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Group-Oriented Values, Rules and Cooperation

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Abstract

This paper uses a game-theoretic framework to explain how collectivist values hamper societies' efforts to elicit cooperation in inter-group games of prisoners' dilemma (PD) and draws on the results of the analysis to interpret the meanings of three historical institutional reform episodes. Group-oriented values, widespread throughout non-western civilizations, can contribute to social cohesion, but tend to cause inter-group conflicts within a country. Regional, ethnic, and other internally cohesive groups often cannot get out of *defection traps* in political and economic PD games they play with each other. Repeating to play the games enhances chances for, but does not assure, cooperation between these groups. Factionalism makes it more difficult for group-oriented societies, compared with individualist ones, to achieve inter-group cooperation. History shows, however, that some societies have tamed factionalism by reforming their institutions. The institutional reforms in ancient Athens, colonial America, and Singapore show that *hybrid political groups*, or *institutionally-engineered political siblings*, which drew their members from rival groups, sought broader social interests than the ethnic or other pre-reform special-interest groups had done, thus, helping the societies achieve Paretian improvements. Indirect democracy in which the representatives of the hybrid political groups were key game players in political processes reduced chances for special-interest groups to form powerful factional coalitions.

Keywords: collectivism, cooperation, economic development, game theory, individualism, institutions, conflicts

JEL classification: C72, D74, O17, H10

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1 Introduction

One of the under-researched topics in economics, particularly in its analysis of institutions, is what collectivism and individualism—two different systems of cultural values—imply for the operation and development of a country's political and economic institutions. The operation and development of these institutions have far-reaching implications for the operation and development of an economy.

Economic theory, in general, assumes rational, individualist agents seeking self-interest. Research by Hofstede and by cross-cultural and social psychologists suggests, however, that culturally collectivist societies, by comparison with individualist societies, tend to value achieving *group objectives* more than achieving *individual objectives*.[1] These societies tend to have a large 'power distance', in Hofstede's (1997) terminology, and, thus, tend to tolerate their leaders' forceful, paternalistic, and authoritarian use of power.

The groups in this paper may be called *cultural groups*, which emerge as a result of prolonged social interactions, with or without blood ties. These groups are not necessarily those, such as discussed by Olson (1965), formed to seek collective net material gains, nor are they necessarily groups with blood-ties.[2] In a collectivist society, members of a group formed purely on account of shared material interests may acquire features of a cohesive cultural group, as its members expand and deepen their interactions. While an obvious factor that binds members of a group is blood-ties, people may acquire group-oriented values through parental upbringing, peer pressure, and formal education—processes that may broadly be called 'enculturation', in psychologists' term.[3]

Inter-group rivalry obviously is pronounced in a country where different ethnic groups compete for dominance as a result of an artificial national border drawn by a former colonial power. The phenomenon of group-oriented social interactions and inter-group conflicts are strong, however, even in collectivist countries (e.g., Korea) without ethnic division. Individuals belong to a variety of overlapping groups, to which they have different degrees of loyalty.

Examples of a group in this paper include, in addition to an ethnic group, residents in a region, or a regionally-based political party with intra-group cultural ties. Members of a group of this nature rarely change their membership, although, over time, economic and social changes (e.g., inter-regional migration) can alter the characteristics of such groups (e.g., a group of residents in a region that has a long value-sharing history).

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1 See Hofstede (1997, 2001); Berry *et al.* (1992), and Triandis *et al.* (1986, 1988).

2 Groups with blood-ties are obviously internally cohesive. Thus, when The Congo held the first election after independence, virtually all of the 120 political parties formed were aimed at promoting tribal interests. Many tribal groups have been in severe inter-group conflicts. Reader (1997) notes: 'Tribalism … has a distinctly dark and nasty African connotation: the Maasai and the Kikuyu in Kenya; the Zulu and the Xhosa in South Africa; the Yoruba, Hausa, and Igbo in Nigeria; the Hutu and the Tutsi in Rwanda and Burundi. These and other groups have at times seemed determined to eliminate each other simply because they claimed differences of birthright'. There are evidences, however, indicating that in Africa pre-colonial inter-*tribal* distinctions were not always sharp and clear.

