to switch identities. A person's propensity to adopt the identity of another social group, for any given motivational state, depends on the motives of the members of the other group that person encounters. These motives, in turn, depend on the identity of the other group members. So just as motives are determined in interaction among people, so identities are determined in interaction among social groups. The gains from a prosocial identity towards outsiders is affected by the chances of encountering outsiders with prosocial identities. In this way, the identities of agents in different social groups are determined conjointly, through their interactions with each other.

For example, when immigrants seek entry into a host country's labor market, they require the goodwill of both their potential employers and potential work-

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[19] See, for example, Tajfel and Turner (1979).
[20] See, for example, Akerlof and Kranton (2010).

place colleagues. The potential employers may need to be convinced that the immigrant job seekers are hard-working and willing to learn new skills before deciding to employ them. The potential workplace colleagues may need to be convinced that it will be psychologically and economically rewarding to work with the immigrant entrants before deciding whether to cooperate with them in work teams. Immigrants can promote such cooperation from their hosts by adopting hard-working, conscientious, aculturated identities. Similarly, the hosts can promote such cooperation by adopting hospitable, cosmopolitan identities. This two-sided nature of identity formation extends the identity economics analysis of Akerlof and Kranton (2000, 2010).

Identities evolve in accordance with principles of evolution, based on equivalents of reproduction, mutation and selection. In our analysis, the equivalents of mutation are random variations in motivational states. The identities that survive are the ones that give their adherents the highest expected payoffs, given their motivational variations. Selection takes place through the adoption of identities. The lower the costs of switching identities, the more readily new identities can be adopted.

In our analysis, we derive an "*identity equilibrium*," in which identities are consistent with the social context (again specified in terms of the encountering prosociality, conditional on one's own motives). In a social identity equilibrium, a set of heterogeneous identities generates a set of motives across individuals, which produces a social context that in turn reproduces the original set of identities.

The evolution of identities may be analyzed in terms of the insider-outsider theory (Lindbeck and Snower (1986, 1989)). Members of the same social group treat one another as "insiders," whose status is protected by identity-switching costs, which play an analogous role to labor turnover costs in the traditional insider-outsider analysis. By contrast, members of different social groups treat one another as "outsiders." Just as a firm's labor turnover costs makes it cheaper for the firm to employ insiders than outsiders, identity-switching costs make it easier for people to cooperate with those of the same social group than with those of a different social group. Just as labor turnover costs help explain why the insider workers in a firm enjoy more cooperative work relationships with one another than with outsider workers, so identity-switching costs help explain why members of a social group enjoy more cooperative social relationships with one another than with members of other social groups.[21] This is the sense in which

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[21] There is however an important difference between our insider-outsider analysis of social groups and that of protected versus unprotected workers. In the labor market, the insider workers are unambiguously privileged, since they are associated with labor turnover costs and thus can achieve higher wages and higher employment probabilities than the outsiders, who are not protected by these costs. Thus it is costly for outsiders to become insiders, but costless for insiders to become outsiders. This asymmetry is not commonplace among social groups. The members of each social group typically see themselves as "insiders" and view the members of other social groups as "outsiders." Thus there are costs of switching from group A to group B, as well as costs of switching in the opposite direction. The two-sided nature of the identity-switching costs explains why the analysis presented here is more complicated than that of the insider-outsider analysis for the labor market.

the insider-outsider distinction between social groups is analogous to the insider-outsider distinction in the labor market (employees protected by labor turnover costs versus unprotected employees). Both labor turnover costs and identity-switching costs may be understood as entry barriers preventing cooperation. These entry barriers reinforce one another in generating temporal persistence of employment and output.

Our analysis shows how economic activity is shaped by motives in the psychological domain of decision making and by identities in the social domain.

3 Psycho-Social-Economic Behavior of a Small Group

To provide a first glimpse of how the psychological, social and economic domains influence one another, we begin with a simple model in which a "small" group interacts with a "large" group. The distinction between the small and large group rests on its responsiveness to its counterparts. The motives of the small-group members are responsive to their counterparts in the large group, but motives of the large-group members are not responsive to their counterparts in the small group. Specifically, the motives of the small-group members are assumed to be conditional on the motives of the large-group members, but the motives of the large-group members are exogenously given. This model enables us to understand the linkages between the psychological, social and economic domains with regard to one group alone. In the following section we then consider the linkages among groups that are mutually responsive to each other.

For a small social group, we consider the psychological, social and economic domains in turn.

3.1 The Psychological Domain

Consider two individuals, $i = A, B$, where A is a member of the small group and B is a member of the large group. Each small-group member, when interacting with a large-group member, is assumed to be driven by one of two motives: (1) a *prosocial motive*, for which an individual's utility depends positively on her own and her counterpart's payoff and (2) a *competitive motive*, for which utility depends positively on her own payoff and negatively on her counterpart's payoff.

3.1.1 An Individual's Payoffs

A's direct payoffs (payoffs flowing directly to individual A directly) are given in the following matrix:

i's payoffs	*Agent B*	Prosocial	Competitive
Agent A			
Prosocial		C_i	S_i
Competitive		F_i	D_i

C_i and S_i are the direct payoffs from the prosocial motive in the presence of a prosocial and competitive counterpart, respectively. F_i and D_i are the direct payoffs from the competitive motive in the presence of a prosocial and competitive counterpart, respectively. These are the payoffs the individual who receive if she were purely self-interested.

In our model, however, the individual is not self-interested. Instead, the individual's utility depends on her motives. This utility has a deterministic and stochastic component. We begin by considering the deterministic one. Under the prosocial motive, the individual has the following payoffs:

- The *mutual cooperation payoff* is $(1 - \beta) C_A + \beta C_B$.

- The *sucker's payoff* (the payoff from unreciprocated cooperation) is $(1 - \beta) S_A + \beta F_B$.

Here the degree of prosociality is specified by the *altruism parameter* β, where $0 < \beta \leq \frac{1}{2}$. When $\beta = \frac{1}{2}$, the individual exhibits "perfect altruism," taking her counterpart's payoff payoff into equal account with her own. When $0 < \beta < \frac{1}{2}$, there is "imperfect altruism," with the counterpart's payoff weighted less heavily than one's own.

Under the competitive motive, by contrast, the individual's payoffs are

- The *free rider's payoff* is $(1 - \gamma) F_A - \gamma S_B$.

- the *mutual defection payoff* (the payoff from mutual non-cooperation) is $(1 - \gamma) D_A - \gamma D_B$.

Here the degree of competitiveness is specified by the competitiveness parameter γ, where $0 \leq \gamma < \frac{1}{2}$. The payoffs from these motives are assumed to have deterministic and stochastic components. When $\gamma = 0$, the individual exhibits pure self-interest. When $0 < \gamma < \frac{1}{2}$, the individual's payoff depends negatively on the counterpart's payoff.

Thus the deterministic payoff matrix for individual A is

A's payoffs *Individual B*	Prosocial	Competitive
Individual A		
Prosocial	$(1 - \beta) C_A + \beta C_B$	$(1 - \beta) S_A + \beta F_B$
Competitive	$(1 - \gamma) F_A - \gamma S_B$	$(1 - \gamma) D_A - \gamma D_B$

Next, we turn to the stochastic components of A's utility, representing random motivational variations, identically and independently across small-group members. These variations imply that different individuals have different appraisals of a particular deterministic social context.

The A's motivational variations can take two forms:

1. *intrinsic motivational variations*, u, affecting A's relative returns from A's prosocial versus competitive motives, and

2. *extrinsic motivational variations*, v, affecting A's relative returns from B's prosocial versus competitive motives.

Then A's total utility matrix is

A's payoffs *Individual B*	Prosocial	Competitive
Individual A		
Prosocial	$((1-\beta)\,C_A + \beta C_B) + u + v$	$((1-\beta)\,S_A + \beta F_B) + u$
Competitive	$((1-\gamma)\,F_A - \gamma S_B) + v$	$(1-\gamma)\,D_A - \gamma D_B$

As noted, the random motivational variations may be interpreted as resulting from heterogeneity of people's past affective experiences, associations and primings. On account these variations, different people may perceive different gains and losses within a particular deterministic context. For example, competitive priming may induce an individual to experience a deterministic social context as a Prisoner's Dilemma, whereas prosocial priming may induce another individual to experience the same deterministic context as mutualistic. This heterogeneity will enable our model to capture individual motivational differences within a social group.

On this basis we now turn to the determination of the individual's motives in the motivation equilibrium.

3.1.2 Determination of Motives

In each period of analysis, pairs of individuals from the two social groups are randomly matched, generating a joint product. Recall that A is the small group, whose members' motives are conditional on the motives of their counterparts, and that B is the large group, whose motives are exogenously given. Let x be the proportion of Bs who collaborate with As.