3 See Berry *et al.* (1992: 17-41).

As shown in cross-country analysis in social psychology, ethnic groups in collectivist societies tend to be cohesive, more so than individualist societies. Groups of residents in separate regions in collectivist societies have shown tendencies of intra-group cohesion and inter-group rivalry. With a strong leader, a political party in a collectivist society often displays a high degree of intra-group cohesion and inter-group rivalry. These are not groups that form and dissolve easily as a result of short-run ups and downs of net benefits for their members.

While this tendency of inter-group conflicts may also exist in individualist societies, it tends to be more pronounced in collectivist societies. How these groups emerge is an important issue, which this paper does not attempt to analyse. The paper's point of departure is a recognition that, as empirically supported, such cohesive value-sharing groups exist, either as a result of blood and other ties.[4] Ethnic and other groups in individualist societies may have intra-group cohesion, but the degree of their intra-group cohesion is lower than in collectivist societies. Their cohesiveness and inter-group rivalry fluctuate as a result of changes in socioeconomic and political situations and are not as enduring as in collectivist societies.[5]

Collectivist societies characterized by a large power distance have certain strengths. They tend to value cooperation among members of a group. It may be relatively easy for a collectivist society to achieve consensus on *certain issues* in *certain circumstances*, for example, when its groups face a common external threat.[6] The acceptance of an unequal distribution of power, in principle, may allow forceful and wise authoritarian leaders to take decisive actions aimed at avoiding destructive social interactions.

Apart from these positive features, however, research in cross-cultural psychology suggests that culturally collectivist societies tend to experience (i) severe factionalism and *inter-group conflicts* and (ii) a high degree of *discretion* in rule enforcement, much more so than in individualist societies. Collectivist societies, in general, have developed a *rule of man*, while individualist societies have developed a *rule of law*. Both collectivist and individualist societies have rival groups, but inter-group conflicts in the former tend to be more intense than in the latter, where (i) individualist values tend to limit both intra-group cohesion and inter-group conflicts[7] and (ii) well-established formal third-party rules (e.g., constitutions and other laws) tend to limit destructive social interactions (see section 2).[8]

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4 Groups can have a variety of internal governance structure. Inter-group conflicts could be intensified by horizontal income inequality. See Addison (2001), Agarwal (2000) and Stewart (2001) for discussions of groups and inter-group conflicts and Heyer, Stewart and Thorp (1999) for a discussion of various types of internal governance of groups.

5 See Aronson, Wilson and Akert (2002) for a discussion of ups and downs of inter-ethnic rivalry in the United States, as a function of socioeconomic conditions.

6 At an early phase of the Korean financial crisis in 1997-98, group-oriented Koreans demonstrated a remarkable sense of unity and a willingness to endure individual financial hardship to promote an early recovery of the Korean economy. In general, however, Korea, an ethnically homogenous society, suffers from factionalism.

7 How individualism, by comparison with collectivism, subdues inter-group conflicts will be shown later.

8 That individualist societies rely on a rule of law is among Hofstede's major points.

Both *inter-group conflicts* and *discretionary rule enforcement* hamper collectivist countries' pursuit of rules-based political and economic interactions and economic development. Rival groups, by trying to promote their factional interests, suffer from diminished chances to promote encompassing interests, undermining, as a result, their own interests. Without effectively enforced rules to guide their transactions, they suffer from this standard Pareto-inefficient outcome for prisoners' dilemma (PD) games, which characterize many economic and political reforms and other interactions between rival interest groups (see the following section). The analysis of inter-group conflicts suggests that rival groups in these societies have limited chances to build up efficient rules on their own, giving rise to pessimism with regard to the prospect for their escaping defection traps to enjoy Paretian improvements on an economy-wide scale. This pessimism concerning these collectivist societies is in contrast with optimistic results based on a range of economic models, including game theoretic ones, that suggest tendencies for societies to achieve evolutionary progress.[9]

The discretionary enforcement of criminal justice, tax laws, and regulatory regimes can make the enforcement of rules in collectivist societies unpredictable. This discourages productive long-term investments.

Social psychologists' cross-country analyses of human behavioural norms are insightful. Drawing on surveys and empirical observations, however, their findings are not based on formal models that postulate causal relations between key variables. Use of such models would enrich the understanding and discussion of the analytical results.[10]

This paper uses a game-theoretic framework to analyse the nature of inter-group conflicts in collectivist societies and to interpret historical reforms aimed at achieving productive social and political interactions, thus shedding light on how to promote political and economic reforms in group-oriented societies. The framework of the analysis, which is compatible with the evolutionary game-theoretic framework, aims to place the former in a much shorter timespan than in the latter and, thus, to offer concrete suggestions for an institutional reform that swims with, not against, evolutionary tides. An analysis of the problem of discretion will be left for a separate paper.[11]

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9 Notwithstanding the pessimistic outcome arising from a one-off PD game and without mentioning the neoclassical analytical outcomes, one can point to many analytical bases for optimism for productive human cooperation. For example, Axelrod (1984) seems to consider the conditions for cooperation less stringent than is characterized later in this paper. He notes: 'The foundation of cooperation is not really trust, but the durability of the relationship' . Hirshleifer (2001) points to a number of roads to cooperation. Evolutionary game models relying on broader human motivations suggest a variety of optimistic roads to cooperation. This optimism, certainly in line with the prosperity in developed economies, is not compatible with widespread poverty and world-wide under-achievement of the human potential. Moreover, the optimism that rises from evolutionary game models is somewhat deceptive, since these studies compress the long, sweeping evolutionary processes that have taken scores of thousands of years into one computer simulation.

10 An extensive field work, including some mentioned later in this paper, using game-theoretic and other models has been conducted and is still being conducted with the samples in locations around the world.

11 See Chu (2004). This paper expands on the results reported in Chu (2003), which has some discussion of the implications of inter-group conflicts and discretionary rule enforcement for institutional development in collectivist societies.

Section 2 provides an overview of the implications of culture for behavioural norms. Group orientation engenders interdependent individuals, giving rise to behavioural norms and other rules quite different from those in individualist societies.

Section 3 introduces a game-theoretic model of inter-group conflicts and alternative rules that can promote cooperation between rival groups. In the context of models dealing with insider-outsider games, this section shows why it is difficult for two rival groups with collectivist values to cooperate voluntarily with each other even when a game is infinitely repeated. Both individuals and groups in societies face many PD games. Inability for individuals and groups to achieve cooperation has negative social consequences. Inability for groups to achieve cooperation is of special institutional significance—for example, in developing efficient rules of the game and pursuing sound policies. The section presents a model showing that collectivist societies face a greater challenge than individualist societies because collectivist values may have internally cohesive rival groups *perceive* non-PD games, which would yield cooperation, as PD games, which yield defection. While these tendencies give rise to the need for effective third-party rules, collectivist societies tend to have ineffective third-party rules.[12] The section suggests, therefore, that forming *hybrid* groups, drawing their members from rival groups, will increase chances for the groups to move out of defection traps without having to establish a third-party rule.

Section 4 uses the framework of this model to analyse a number of practical problems. The section shows that, while not easy, forming hybrid groups is feasible and politically more realistic to achieve than a third-party rule, which is perhaps an end-point of institutional evolution and, therefore, should be a longer-term goal of a developing society. A third-party rule emerges from cooperative games, whereas, as will be shown later, games between hybrid groups resemble noncooperative games and require less third-party coordination, which is difficult to obtain in collectivist societies. In ancient Greece, colonial America, and Singapore, institutional reforms along these lines, in which *institutional entrepreneurs*—Cleisthenes, James Madison, and Lee Kuan Yew—played key roles, tamed inter-group conflicts.

Section 5 outlines a broader framework that may be used to explain how collectivist societies work both in static and dynamic contexts. This section interprets the rise of institutional entrepreneurs in an evolutionary game framework. Section 6 concludes the discussion.

2 Cultural values and social interactions

2.1 Dimensions of culture

Hofstede (1997, 2001) offers a broad, although not formal, framework of analysis of human behavioural norms by reducing culture to quantifiable dimensions. In the context of this framework, human mental programming is unique at three levels: (i) human nature, (ii) culture, and (iii) personality. Human nature, which distinguishes human

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[12] Collectivist societies tend to have a strong rule of man, but may not maintain effective third-party rules.

beings from other animals, is universal and inherited. Culture is group-specific and is learned. Personality is individual-specific and is both learned and inherited.

Culture, as defined by Hofstede, has four dimensions: (i) collectivism and individualism, (ii) large and small power distance, (iii) strong and weak uncertainty avoidance, and (iv) masculinity and femininity. This paper focuses only on the first two dimensions of culture as a means of analysing inter-group conflicts and their implications for institutional development.