For an individual i from group A, the expected payoffs from the prosocial and competitive motives, respectively, after observing the realized value of the random motivation variable u_i, are

$$Y_p\,(i,j) \;=\; x\,((1-\beta)\,C_A + \beta C_B + \nu_j) + (1-x)\,((1-\beta)\,S_A + \beta F_B) + u_i \quad (1)$$
$$Y_c\,(i,j) \;=\; x\,((1-\gamma)\,F_A - \gamma S_B + \nu_j) + (1-x)\,((1-\gamma)\,D_A - \gamma D_B) \quad (2)$$

Since motives are elicited to maximize expected payoffs,[22] prosocial individual (i.e. an individual with a prosocial identity) adopts a prosocial motive when $Y_p\,(i,j) > Y_c\,(i,j)$, which implies that the random motivation variable must exceed the following cutoff utility value:

$$u_i \;>\; u_i^* = -\left(\begin{array}{c}((1-\beta)\,C_A + \beta C_B + ((1-\gamma)\,D_A - \gamma D_B)) \\ -\,((1-\beta)\,S_A + \beta F_B + (1-\gamma)\,F_A - \gamma S_B)\end{array}\right) x$$
$$-\,((1-\beta)\,S_A + \beta F_B - ((1-\gamma)\,D_A - \gamma D_B))$$

Note that the extrinsic motivational variation ν_j is not relevant to the comparison of the expected payoffs from the prosocial and competitive motives, since it affects both motives equally. This is the reason why extrinsic motivational variations are ignored in our analysis.

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[22] This may or may not be the result of conscious choice. Agents face no costs of switching motives.

We define the *unreciprocated prosociality parameter* as

$$\sigma = \left((1 - \beta) \, S_A + \beta F_B \right) - \left((1 - \gamma) \, D_A - \gamma D_B \right),$$

measuring the returns from unreciprocated cooperation relative to mutual non-cooperation. Furthermore, we define the *reciprocity parameter* as

$$\begin{aligned} \rho &= \left(\left((1 - \beta) \, C_A + \beta C_B \right) + \left((1 - \gamma) \, D_A - \gamma D_B \right) \right) \\ &\quad - \left(\left((1 - \beta) \, S_A + \beta F_B \right) + \left((1 - \gamma) \, F_A - \gamma S_B \right) \right), \end{aligned}$$

measuring the degree to which people prefer reciprocal over non-reciprocal actions, thereby capturing an important aspect of social interconnectedness.[23]

Then the cutoff utility value, above which the individual is collaborative, may be expressed as

$$u_i > u_i^* = -\rho x - \sigma \tag{3}$$

Let the cumulative density of the random motivation variable u_i be $H\left(u_i\right)$. Then the probability that A will be collaborative with B – which is equal to the proportion of collaborative A-group members – is

$$y = 1 - H\left(-\rho x - \sigma\right) \tag{4}$$

This depicts the proportion of collaborative As as function of the proportion of collaborative Bs. Since $H' > 0$, the proportion (x) of collaborative A's, given the proportion of collaborative B's, depends positively on two parameters: the A's unreciprocated prosociality parameter (σ) and A's reciprocity parameter(ρ).

For simplicity, suppose that u_i is uniformly distributed over $[-\frac{1}{2}, \frac{1}{2}]$, where $\delta > 1$ is a positive constant. Then the proportion of collaborative A's is

$$y = \left(\frac{1}{2} + \sigma\right) + \rho x \tag{5}$$

This will be called *A's collaboration function (AC)*, pictured in Fig. 1a. It measures the responsiveness of A's prosocial motives to B's prosocial motives. To ensure that $0 \leq x, y \leq 1$, we assume that $-\frac{1}{2} \leq u_i^* \leq \frac{1}{2}$. Whereas the intercept $\left(\frac{1}{2} + \sigma\right)$ depends on the unreciprocated prosociality parameter, the slope ρ depends on the reciprocity parameter.

In this analysis, an individual's prosociality is determined by three forces: (i) traits (due to which, for example, C_A may differ from C_B), (ii) random motivational variations (u and v) and (iii) the social context.

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[23] This sum of the payoffs from reciprocal behaviors $\left(\left((1 - \beta) \, C_A + \beta C_B \right) + \left((1 - \gamma) \, D_A - \gamma D_B \right) \right)$ minus the payoffs from unreciprocal behaviors $\left(\left((1 - \beta) \, S_A + \beta F_B \right) + \left((1 - \gamma) \, F_A - \gamma S_B \right) \right)$ may also be called the "reciprocity return differential."

y

A's collaboration
function (AC)

x

Fig. 1a: Psychological
Domain

y

A's group size
function (AS)
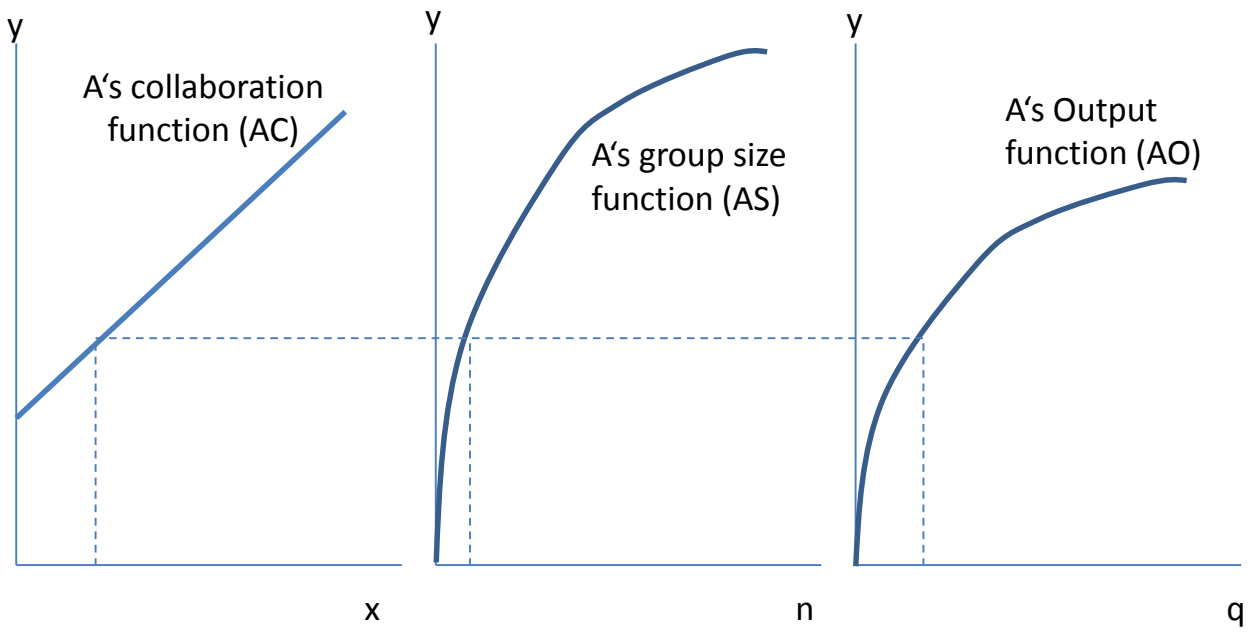
n

Fig. 1b: Social
Domain

y

A's Output
function (AO)

q

Fig. 1c: Economic
Domain

3.2 The Social Domain

Groups A and B are assumed to be distinguished in terms of their motive-oriented social identities. To fix ideas, the small group A is assumed to have a prosocial identity, implying that its members are driven by the prosocial motive; and the large group B isi assumed to have a competitive identity, with members driven by the competitive motive.

A prosocial individual (group A) switches to a competitive identity (group B) when

$$Y_c(i,j) > Y_p(i,j) + \kappa$$

where $Y_c(i,j)$ and $Y_p(i,j)$ are given by equations (2) and (1), respectively, and κ is the cost of switching from a prosocial to a competitive identity. Analogously to equation (3), it can be shown that the utility cutoff value for the motivational variation is

$$u_i < -\rho x^* - \sigma - \kappa \tag{6}$$

where the exogenous proportion x^* of collaborative Bs.

Normalize the population to unity, let n_t be the number of prosocial individuals in the population in period t, and assume (as above) that u_i is uniformly distributed over $[-\frac{1}{2}, \frac{1}{2}]$. Then the number of prosocial individuals switching to a competitive identity in period t is $\left(\frac{1}{2} - \rho x - \sigma\right) n_{t-1}$. Furthermore, we assume that the number of competitive individuals (from group B) switching to a prosocial identity is $m(1 - n_{t-1})$, where m is a constant (since the collaborativeness of Bs is exogenous). Consequently the change in the number of individuals with a prosocial identity is $\Delta n_t = m(1 - n_{t-1}) - \left(\frac{1}{2} - \rho x - \sigma\right) n_{t-1}$, implying the following time path for the number of prosocials:

$$n_t = m + (y - m) n_{t-1} \tag{7}$$

where $(y - m)$ represents the degree of persistence of the prosocial identity.

In the long run, the equilibrium size of the prosocial group is

$$n = \frac{m}{1 - y + m} \tag{8}$$

This *A's group size function (AS)* is pictured in Fig. 1b.