2.2 Behavioural implications of cultural collectivism

Collectivism and individualism define one of the four dimensions of culture and represent two different value systems that lead to contrasting behavioural norms. Different societies can have different degrees of collectivism. A large or a small power distance defines culture's another dimension. Societies with a large power distance tend to tolerate and accept an unequal distribution of power and authoritarian rule for their groups. Although there are exceptions, individualist societies, in general, tend to have a small power distance; collectivist societies, a large power distance.[13]

The empirical studies of cross-cultural psychologists offer a rich analysis of behavioural implications of these values. Thus, a collectivist society with a large power distance, in comparison with an individualist society that has a small power distance, tends to have several distinct characteristics:

a) Members of a collectivist society value achieving group interests more than achieving individual interests. An individual is often identified more as a group member than as an individual.[14] By contrast, individualism tends to value members of society more as individuals than as group members. Does group-orientation mean that individuals in a collectivist society do not pursue their self-interests? Cross-cultural psychologists note that shared group-oriented values tend to limit their pursuit of self-interests. Individuals in a collectivist society may have different *individual* values. On average, their degree of collectivist tendencies is higher than that of those in individualist societies.

b) Members of a group are loyal to one another and value harmony and cohesion among members of a group. Interpersonal relations are often more important than rules. Individuals, however, tend to have conflictive interactions with the members of other groups. Groups, therefore, tend to have strong inter-group conflicts. Different collectivist societies may have different degrees of inter-group conflicts. By contrast, individuals in individualist societies are less loyal

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13 Recent research in cross-cultural psychology distinguishes between horizontal and vertical individualism and collectivism (HI vs. VI and HC vs. VC). A horizontal/vertical society, whether individualist or collectivist, tends to have a small/large power distance. A vertical society tends to accept inequality more easily than a horizontal society does. Among individualist societies, the United States is a VI society; Northern European countries HI societies. Within collectivist societies, there are HC communities, in which members do not have any sense of hierarchy, as well as VC societies, in which privileged leaders have social obligations to safeguard the livelihoods of subordinates (see, for example, Darwish and Huber 2003).

14 See Feldman (2001: 475-7), as well as Hofstede (1997).

to the groups they belong to, and groups tend to have less inter-group conflicts. In *principle*, a collectivist nation could achieve strong national cohesion with no conflict among groups within the nation. In *practice*, however, inter-group conflicts are strong within a collectivist society.

c) Members of a group experience shame when they have trespassed proper limits for socially acceptable behaviour. This feature compares with the emotion of guilt in individualist societies. Shame is a group-oriented emotion; guilt is an individual-oriented emotion (see Benedict 1946 for a discussion of this phenomenon with respect to Japan).

d) Ideal leaders are authoritarian, paternalistic autocrats. By contrast, ideal leaders in individualist societies are resourceful democrats.

e) They tend to value a rule of man and discretionary enforcement of rules. By contrast, individualist societies tend to value a rule of law and rules-based social interactions.[15] Collectivist societies within which rule enforcers with paternalist ideals use a high degree of discretion in enforcing rules often experience unintended consequences of reduced transparency and predictability of rules.

The essential difference between the two contrasting value systems is well captured in the following two passages:

> Each member of society is thought to have an inviolability founded on justice… which even the welfare of every one else cannot override… Justice denies that the loss of freedom for some is made right by a greatest good shared by others (Rawls 1999: 24-25).

> Nation before [ethnic] community and society above self… Consensus instead of contention… (Government of Singapore, quoted in Huntington 1996: 319).

Key features of ideal governance in the two worlds are captured in the following passages delineating two contrasting ideals:

> It is in vain to say that enlightened statesmen will be able to adjust these clashing interests, and render them all subservient to the public goods. Enlightened statesmen will not always be at the helm (Madison 1788).

> Confucianism traced back the ordering of a national life to the regulation of the family life and the regulation of the family life to the cultivation of the personal life (Lin 1938: 21).

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15 In one of the few economists' studies of the implications of individualism vs. collectivism, Greif (1994) has also noted that individualist societies have developed rules-based transactions, while collectivist societies have developed transactions based on personal ties.