3.3 The Economic Domain

Consider a labor market in which the A's are workers and the B's are firms. A "prosocial worker" offers an indivisible unit of effort, whereas a "competitive worker" offers no effort. A "prosocial firm" offers a job along with an indivisible unit of on-the-job training, while a "competitive firm" offers such a job without training. Both the worker's effort and the firm's training is needed in order for output to be produced.

When both the effort and the training are forthcoming, the worker and firm produce a joint product α (a positive constant). In the social equilibium, only

a fraction of all workers and only a fraction of all firms are collaborative. Thus the expected output in the social equilibrium is

$$q = \alpha\left(xN\right)\left(yn\right) \tag{9}$$

where N (a constant) is the number of Bs that As are interacting with, xN is the expected number of collaborative Bs, and yn is the expected number of collaborative As. This equation is A's output function, pictured in Fig. 1c.

Equations (5), (8) and (9) clarify the relation between the psychological, social and economic domains: Given the proportion x of collaborative Bs, the proportion y of collaborative As are determined in psychological domain (equation (5)). Next, given y, the size of the A group is determined in the social domain ((8)). Finally, given x and y, the expected equilibrium output is determined in the economic domain (equation (9)).

In this context, we now consider the effects of a rise in workers' skills (α) on expected output.

The firm's expected profit is $\alpha xy - w$, where w is the wage. This wage is the outcome of a Nash bargaining process where the worker's fallback position yields zero payoff:

$$w = \mu\alpha x Nyn$$

where μ (a constant) represents the worker's bargaining power. Thus the firm's profits may be expressed as

$$\pi = \left(1 - \mu\right)\alpha x Nyn$$

The worker's mutual cooperation payoff $\left(1 - \beta\right)C_A + \beta C_B$ may be expressed as $\left(1 - \beta\right)\left(\mu\alpha xyNn + C_0\right) + \beta\left(1 - \mu\right)\alpha xyNn = \left(\left(1 - \beta\right)\mu + \beta\left(1 - \mu\right)\right)\alpha xyNn$, where $\mu\alpha xyNn$ and C_0 are the worker's economic and non-economic payoff, respectively. The worker's other payoffs – S_A, $\left(1 - \gamma\right)F_A - \gamma S_B$ and $\left(\left(1 - \gamma\right)D_A - \gamma D_B\right)$ – are non-economic, such as the payoffs from betrayal, guilt and disempowerment.

For the firm, analogously, the mutual cooperation payoff $C_B + \beta C_A$ may be expressed as $\left(1 - \mu\right)\alpha xyNn + \beta\left(\mu\alpha xyNn + C_0\right) = \left(1 - \mu + \beta\mu\right)\alpha xyNn + C_0$, where α is the worker's output per head. The firm's other payoffs – S_B, F_B, and D_B – are non-economic.

A rise in skills (α) raises the worker's and firm's mutual cooperation payoffs. As a result, the reciprocity parameter ρ rises, while the prosociality parameter remains unchanged: $\frac{d\rho}{d\alpha} = \left(\left(1 - \beta\right)\mu + \beta\left(1 - \mu\right)\right)xyNn$. In the psychological domain, the rise in the prosociality parameter leads to a rise in the proportion of collaborative As: $\frac{dy}{d\rho} = x$ (by the collaboraton function (5)). In the social domain, the rise in the proportion of collaborative As leads to an increase in the size of the A group: $\frac{d\left(\frac{m}{1-y+m}\right)}{dy} = \frac{m}{(1-y+m)^2}$. Finally, in the economic domain,

the increases in y and n lead to an increase in expected output:

$$\frac{\partial q}{\partial \alpha} = (xN)(yn) + \frac{\partial \rho}{\partial \alpha}\frac{\partial y}{\partial \rho}\left(\frac{\partial q}{\partial y} + \frac{\partial n}{\partial y}\frac{\partial q}{\partial n}\right) \tag{10}$$

$$= ((1-\beta)\mu + \alpha\beta(1-\mu))x^3 Ny\left(n + \frac{my}{(1-y+m)^2}\right)$$

The first term is the pure economic effect of a rise in skills on output; the second term is the psycho-social effect.

4 Psycho-Socio-Economic Group Interactions

We now extend our analysis to explore the interaction among two social groups, whose members are mutually responsive to each other's motives, as may arise in groups of comparable size.

4.1 The Psychological Domain

Analogously to A's payoff matrix, B's deterministic payoff matrix may be specified as follows:

B's payoffs _Agent A_	Prosocial	Competitive
Agent B		
Prosocial	$C_B + \beta C_A$	$S_B + \beta F_A$
Competitive	$(1-\gamma)F_B - \gamma S_A$	$(1-\gamma)D_B - \gamma D_A$

For an individual i in Group B, the expected payoffs from the prosocial and competitive motives, respectively, are

$$X_p(i,j) = y((1-\beta)C_B + \beta C_A + \nu_j) + (1-y)((1-\beta)S_B + \beta F_A) + u_i$$
$$X_c(i,j) = y((1-\gamma)F_B - \gamma S_A + \nu_j) + (1-y)((1-\gamma)D_B - \gamma D_A)$$

For such an individual, the unreciprocated prosociality parameter is

$$s = ((1-\beta)S_B + \beta F_A) - ((1-\gamma)D_B - \gamma D_A),$$

and the reciprocity parameter is

$$r = (((1-\beta)C_B + \beta C_A) + ((1-\gamma)D_B - \gamma D_A))$$
$$- (((1-\beta)S_B + \beta F_A) + ((1-\gamma)F_B - \gamma S_A)),$$

Thus B's _collaboration function_ (BC) may be expressed as

$$x = \left(\frac{1}{2} + s\right) + ry \tag{11}$$

The social motivation equilibrium, in which the social motives of the members of the two social groups are stable and self-reinforcing, is the solution of the

equation system given by the A- and B-group members' collaboration functions (5 and 11, respectively):

$$y^* = \frac{\left(\frac{1}{2} + \sigma\right) + \rho\left(\frac{1}{2} + s\right)}{1 - \rho r} \tag{12}$$

$$x^* = \frac{\left(\frac{1}{2} + s\right) + r\left(\frac{1}{2} + \sigma\right)}{1 - \rho r} \tag{13}$$

To ensure that that x^* and y^* are positive, we assume that $\rho r < 1$.

Note that, for a given variance of the random motivation variable u_i, the social equilibrium depends solely on two phenomena: "unreciprocated prosociality," denoted by the unreciprocated prosociality parameters (σ, s) and "reciprocity," denoted by the reciprocity parameters (r, ρ).

When $0 < r\rho < 1$, the proportion of collaborative As is positively related to the magnitudes of both the unreciprocated prosociality parameters and the reciprocity parameters:

$$\frac{dy^*}{d\sigma} = \frac{1}{1 - \rho r}, \quad \frac{dy^*}{ds} = \frac{\rho}{1 - \rho r}$$

$$\frac{dy^*}{d\rho} = \frac{1}{2\left(1 - \rho r\right)^2}\left(r + 2s + 2r\sigma + 1\right),$$

$$\frac{dy^*}{dr} = \frac{\rho}{\left(1 - \rho r\right)^2}\left(\sigma + \frac{1}{2}\rho + s\rho + \frac{1}{2}\right) \tag{14}$$

Analogously, the proportion of collaborative Bs also depends positively on the unreciprocated prosociality and reciprocity parameters.

4.2   Comparative Statics

For the motivation equilibrium, it can be shown that **an exogenous increase in unreciprocated prosociality** has a multiplier effect on the long-run proportion of collaborative A's. In the first round of the multiplier ($\tau = 1$), the AC function shifts upwards, leading to a rise in the proportion of collaborative A's, for any given proportion of collaborative B's: $dy|_{\tau=1} = d\sigma$. In the second round, this leads to a change in the proportion of collaborative B's, along the BC function $(dx|_{\tau=2} = rdy|_{\tau=1})$, leading to another rise in the proportion of collaborative A's, along the AC function: $dy|_{\tau=2} = \rho dx|_{\tau=2} = \rho rdy|_{\tau=1}$. Similarly, in the third round, $dy|_{\tau=3} = \rho rdy|_{\tau=2}$. Thus the entire multiplier effect of an exogenous increase in A-cooperation on the proportion of collaborative A's is

$$M_A = \frac{dy}{d\sigma} = \frac{1}{1 - \rho r}$$

Similarly, the multiplier effect of an exogenous increase in A-cooperation on the proportion of collaborative B's is

$$M_B = \frac{dx}{d\sigma} = \frac{r}{1 - \rho r}$$

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We call these the "*prosociality multipliers.*"

Figure 2a illustrates these multipliers for the case of "positive reciprocity" for both agents (where the reciprocity return differentials are both positive: $r, \rho > 0$), i.e. the sum of the gains from reciprocation exceed the sum of the gains from unreciprocated actions. Figure 2b shows the operation of these multipliers when there is "negative reciprocity" for both agents (where the reciprocity return differentials are both negative: $r, \rho < 0$).

Figure 2c shows the multiplier process when A's have "positive reciprocity" while B's have "negative reciprocity."[24] Now the approach to the new equilibrium takes the form of damped oscillations. The exogenous increase in A-cooperation leads to a multiplier rise in the proportion of collaborative A's and a multiplier fall in the proportion of collaborative B's.

Finally, Figure 2d shows the multiplier process when A's have "negative reciprocity" while B's have "positive reciprocity."[25] In this case, the exogenous increase in A-cooperation leads to a multiplier rise in both A- and B's.

The multiplier effect of **an exogenous increase in A's reciprocity** on the proportion of collaborative A's is[26]

$$M_A = \frac{dy}{d\rho} = \frac{r + 2s + 2r\sigma + 1}{2(1 - r\rho)^2}$$

and the multiplier effect of an exogenous increase in A's positive reciprocity on the proportion of collaborative B's is

$$M_B = \frac{dx}{d\rho} = \frac{2r(r + 2s + 2r\sigma + 1)}{(1 - r\rho)^2}$$

We call these the "*reciprocity multipliers.*"

Observe that for positive reciprocity ($0 < \rho, r < 1$), the approach to the new equilibrium is monotonic and the exogenous increase in A's reciprocity leads to a multiplier rise in the proportion of collaborative As and Bs.

The results above are both powerful and largely surprising. While it is not surprising that the evolution of cooperation among social groups should depend on the unreciprocated prosociality and reciprocity of these groups, it is interesting, first, that the degree of unreciprocated prosociality, independent of reciprocity, should depend solely on the four ethical conditions above. Second, our results imply that positive reciprocity (i.e. I benefit you if you benefit me) is precisely just as effective as negative reciprocity (i.e. I harm you if you harm me) for promoting cooperation. In particular, what matters for cooperation is *the sum of the reciprocated returns relative to the sum of the unreciprocated returns.* This is a specific - and thus far unexplored - notion of reciprocity. Third, while it is not surprising that the social motive multipliers M_A and M_B depend on the degree of reciprocity, it is interesting that this degree of reciprocity should depend only on the product of A's and B's' reciprocity parameters.[27]

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[24] For an equilibriuim to exist, we assume that $-\frac{1}{r}\left(\frac{1}{2} - s\right) > \left(\frac{1}{2} - \sigma\right)$.

[25] For an equilibriuim to exist, we assume that $-\frac{1}{r}\left(\frac{1}{2} - s\right) < \left(\frac{1}{2} - \sigma\right)$.

[26] To ensure that the equilibrium exists, we assume that $-\frac{1}{r}\left(\frac{1}{2} - s\right) < \left(\frac{1}{2} - \sigma\right)$.

[27] The greater is this product, the greater are the social motive multipliers, i.e. the greater
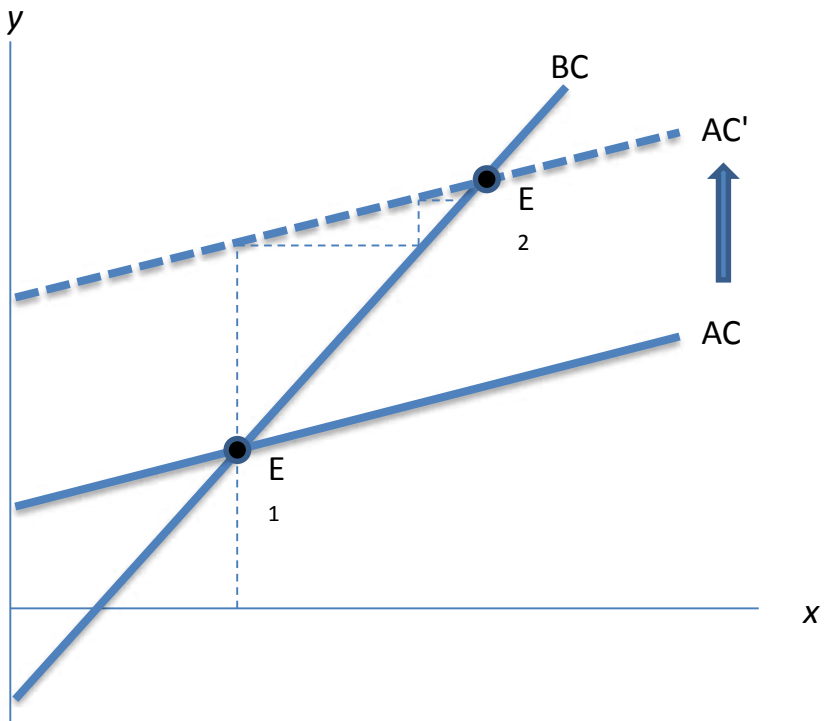
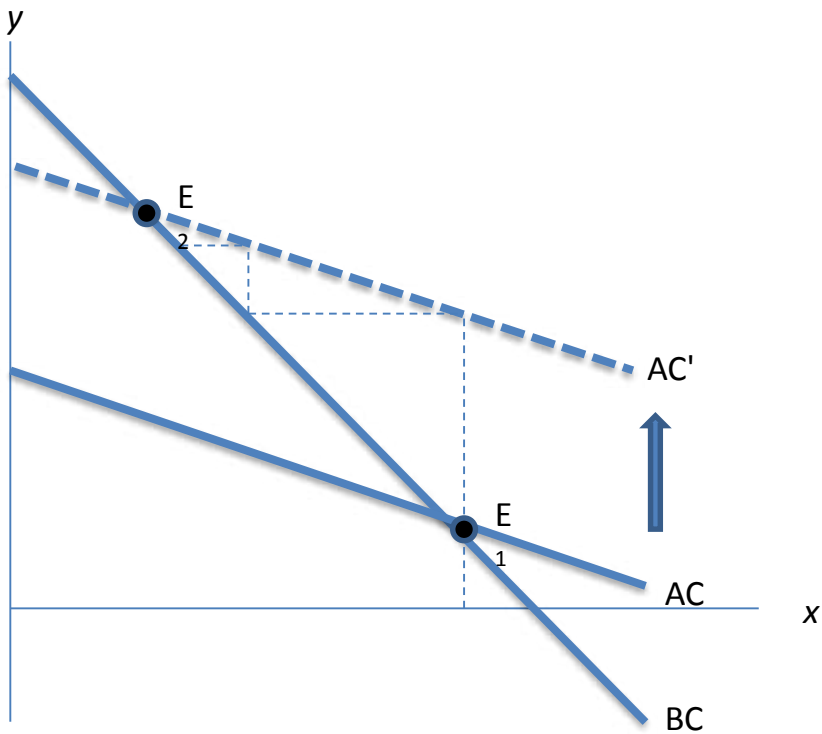Fig. 2a: A's Prosociality Multiplier under Positive Reciprocity

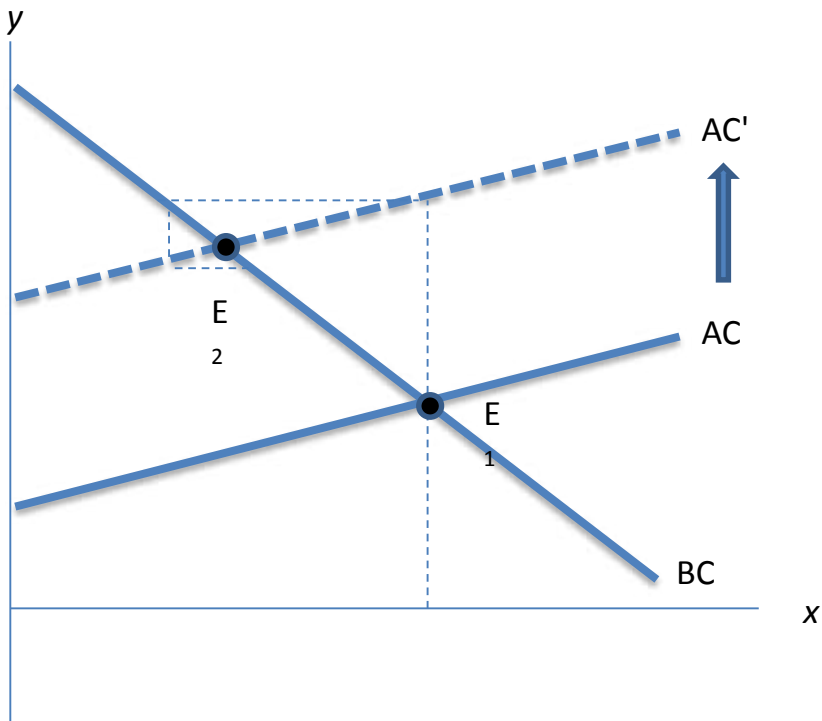Fig. 2b: A's Collaboration Multiplier under Negative Reciprocity