Table 1
Dimensions of culture and effectiveness of rules

	Sample countries	Dimensions of culture		Effectiveness of rules
		Individualism-collectivism	Power distance	Rule of law
		(1)	(2)	(3)
Standard deviation		25.6	26.0	1.1
West	20-22	70	37	6.2
Rest of the world	21-25	25	72	4.0

Notes: Column (1) shows measures of the index of individualism-collectivism (a measure close to 100 means a high degree of individualism), column (2) measures of power distance (a measure close to 100 means a high degree of power distance); and column (3) measures of the degree of rule of law (a higher index means a higher degree of rule of law. The individualism-collectivism and power distance indices, respectively, range from 92 and 40 (United States), 89 and 35 (United Kingdom), and 74 and 16 (Sweden) to 12 and 81 (Venezuela), 17 and 58 (Taiwan), and 18 and 60 (Korea).

Sources: Chu (2003). The results are based on the data from Hofstede (1997) and World Economic Forum (2001).

In the former, Madison underscores the importance of not presuming that enlightened statesmen will always be governing. Therefore, a government based on rules should replace a government by enlightened statesmen ruling with discretion. The latter highlights the important role Confucianism attaches to cultivated leaders, who would be able to use their discretion for public interests, rather than for personal gains.[16]

Table 1 provides an overview of individualism-collectivism indices for two groups of countries and some individual countries.

A regression of a rule of law (RL) index on an individualism-collectivism (IC) index yields the following equation, confirming a strong correlation between individualism and a rule of law.[17]

$$RL = \underset{(15.22)}{3.659} + \underset{(7.60)}{0.034IC} \quad \text{Adjusted } R^2 = 0.581$$

3 A model of inter-group conflicts and cooperation

This section analyses how two internally cohesive rival groups in a collectivist society may interact with each other in strategic games. Members of a collectivist society belong to a number of overlapping formal and informal groups: for example, a labour union, a group of residents of a certain region, a political party, an extended family, and

16 Hofstede notes that this tendency to value ideal leaders, rather than rules and checks and balances, is shared by collectivist societies beyond the Confucian world.

17 See Chu (2003). The rule of law index is the unweighted average of three indices (judicial independence, soundness of property rights, and predictability of rules), based on opinion surveys and reported in WEF (2001). The individualism-collectivism index is from Hofstede (1997).

a class of a university. Their degrees of loyalty differ between groups and through time. Their loyalty is more enduring with some groups than with others.

This section explores possible roads to inducing cooperative behaviour in inter-group conflicts of enduring nature. The analysis starts with the assumption that each group has coherent, not necessarily formal, decision rules for transforming individual interests to group interest. It also assumes that each group has its system of distributing the group's payoffs. The simplest case of governance would be a benevolent autocracy in which an authoritarian leader coordinates group members' activities. The paper later discusses different decision rules.

3.1 A brief review of literature in inter-group conflicts

There are a large number of studies in groups in economics, political science, sociology, and social psychology. This review focuses on those in game theory, which offers rich tools to analyse inter-group conflicts. Classical game theory suggests that rational individualists, or groups of them, seeking self interest, while unable to achieve cooperation in typical one-off games of prisoners' dilemma (PD), enhance their chances for cooperation when they repeat PD games, with an appropriate discount rate and an effective punishment strategy, such as a tif-for-tat (TfT) or a trigger strategy.[18]

Drawing on real-life observations and one-off experimental games that show human tendencies of not behaving as classical game models predict, game theorists have used simulations to show that certain aspects of the institutional evolution in human societies may be modelled and explained by assuming altruism, fairness, group orientation, and strong reciprocity. In the context of an effort to explain the behaviour of inter-group conflicts in collectivist societies, three strands of research are notable:

a) In one of such strands, game models distinguish between (material) payoffs and players' perceptions of these payoffs.[19] Game theorists have explored the implications of inter-player interdependence for game outcomes. In the studies of Konrad (2002), Ahn *et al.* (2001), Engelmann and Strobel (2000), Fehr and Schmidt (1999), players choose their strategies on the basis of pecuniary (i.e., material) payoffs, but are influenced by their opponent's payoffs, not only their own, but also their opponent's relative payoff positions, as well as by their *collective* gains.

b) Recognizing such interdependence gives rise to possibilities of modelling how individuals might have different attitudes toward insiders and outsiders. Game models have used insider-outsider relations to show the slow emergence of cultural groups. Bowles and Hopfensitz (2000) have used an evolutionary game model to show how group-oriented human traits and resource-sharing institutions may have evolved jointly through genetic and cultural

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18 Axelrod's experiments (1984) have shown enhanced chances for cooperation based on a TfT, while the standard game models have shown how two rational players can achieve cooperation by repeating a PD game with a trigger strategy.