Fig. 2c: A's Collaboration Multiplier under A's Positive
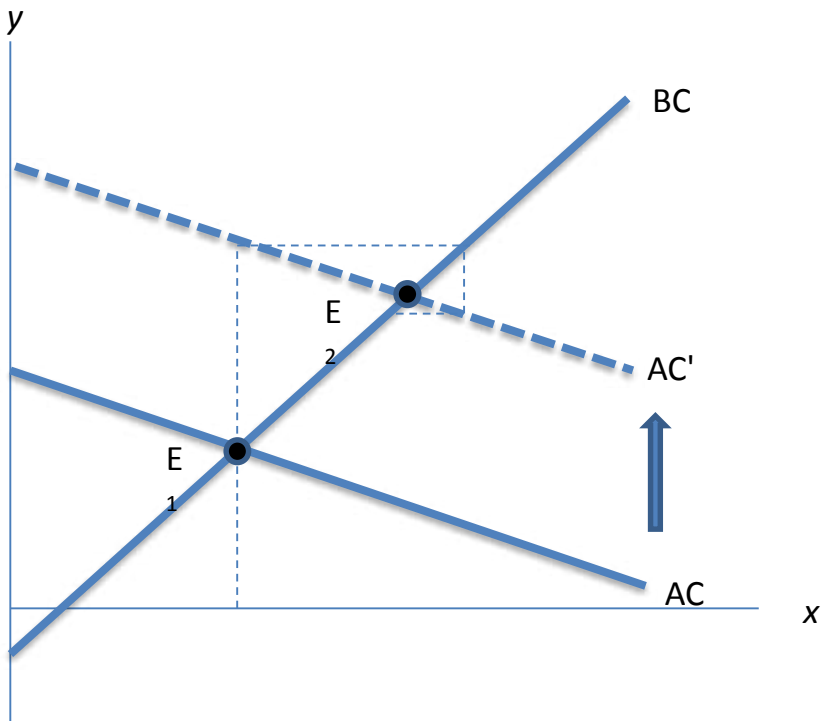Reciprocity and B's Negative Reciprocity

Fig. 2d: A's Collaboration Multiplier under A's Negative
Reciprocity and B's Positive Reciprocity

4.3   The Economic Domain

Assuming that the sizes of Groups A and B are exogenously given, we now consider a labor market in which workers and firms are mutually responsive to each other's motives. We first examine the effect of a rise in skills (α) on expected output; then we explore how an exogenous rise in prosociality affects output.

4.3.1   The Skill Effect

Along the same lines as above, the rise in skills raises the reciprocity parameters (ρ, r) of both social groups, while leaving the other parameters (σ, ρ, s) unchanged.[28] If we normalize the total population to unity, then the expected output becomes

$$q = \alpha x \left(1 - n\right) yn$$

where n is the size of group A and $(1 - n)$ is the size of group B. Specifically, the output effect of an increase in skill (α) is

$$
\begin{aligned}
\frac{dq}{d\alpha} &= x\left(1-n\right)yn + \alpha\frac{d\rho}{d\alpha}\left(\frac{dx}{d\rho}y\left(1-n\right)n + \frac{dy}{d\rho}x\left(1-n\right)n\right) \\
&+ \alpha\frac{dr}{d\alpha}\left(\frac{dx}{dr}y\left(1-n\right)n + \frac{dy}{dr}x\left(1-n\right)n\right)
\end{aligned}
$$

Here we see how the economic and social effects of the productivity change operate side by side. The first term represents the *economic effect* of the rise in output per worker, namely, the direct effect of productivity on output ($\frac{d(\alpha x^* y^*)}{d\alpha}$, holding the values of x^* and y^* constant). The second and third terms represent the *social effect*, namely, the indirect influence via A's and B's propensities to cooperate ($\alpha\frac{d(x^* y^*)}{dr}$ and $\alpha\frac{d(x^* y^*)}{d\rho}$). Both effects are positive, so that the social effect reinforces the economic effect. Note, however, that the economic effect is itself the result of social forces, as described by the unreciprocated prosociality and reciprocity parameters of the two agents: $x^* y^* = \frac{\left(\left(\frac{1}{2}+s\right)+r\left(\frac{1}{2}+\sigma\right)\right)\left(\left(\frac{1}{2}+\sigma\right)+\rho\left(\frac{1}{2}+s\right)\right)}{1-\rho r}$.

The social effect may be interpreted as a productivity-driven social multiplier.[29] In particular, a rise in productivity (i) raises the firm's propensity to provide training, which (ii) raises the worker's propensity to provide effort, which in turn (iii) raises the firm's propensity to provide training, and so on. Note that the size of this social multiplier depends positively on the unreciprocated prosociality parameters σ and s of the worker and firm, respectively; and

the effect of an exogenous rise in A's prosociality parameters on the long-run proportion of A- and B's.

[28] For agent B, $r = (c + d) - (s + f)$, so that $\frac{dr}{dc} = 1$.

[29] This multiplier is explained through our comparative static results concerning the influence of reciprocity on social cooperation.

also positively on the reciprocity parameters ρ and r of the worker and firm, respectively: $\frac{d\left(\frac{dq}{d\alpha}\right)}{d\sigma}$, $\frac{d\left(\frac{dq}{d\alpha}\right)}{ds}$, $\frac{d\left(\frac{dq}{d\alpha}\right)}{d\rho}$, $\frac{d\left(\frac{dq}{d\alpha}\right)}{dr} > 0.$

This result has many practical applications for assessing the effectiveness of education and training. For example, it suggests that the reason why refugees with deficient skills are often difficult to integrate in the labor market is not just that employers have limited demand for low-skill work, but also that the lower the skills of the refugees, the less willing employers are to provide training, which makes the refugees less willing to provide effort, leading to a multiplier rise in the refugees' unemployment rate.

4.3.2   The Prosociality Effect

The output effect of an increase in A's unreciprocated prosociality σ (for example, through compassion meditation) is

$$\frac{dq}{d\sigma} = \frac{d\left(\alpha x^* y^*\right)}{d\sigma} = \frac{2r + 2s + 4r\sigma + r\rho + 2rs\rho + 1}{2\left(1 - r\rho\right)}$$

This multiplier depends positively on the reciprocity parameters ρ and r, and on the unreciprocated cooperation parameters σ and s.[30]

This result is a straightforward illustration of the channels whereby social relations influence economic performance. The social relations determine whether agents are willing to engage in mutual cooperation, which in turn generates output. This analysis is relevant to cooperation in all economic markets characterized by incomplete contracts, so that the transacting parties need to trust one another to fulfill the terms of the transaction. In the absence of such trust, the potential gains from trade cannot be realized.

In this context it is easy to understand how corporate culture – psychological and social setting within which a firm conducts its business – affects economic performance. Corporate culture is driven by the beliefs, norms and values of the firm. In the business and management literature, corporate culture is recognized as an important influence on productivity and other measures of corporate performance.[31] Our analysis suggests that the influence of corporate culture affects the economic performance of firms by influencing the gains from mutual cooperation, mutual defection, free riding and being suckered. In particular, our analysis indicates how these implications of corporate culture

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[30] See Appendix on "The Effect of an Increase in Cooperativeness".

[31] See, for example, Peters, T.J. and Waterman, R.H. (1982) In Search of Excellence: Lessons from America's Best-Run Companies. Harper & Row, New York.

Denison, D.R., Haaland, S. and Goelzer, P. (2004) Corporate Culture and Organizational Effectiveness: Is Asia Different from the Rest of the World? Organizational Dynamics, 33, 98-109.

http://dx.doi.org/10.1016/j.orgdyn.2003.11.008

Martinez, E. A., N. Beaulieu, R. Gibbons, P. Pronovost, and T. Wang (2015), "Organizational Culture and Performance," American Economic Review 105 (2015): 331-35.

Luigi G., P. Sapienza, and L. Zingales, 2008, "Social Capital as Good Culture", The Journalof the European Economic Association, April-May, 6(2-3): 295-320.

affect the willingness of managers and workers to cooperate through their influence on the unreciprocated prosociality and reciprocity parameters. Thereby it becomes straightforward to understand, for example, why the productivity of workers should depend on whether the firms are management- versus family-run (since the interpersonal relations within these types of firms is generally quite different), whether the firms are run on individualistic versus collectivistic lines (emphasizing self-interest versus the collective good), and the inequality of power between the bosses and their subordinates.[32]

4.4   The Social Domain

A competitive individual (i.e. an individual with a competitive identity) switches from a competitive to prosocial identity when

$$X_p(i,j) > X_c(j) + k$$

where k is the cost (a psychic cost) of switching from a competitive identity to an prosocial one. This implies the following cutoff value for the motivational variation u_i:

$$u_i > -ry^* - s + k$$

where the equilibrium proportion y^* of collaborative members of the prosocial social group is given by equation (12).

Recalling that the population is normalized to unity and that u_i is uniformly distributed over $[-\frac{1}{2}, \frac{1}{2}]$, Then the number of competitive individuals switching to a prosocial identity from period $t-1$ to t is $\left(\frac{1}{2} + rx + (s-k)\right)(1 - n_{t-1})$ and the number of prosocial individual switching to a competitive identity in this time is $\left(\frac{1}{2} - \rho x - \sigma\right) n_{t-1}$.