19 The tradition of analysing games on the basis of players' utilities goes back to von Neumann and Morgenstern (1944).

transmissions. Humans emerging through these evolutionary processes are group-oriented—altruistic toward insiders and antagonistic toward outsiders. Another important related finding of insider-outsider models is the plausibility of the emergence of strong reciprocators, who are willing to suffer pains to reward other reciprocators and punish defectors. Gintis (2000) discusses an insider-outsider model, in which discriminators (the *homo parochius*), playing a game of the tragedy of the commons, attach a positive weight to the payoffs of fellow discriminators and a negative weight to those of selfish outsiders.

c) Whereas these are evolutionary models, which explain changes in human behaviour and institutions over scores of thousands of years or longer, another strand of research has explored how groups may form in a static framework. Olson (1965) has discussed groups in pursuits of net benefits from group membership. Muenster (2004) builds a model that shows how intra-group and inter-group conflicts are jointly determined as rent-seeking opportunities arise from contractual incompleteness. In Muenster's model, the degree of inter-group and intra-group contests and group cohesion are interdependent. An increase in rent-seeking opportunities in inter-group transactions would lead group members to be more conflictive toward outsiders, while strengthening intra-group solidarity.

3.2 An overview of an analytical framework

This paper draws on these results to analyse inter-group conflicts in collectivist societies, how and why the conflicts do not subside, and what institutions might help them achieve mutual cooperation.

The groups in this paper are internally cohesive value-sharing groups in collectivist societies. Unlike those in Muenster, the groups in this paper are enduring ones. Unlike in Bowles and Hopfensitz (2000) and Bowles and Gintis (2003), time in this paper is far too brief to allow *evolutionary* changes in institutions, but is sufficiently long to accommodate significant institutional reforms. This characterization of what can change and what not and what is feasible and what not in this paper requires some elaboration.

In this paper, two internally cohesive groups cannot easily achieve cooperation in a PD game, even if they repeat the play, not only because its material payoffs have a PD structure, but also each group chooses its strategies on the basis of *perceived* payoffs, which it calculates as weighted averages of its own and its opponents' material payoffs, with λ and 1- λ as the weights, as explained in section3.2. With λ, a cultural parameter, in excess of 1, a group's perceived payoffs are negative functions of the opponent's positive material payoffs. For a given set of material payoffs, the model shows the attainability of cooperation on a λ-i plane as a negative function of both λ, the weight, and i, the discount rate (see below).

The model is flexible to show how the value of λ reinforces or offsets the positive effect of repetition on tendencies for players to cooperate. This result, while confirming tendencies for *gene-sharing biological siblings* to cooperate (with $\lambda < 1$), highlights the nature of the problems in collectivist societies, where two factors keep the groups in a defection trap: (1) a high discount rate, reflecting inadequate third-party rules and a high degree of uncertainties reflecting a high degree of discretion in rule enforcement, and

(2) a large λ exceeding 1, or a negative weight attached for the opponent's payoffs, reflecting severe inter-group rivalry.

In this framework, the paper characterizes successful institutional reform efforts in ancient Greece, colonial America, and Singapore, as the emergence of *institutionally engineered political siblings*. The emergence of these political siblings was in line with evolutionary game models, in which strong reciprocators play a key role in disciplining game-playing groups to alter their tendencies to defect. These evolutionary game models, however, while providing a broad framework to predict the emergence of both strong reciprocators and institutions for cooperation, are excessively long-run-oriented to be useful to explain the birth of political siblings. The framework in this paper fills the gap in evolutionary game models to provide details to the picture of evolutionary processes painted by the models.

This paper highlights the role of institutional entrepreneurs as *early* strong reciprocators. The gains associated with a Pareto-efficient move from mutual defection (D-D) to mutual cooperation (C-C) offer incentives for a society in conflict. They prepare a ground for the birth of political siblings. Game-playing groups, however, would not voluntarily make the move, without the role of these early strong reciprocators as catalysts. This paper notes that the emergence of early strong reciprocators depended on the frequency distribution of individual traits that defined institutional entrepreneurs. These traits would include not only cognitive ability to recognize an opportunity, but also other leadership qualities, such as intelligence and motivation. Those societies that had such individuals succeeded in establishing new institutions that allowed cooperation between political siblings; those that had no such individuals have not been able to implement such a reform.