Consequently the change in the number of individuals with a prosocial identity is the difference between the number of entrants and the number of exits from the prosocial group:

$$\Delta n_t = \left(\frac{1}{2} + ry^* + s - k\right)(1 - n_{t-1}) - \left(\frac{1}{2} - \rho x^* - \sigma\right) n_{t-1}$$

and the time path of prosocial individuals may be described by the following *prosocial identity dynamics function (PID)*:

$$n_t = a + b n_{t-1} \tag{15}$$

where

$$a = \frac{1}{2} + ry^* + s - k$$

$$b = (\rho x^* - ry^*) + \sigma + (k + \kappa)$$

The term a can be used to represent the *impact effect* of a change in the reciprocity, prosociality, and identity-switching parameters $(\sigma, s; \rho, r; \kappa, k)$, i.e.

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[32] The latter are dimensions of culture identified by Hofstede (1991, 2001) as relevant to organizational performance.

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the effects on the equilibrium number of prosocial-group members in the current period. A change in one of these parameters has a motivation-driven impact effect via y^* (an aspect of the social motivation equilibrium) and an identity-driven impact effect (i.e. an effect on the proportion of p-group members, for any given social motivation equilibrium).

Similarly, the term b can be used to represent the *persistence effect* of a change in these parameters (i.e. the effect on the equilibrium number of prosocial-group members in the next period), and this effect can also be decomposed into a motivation-driven and identity-driven components.

The long-run equilibrium proportion of prosocial individuals is

$$\bar{n} = \frac{a}{1-b} \tag{16}$$

This represents the identity equilibrium, in which the proportion of individuals with prosocial identity generates motives that reaffirms the initial proportion of prosocial individuals. For economically meaningful results, we assume that $a > 0$ and $b < 1$.

The behavior of the dynamic identity system depends solely on three sets of parameters: (i) the identity-switching costs $(\kappa,\ k)$, (ii) the unreciprocated prosociality parameters $(\sigma,\ s)$ and (iii) the reciprocity parameters $(\rho,\ r)$.

In order to gain insight into the roles of these parameters in this system, it is useful to examine the effect of a parameter change on the time path of prosocial individuals in the following special cases.

4.4.1 Case A: Zero Reciprocity

When the reciprocity parameters are zero $(\rho = r = 0)$, the motives of the two groups develop independently of one another, so that the social motivation equilibrium depends solely on the unreciprocated prosociality parameters:

$$y^* = \frac{1}{2} + \sigma \tag{17}$$

$$x^* = \frac{1}{2} + s \tag{18}$$

Furthermore, the impact parameter (the intercept of the PID function) depends only on the difference between the competitive-group's unreciprocated prosociality parameter and cost of switching to a prosocial identity:

$$a = \frac{1}{2} + s - k$$

Finally, the persistence parameter depends on only the difference between the unreciprocated prosociality parameters of the two groups and the sum of their identity switching costs:

$$b = (\sigma - s) + (k + \kappa)$$

The long-run proportion of prosocial-group members in the population is thus

$$\overline{n} = \frac{\frac{1}{2} + s - k}{1 - ((\sigma - s) + (k + \kappa))}$$

where we assume that $\frac{1}{2} + s - k > 0$ for meaningful results.

For the prosocial group, it is not surprising that the unreciprocated prosociality multiplier is positive (i.e. more p-group prosociality leads to a larger long-run proportion of p-group members):

$$\frac{d\overline{n}}{d\sigma} = \frac{\frac{1}{2} + s - k}{\left(1 - (\sigma - s) - (k + \kappa)\right)^2} > 0$$

But it may appear surprising, at first sight, that for the competitive group, the prosociality multiplier may be negative (when $\kappa + \sigma > \frac{1}{2}$):

$$\frac{d\overline{n}}{ds} = -\frac{\kappa + \sigma - \frac{1}{2}}{\left(1 - (\sigma - s) - (k + \kappa)\right)^2}$$

The reason lies in the persistence effect: whereas a rise in σ has no impact effect and a positive persistence effect, a rise in s has a positive impact effect and a negative persistence effect. Thus a rise in s generates a short run increase in the proportion of p-group members in the population, but in the long run it may reduce this proportion if the cost of switching to a competitive identity is sufficiently high (reducing the competitiveness of the c-group) and the p-groups prosociality parameter is sufficiently high (raising the competitiveness of the p-group).

The same reasoning applies to the effects of the identity switching costs on the proportion of p-group members. Not surprisingly, a rise in the cost of switching to a competitive identity raises the proportion of p-group members:

$$\frac{d\overline{n}}{d\kappa} = \frac{\frac{1}{2} + s - k}{\left(1 - (\sigma - s) - (k + \kappa)\right)^2} > 0$$

But an increase in the cost of switching from the competitive to the prosocial identity may also raise the proportion of p-group members (if $\kappa + \sigma > \frac{1}{2}$):

$$\frac{d\overline{n}}{dk} = \frac{\kappa + \sigma - \frac{1}{2}}{\left(1 - (\sigma - s) - (k + \kappa)\right)^2}$$

To explain this paradoxical result, note that the impact effect of this change is negative, whereas the persistence effect is positive. When $\kappa + \sigma$ is sufficiently large, the persistence effect dominates (since, once again, a larger κ reduces the competitiveness of the c-group and a larger σ increases the competitiveness of the p-group).

Figure 3 illustrates the case in which the persistence effect dominates the impact effect. Suppose that the initial position is Point E_1 along A's prosocial
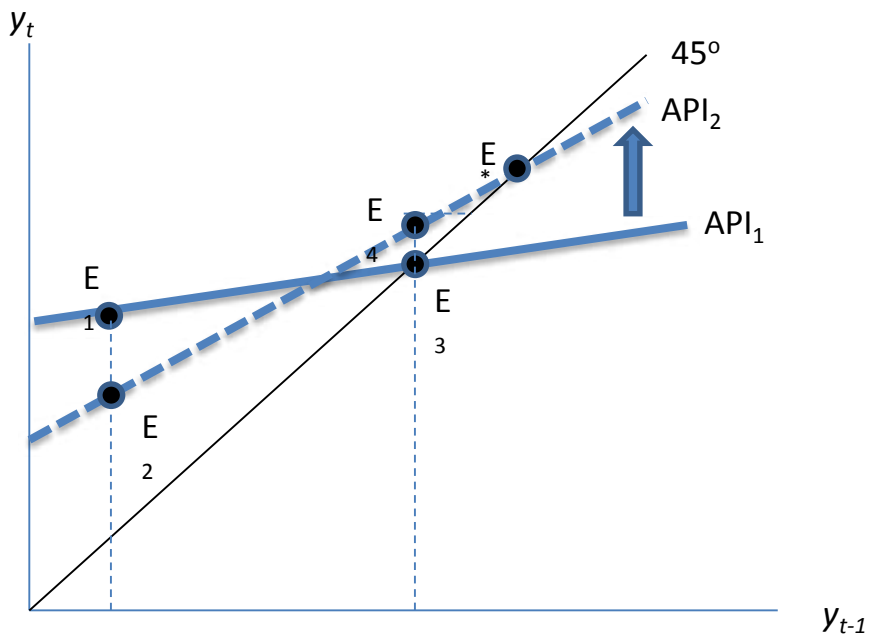
Fig. 3: The Effect of a Rise in the Cost of Acquiring a
Prosocial Identity

identity dynamics curve API_1, whereupon the cost of achieving a prosocial identity rises. Thus the curve shifts to API_2, with a lower intercept (the short-run effect) and a higher slope (the long-run effect). As a result, the proportion of prosocial A's falls from Point E_1 to E_2 in the short run. But in the long run, the proportion of prosocial A's rises to Point E^*, which is higher than the initial proportion.

Alternatively, suppose that the initial position is Point E_3 along curve API_1, after which the cost of switching to a prosocial identity increases. Here the impact effect is dominated by the persistence effect even in the short run, in which the proportion of prosocial A's rises from E_3 to E_4. In the long run, as above, the proportion rises even higher to E^*.

It is interesting to note that an increase in identity-switching costs is supported by the ethical principle of Loyalty: be loyal to your nation, people or religion. For the leaders of these social groups, the ethical principle that pulls in the same direction is that of responsible Authority: use your authority responsibly, in order to enhance the loyalty of your followers.[33] It is also supported by political institutions that encourage loyalty and the exercise of responsible authority (such as seniority rules and rewards for long-term service).

Finally, note that the prosociality parameter and the identity switching cost are Edgeworth substitutes for the p-group, but Edgeworth complements for the c-group:

$$\frac{d^2\overline{n}}{d\kappa d\sigma} = -\frac{2\left(s - k + \frac{1}{2}\right)}{(k - s + \kappa + \sigma - 1)^3} < 0, \quad \frac{d^2\overline{n}}{dk ds} = \frac{2\left(\kappa + \sigma - \frac{1}{2}\right)}{(k - s + \kappa + \sigma - 1)^3} > 0$$

For our economic model, the equilibrium output generated under zero reciprocity parameters is

$$q^* = \alpha \left(x^* (1 - \overline{n})\right)(y^* \overline{n}) - w \tag{19}$$

$$= \alpha \frac{\left(\frac{1}{2} + s\right)\left(\frac{1}{2} + \sigma\right)\left(\frac{1}{2} - \sigma - \kappa\right)\left(\frac{1}{2} + s - k\right)}{1 - ((\sigma - s) + (k + \kappa))} - w \tag{20}$$

The output effects of a change in the parameters above $(\sigma, s; \rho, r; \kappa, k)$ depends on (1) their effects on the social motivation equilibrium (specified in terms of the proportion of collaborative p- and c-group members) and (2) their effects via the proportion of p-group members in the population. Both of these effects have been described above.

4.4.2   Case B: Zero Unreciprocated Prosociality

When the unreciprocated parameters are zero ($\sigma = s = 0$), the social motivation equilibrium becomes:

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[33] See, for example, Haidt (2012).

$$y^* = \frac{1}{2}\frac{1+\rho}{1-\rho r} \tag{21}$$

$$x^* = \frac{1}{2}\frac{1+r}{1-\rho r} \tag{22}$$

A rise in the reciprocity parameters raise the proportion of collaborative individuals in each group.[34]

The p-group's reciprocity multiplier is positive:

$$\frac{d\overline{n}}{d\rho} = \left(\begin{array}{c} \frac{\rho}{(1-((\rho x^* - r y^*)+(k+\kappa)))^2}\frac{dx^*}{d\rho} \\ +\frac{r}{1-((\rho x^* - r y^*)+(k+\kappa))}\frac{dy^*}{d\rho} \end{array} \right) + \left(x^*\frac{r y^* - k + \frac{1}{2}}{(k+\kappa - r y^* + \rho x^* - 1)^2} \right) > 0$$

where the first term is the motivation-driven effect and the second term is the identity-driven effect, both of which are positive.[35]

Furthermore, the c-group's reciprocity multiplier is ambiguous in sign:

$$\frac{d\overline{n}}{dr} = \left(\begin{array}{c} \rho\frac{r y^* - k + \frac{1}{2}}{(k+\kappa + x\rho - r y^* - 1)^2}\frac{dx^*}{dr} \\ -\frac{1}{2}r\frac{2\kappa + 2x\rho - 1}{(k+\kappa + x\rho - r y - 1)^2}\frac{dy^*}{d\rho} \end{array} \right) - \left(\frac{1}{2}y^*\frac{2\kappa + 2\rho x^* - 1}{(k+\kappa - r y^* + \rho x^* - 1)^2} \right) > 0$$

where the motivation-driven and identity-driven effects (first and second terms, respectively) may both be positive or negative.

4.4.3 Case C: Zero Identity Switching Costs

In the absence of identity switching costs ($\kappa = k = 0$), the social motivation equilibrium is given by (12) and (13). Here a rise in the prosociality parameters increases the proportion of collaborative group members:

$$\frac{dy^*}{d\rho} = \frac{r + 2s + 2r\sigma + 1}{2(r\rho - 1)^2} > 0 \ \text{ and } \ \frac{dy^*}{dr} = \frac{\rho\left(\sigma + \frac{1}{2}\rho + s\rho + \frac{1}{2}\right)}{(r\rho - 1)^2} > 0$$

Furthermore, the prosociality and reciprocity parameters are Edgeworth complements:

$$\frac{d^2 y^*}{d\rho d\sigma} = \frac{r}{(r\rho - 1)^2} > 0 \ \text{ and } \ \frac{d^2 y^*}{dr ds} = \frac{\rho^2}{(1 - r\rho)^2} > 0$$

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[34] $\frac{dy^*}{d\rho} = \frac{d\left(\frac{1}{2}\frac{1+\rho}{1-\rho r}\right)}{d\rho} = \frac{r+1}{2(r\rho - 1)^2} > 0$, $\frac{dy^*}{dr} = \frac{1}{2}\frac{\rho(\rho+1)}{(r\rho - 1)^2} > 0$

$\frac{dx^*}{d\rho} = \frac{1}{2}\frac{r(r+1)}{(r\rho - 1)^2} > 0$, $\frac{dx^*}{dr} = \frac{1}{2}\frac{\rho+1}{(r\rho - 1)^2} > 0$

[35] The long-run proportion of prosocial-group members in the population is

$$\overline{n} = \frac{\frac{1}{2} + r y^* - k}{1 - ((\rho x^* - r y^*) + (k + \kappa))}$$

The long-run proportion of prosocial-group members in the population is

$$\overline{n} = \frac{\frac{1}{2} + ry^* + s}{1 - ((\rho x^* - ry^*) + \sigma)}$$

Thus the p-group's reciprocity multiplier, for any given social motivation equilibrium, is positive:

$$\frac{d\overline{n}}{d\rho} = x^* \frac{s + ry^* + \frac{1}{2}}{(\sigma - ry^* + \rho x^* - 1)^2} > 0$$

and the c-group's reciprocity multiplier, for any given social motivation equilibrium, is ambiguous in sign:

$$\frac{d\overline{n}}{dr} = -\frac{1}{2} \frac{y^* (2s + 2\sigma + 2\rho x^* - 1)}{(\sigma - ry^* + \rho x^* - 1)^2}$$

5 Multiple Equilibria and the "Big Push"

Thus far we have considered only unique, stable social motivation equilibria. However, these equilibria are merely a technical artefact arising from our assumption that the motivation variations across agents are uniformly distributed. In particular, assuming that the cumulative density function H of the random motivation variable u_i is uniformly distributed, A's and B's collaboration functions (AC and BC, respectively) are linear. Under single-peaked distributions, however, nonlinear collaboration functions and multiple equilibria become possible. These multiple equilibria have important social and economic implications.

For example, if the random motivation variable u_i is normally distributed and there is positive reciprocity, the cumulative density H may be pictured as shown in Figure 4. For the collaboration functions AC and BC, there are two stable equilibria: a "low coperation equilibrium" E_1 and a "high cooperation equilibrium" E_2.

Suppose that the society is initially at the high-cooperation equilibrium E_1. Then an adverse "big push" that destroys trust and good-will – such as a terrorist attack initiated by a religious or ethnic group – can shift the AC curve downwards from AC_1 to AC_2 and thus move the society to the low-cooperation equilibrium E_2. A reversal of this adverse push, from AC_2 back to AC_1, does not restore the high-cooperation equilibrium E_1. Rather, the society moves from the low-cooperation equilibrium E_2 to the somewhat slightly more favorable low-cooperation equilibrium E_3.

In order to reach a high-cooperation equilibrium, the society requires a much bigger favorable push than a mere reversal, such as from E_2 to E_3. In short, the trust and good-will that is destroyed through an competitive event may be difficult to rebuild and require the society to create much more trust and good-will than in the previously harmonious state.

In the same spirit, a society that is initially in a low-cooperation equilibrium E_3 – such as relatively low-trust societies such as Russia and Greece, in which
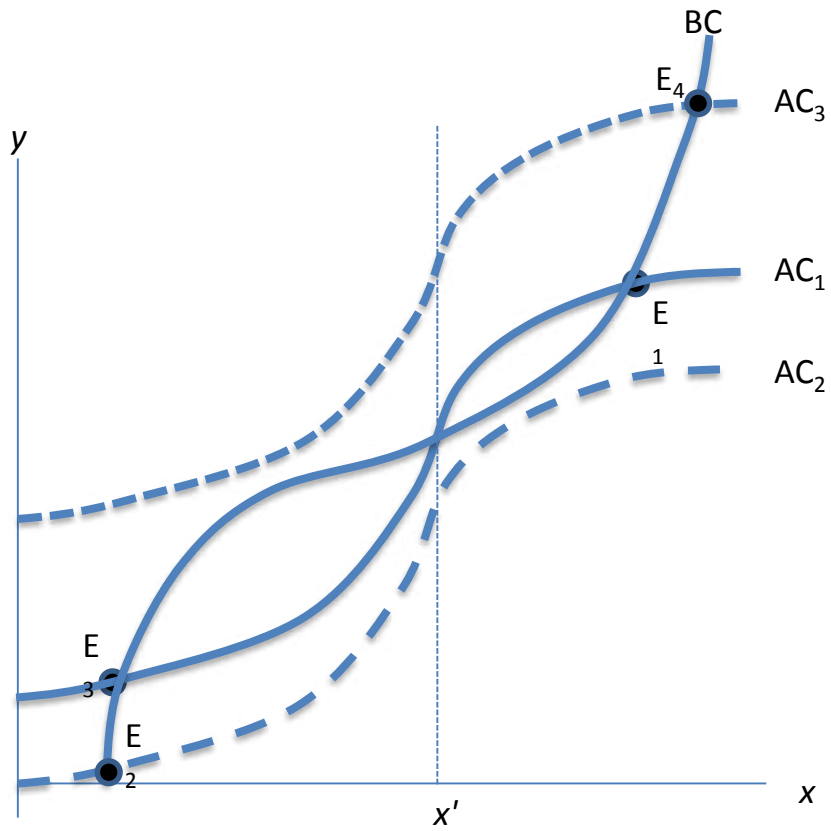
Fig. 4: Multiple Equilibria under Positive Reciprocity

corruption among civil servants is common and citizens are unwilling to pay taxes – could possibly reach a high-cooperation equilibrium E_4 through a big favorable push from AC_1 to AC_2 (such as through appropriate institutional changes that promote transparency and fairness, combined with public relations initiatives to promote pro-social norms). If these policy changes succeeds in establishing a high-cooperation equilibrium, then a reversal of these policies will not lead to a return to the low-cooperation equilibrium E_3, but rather to a somewhat less favorable high-cooperation equilibrium E_1.