3.3 Collectivist values, inter-group conflicts, and failure to cooperate

The games discussed in this paper are two varieties of the *games of complete information*: (i) one-off games and (ii) infinitely repeated games, in which game players experience cross-player utility spillover. To model this phenomenon, this paper uses a simple 2x2 game, in which players form their respective perceived payoffs by calculating weighted averages of material payoffs, with λ and (1- λ) as the weights, the former for self and the latter for the opponent. The game-playing group i uses λ_{ij} for this calculation to play games with an opponent j. This weight may be considered an weighted average of λ_{ij}'s that the individuals who belong to the group i use when they play games individually with members of the group j. (In subsequent discussions, the subscripts i and j will be dropped when the discussion clearly concerns games between two individuals or groups.)

In this paper, the payoff values of a, b, c, d, and the cultural parameters λ_{ij}'s (to be elaborated below) are *common knowledge* among all game-playing groups. The uncertainties (about the future) enter the model in this paper only in the form of a high discount rate i in the case of repeated games.

To develop the model, consider the following symmetric *material* payoffs for a game between two groups:

Material payoffs, an example of which is shown in Matrix (1), are the payoffs that can be measured objectively (e.g., number of national assembly seats, financial gains) and are compared with *perceived* payoffs, as illustrated in Matrix (2).

Matrix (1)
Material payoffs

	Group Y	
	cooperation	defection
Group X		
cooperation	a, a	b, c
defection	c, b	d, d

Consider the following two different cases:

Case 1a

In case (1a), for which the payoff matrix is shown in Matrix (1a), the game is a prisoners' dilemma (PD). The dominant strategy in a one-off game is 'defection' for either of the players. In this case, the payoffs may be ordered as: $c > a > d > b$, where, for example, $c = 15$, $a = 10$, $d = 5$, and $b = 2$.

Matrix (1a)
Material payoffs

	Group Y	
	cooperation	defection
Group X		
cooperation	10, 10	2, 15
defection	15, 2	5, 5

There are many real-life examples of games of this type. Game-playing groups are not necessarily formally organized groups. Three of the examples, with more following in section 4, are as follows:

i) Two rival political parties agree to have low-cost campaigns. There is no effective third-party enforcement of this agreement. They could cooperate by honouring the agreement, and each would win, say, more or less a half of the national assembly seats (a, a). Their payoffs are high. Alternatively, each could win more or less a half of the seats by both defecting (i.e., by running a high-cost campaign). Their payoffs, the number of seats net of the costs, are lower (d, d). Suppose an unsuspected defection (i.e., running a high-cost campaign while the opponent party runs a low-cost campaign) can give the defecting party an overwhelming majority of the seats, leaving the rival party crippled with only a handful of seats as a result of its unreciprocated cooperation (c, b). This would set a stage for a PD game between the two parties.[20]

[20] The number of seats, net of the campaign costs, is a material payoff and can be defined on the basis of weights assigned to the number of the seats and the amount of campaign costs, both of which can be objectively enumerated.

ii) Similarly, suppose two warring tribal groups have agreed on a ceasefire, without effective third-party enforcement. Honouring the ceasefire agreement would bring genuine peace to both tribes (a, a). Both can lose, in comparison with (a, a), by continuing to wage the war (d, d). An unsuspected defection, however, would give the defecting group a chance to overwhelm the opponent group (c, b).

iii) Rural residents could agree, for example, to accept a proposal to open up the farm market and to increase public investment in rural areas, whereas urban residents, who are expected to benefit from an increase in the imports of farm products, could agree to accept a cut in urban public investment programmes to finance an increase in public investments in rural areas. Without an effective government enforcement of such a compromise, the two groups might choose to defect (i.e., for the status quo).

Case 1b

In case (1b), for which the payoff matrix shown in Matrix (1b), the dominant strategy is 'cooperation' for either of the players. In this case, the payoffs may be ordered as: $a > c > b > d$, where, for example, $a = 10$, $c = 9$, $b = 6$, $d = 5$.

Now consider inter-player payoff spillover. Each game-playing group's objective is to pursue the maximum of *perceived payoffs*, represented by *weighted averages of its and the opponent's material payoffs* for each combination of actions. The nature of this game differs from that of the previous one. The weight (λ) in this case ranges between a value between zero and infinity, but not zero or infinity. In this case, in which material payoffs may have inter-player externalities, the perceived payoffs for Group X may take the form as given in Matrix (2).