Finally, the nonlinearities above also imply that "small" and "large" temporary shocks may have radically different social effects. Specifically, "small" temporary shocks in the neighborhood of the long-run equilibrium (such as E_1 or E_3 in Figure 4), leading to temporary shifts of the AC function, have temporary – but no permanent – effects on this equilibrium. Once the AC function has returned to its original position, the equilibrium proportions of collaborative agents return to their original values as well.

By contrast, "large" temporary shocks can have permanent effects. For example, consider a society is initially at a high-cooperation long-run equilibrium E_1 and then witnesses a large, adverse shock – such as a sudden, large influx of competitive refugees, manifested in a sudden drop in the unreciprocated prosociality of the workforce – that shifts the AC function temporarily downwards to AC_1 to AC_2. If the shock lasts long enough in order for the proportion of collaborative A's to fall beneath x', then a return of the AC function from AC_1 to AC_2 – such as a return of the competitive refugee flow to its initial level – will not lead to a return to the high-cooperation long-run equilibrium E_1. Rather, the society will get stuck at the low-cooperation long-run equilibrium E_3.

6   Ethical Principles and the Effects of Prosociality and Reciprocity

In the social equilibrium system (5)-(11), the unreciprocated prosociality parameters (σ, s) measure people's preference for unreciprocated cooperation, whereas the reciprocity parameters (ρ, r) measure their preference to reciprocated over unreciprocated behavior. We now examine how the proportion of collaborative agents responds to (i) an exogenous increase in unreciprocated prosociality, holding reciprocity constant, and (ii) an exogenous increase in reciprocity, holding unreciprocated prosociality constant.

Specifically, we capture an exogenous increase in unreciprocated prosociality (with unchanged reciprocity) by a rise in the intercept σ of the AC function, leaving the responsiveness parameter ρ (and all other parameters of the model) unchanged. Recall that the unreciprocated prosociality parameter ($\widehat{\sigma} = ((1-\beta) S_A + \beta F_B) - ((1-\gamma) D_A - \gamma D_B)$) and reciprocity paramter ($\widehat{\rho} = ((1-\beta) C_A + \beta C_B) + ((1-\gamma) D_A - \gamma D_B) - (((1-\beta) S_A + \beta F_B) + (1-\gamma) F_A - \gamma S_B))$) are interdependent via the sucker's return $((1-\beta) S_A + \beta F_B)$ and the return from mutual defection $((1-\gamma) D_A - \gamma D_B)$. Thus an exogenous increase in unreciprocated

prosociality, holding reciprocity constant, may be specified in four distinct ways:

- **Encouraging care**: An equal rise in returns from reciprocated cooperation $((1 - \beta) C_A + \beta C_B)$ and unreciprocated cooperation $((1 - \beta) S_A + \beta F_B)$[36]

- **Discouraging defection**: An equal fall in returns from reciprocated defection $(((1 - \gamma) D_A - \gamma D_B))$ and unreciprocated defection $((1 - \gamma) F_A - \gamma S_B)$[37]

- **Encouraging reciprocal pro-sociality**: A rise in returns from reciprocated cooperation (C) accompanied by an equal fall in returns from reciprocated defection $(((1 - \gamma) D_A - \gamma D_B))$[38]

- **Encouraging clemency**: A rise in returns unreciprocated cooperation $((1 - \beta) S_A + \beta F_B)$ accompanied by an equal fall in returns from free riding $((1 - \gamma) F_A - \gamma S_B)$[39]

Furthermore, we capture an exogenous increase in reciprocity (with unchanged unreciprocated prosociality) by a rise in the slope of the AC function, leaving the intercept constant. This may be specified in terms of the following condition:

- **Discouraging Exploitation**: A rise in returns from reciprocated cooperation (C) relative to returns from unreciprocated cooperation $((1 - \gamma) F_A - \gamma S_B)$[40]

As noted in the introduction, these conditions can be shown to correspond to well-known ethical principles. In particular, the "encouraging care" condition corresponds to the ethical principle is *Benevolence* (or Love)*: Care for strangers, regardless of whether your care is requited or unrequited. The "discouraging defection" condition corresponds to the ethical principle of *Helpfulness*: Avoid being unhelpful to the strangers, regardless of whether the stranger is helpful to you. The ethical principle underlying "encouraging reciprocal pro-sociality" condition is the *Golden Rule*: Do unto others what you wish others to do unto you. The ethical counterpart of the "encouraging clemency" condition is the principle of *forgivenness and mercy*: Be forgiving and compassionate to strangers. The "discouraging exploitation" condition corresponds to corresponds to the ethical principle of *protecting the weak and vulnerable*: Avoid exploiting strangers. In this way, our analysis shows how the above ethical

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[36]The rise in S raises cooperativeness (σ), while the equal rise in S and C leaves reciprocity (ρ) constant.

[37]The fall in D raises cooperativeness (σ), while the equal fall in D and F leaves reciprocity (ρ) constant.

[38]The fall in D raises cooperativeness (σ), while the rise in C and equal fall in D leaves reciprocity (ρ) constant.

[39]The rise in S raises cooperativeness (σ), while the rise in S and equal fall in F leaves reciprocity (ρ) constant.

[40]The rise in $(C - F)$ raises ρ, while σ is constant since S and D are unchange.

principles serve to promote cooperation beyond the bounds of our existing social groups.

Our analysis also suggests that such cooperation is promoted through well-known political principles and their associated institutions. In particular, we show how the four forms of cooperativeness are promoted through four sets of well-known social and political practices: (a) institutions to reward public service (such as through public honors), (b) institutions for public censure of unhelpfulness (such as independent media), (c) institutions to promote reciprocal fairness (such as through expressions of public approval in the political debate or the media, or through judicial channels), and (d) institutions, as well as legal and political practices, promoting leniency when there is doubt of culpability (such as the presumption of innocence in courts of law), censure of free-riding, and punishment for corruption (such as the enforcement of anti-corruption laws) and (e) institutions that allow protection of the vulnerable (such as the right to be defended in courts of law).

7   Concluding Remarks

This paper explores market activities in terms of social relations that underpin them. For simplicity, we have restricted our attention to prosocial and competitive social relations. When the rewards for economic cooperation cannot be contractually assured, economic cooperation commonly rests on social cooperation. Even under complete contracts, private gains from cooperation may not be exploited on account of associated social costs and benefits (as in the case of public goods and common pool resources). Social relations between social groups encourage or discourage econmomic cooperation through the social preferences that drive them. These social preferences are driven by motives and over the longer run are reflected in identities, which make motives temporally persistent.

Thereby our analysis indicates how social cohesion affects corporate and macroeconomic performance. It helps explain how social divisions – between immigrants and natives, ethnic and religious divisions, and gender differences – influence people's willingness to cooperate with one another in the workplace and the civic arena, and thereby affect their economic interactions.

The ideas underlying our analysis may be summarized in the following propositions:

1. Economic cooperation commonly is shaped by social cooperation.

2. Social cooperation is driven by prosocial motives.

3. Whereas people have prosocial motives for members of their own social in-groups ("insiders"),[41] they may not have such motives for out-group members ("outsiders").

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[41] All social in-group are inherently based on affiliation. In the absence of affiliation, the in-group would cease to exist.

4. Motives are determined reflexively and consequently people's inter-group interactions shape their preferences towards each other.

5. In a "social motivation equilibrium," in which agents behave opportunistically, the motives of one social group promote the motives of another group. The proportion of cooperative agents depends on only two parameters, one concerning unreciprocated prosociality (characterizing individual agents' willingness to cooperate with members of another social group) and the other concerning reciprocity (summarizing the interconnectedness of social groups).

6. Changes in the payoffs from inter-group cooperation can generate multiplier changes in the social motivation equilibrium, leading to multiplier changes in the economic activities.

7. Identities help people address the problem of trust by making their behavior temporally persistent and thereby more predictable. Identities are temporally persistent on account of identity switching costs.

8. The identities of social groups are formed reflexively. In an "identity equilibrium," the identities of different social groups are consistent with one another, in the sense that the identities across groups reinforce themselves.

9. The evolution of identities may be understood as the outcome of a process of mutation and selection, where "mutuation" and "selection" are to be understood in cultural rather than biological terms.

10. In the long run, the proportion of cooperative identities depends positively on the identity switching costs, as well as the unreciprocated prosociality and reciprocity parameters.

We have shown that the unreciprocated prosociality and reciprocity parameters correspond to well-known ethical principles, as well as their political-social counterparts. Furthermore, the evolution of identities can be explained in terms of these two parameters as well as identity-switching costs. Thereby our model is simple enough to provide a clear picture of major avenues whereby social relations shape economic relations.

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