A methodologically-individualistic basis of this approach may be as follows: Agents' *perceived* payoffs from a game are weighted averages of their own material payoffs and the opponent players' material payoffs. In other words, payoffs have inter-personal spillover effects.[21] Based on this approach, a key difference between collectivist and individualist societies may be highlighted as follows:[22] In a collectivist society, members of a group use a λ (< 1) to form perceived payoffs by transforming the material payoffs when they play games with insiders (i.e., other members of their own groups), but use a λ (>1) when they play games with outsiders (i.e., members of a rival group).[23]

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21 This approach is in line with the practice of utility analysis in economics that has assumed altruism or envy, as well as of game theorists who have explored inter-player utility spillover phenomena. As mentioned, see Konrad (2002); Ahn *et al.* (2001); Englemann and Strobel (2000); Fehr and Schmidt (1999), and Gintis (2000) who discusses an insider-outsider model in which discriminators (the *homo parochius*) play a role.

22 For the analysis in this paper, multiplying the payoffs by a constant would not alter the game outcomes. Utility analysis and game-theoretic models often normalize $\lambda c+(1-\lambda)b$ by dividing the expression by λ to obtain $c+[(1-\lambda)/\lambda]b$, in which $(1-\lambda)/\lambda$ approaches, respectively infinity, 1, 0, -0.5, and -1, as λ approaches 0, 0.5, 1, 2, and infinity. For the analysis in this paper, the two formulations yield the same results. This traditional formulation indicates clearly that λ can neither be zero nor infinity.

23 MacDonald (1998), drawing on Triandis (1990), highlights these characteristics of an extreme vertical collectivism: 'Collectivist cultures … place a much greater emphasis on the goals … of the ingroup rather than on individual rights and interests. Collectivist cultures develop an "unquestioned

Matrix (1b)
Material payoffs

	Group Y	
	cooperation	defection
Group X		
cooperation	10, 10	6, 9
Defection	9, 6	5, 5

Matrix (2)
Perceived payoffs

	Group Y	
	cooperation	defection
Group X		
cooperation	a	λb+ (1-λ)c
Defection	λc+(1-λ)b	d

The values of λ for a member of a group differ for different insiders and outsiders. Collectivist group members may use different λ's for insiders and outsiders for the following reasons:[24]

i) A positive weight (i.e., for the case of $\lambda < 1$) a game player attaches to an opponent game-player's positive material payoff when the opponent is an insider may result from either one of a number of reasons: altruism arising from biological or cultural kinship and/or a sense that that the material payoff

attachment" to the ingroup, including 'the perception that ingroup norms are universally valid (a form of ethnocentricism), the automatic obedience to ingroup authorities, and willingness to fight and die for the ingroup. These characteristics are usually associated with distrust of and unwillingness to cooperate with outgroups…In collectivist cultures morality is conceptualized as that which benefits the group, and aggression and exploitation of outgroups are acceptable…' The results of the experimental ultimatum (UG) and public good (PG) games, supported by the National Science Foundation and conducted by a team of social scientists, including S. Bowles, J. Ensminger, E. Fehr, H. Gintis, and J. Henrich, seem to be compatible with this formulation (see the summary of their results in 'In Search of *Homo economicus*: Cooperation, Reciprocity, and Punishment in Fifteen Small-scale Societies', available on the internet). In their anonymous one-shot game experiments, both individualist western and collectivist non-western subjects have not behaved like the rational economic man (REM). The difference between the non-western players and the western players, however, is notable. The former offered less than the latter as proposers in UGs and contributed less in PGs. While the sense of fairness to other human beings might explain the deviation of the results for both groups from theoretical predictions based on REM assumptions, the difference between the western and non-western group might reflect the difference in λ between the former and the latter, who might consider anonymous opponents in experimental games as outsiders.

24 Collectivists in this paper belong to the *homo egualis* (Gintis 2000), with two different senses of asymmetric fairness: one toward insiders and the other toward the outsiders. With respect to wealthier members of society, they tend to tolerate more the higher incomes of insiders than those of outsiders. Their tolerance toward fellow group members' high incomes might reflect their perception that they are community incomes. With respect to poorer members of society, they are more keen about reducing income inequalities vis-à-vis insiders than vis-à-vis outsiders. At an extreme, this type of fairness can yield a negative weight for an outsider's increase in income or any positive income.

for a fellow group member is a *shared property*.[25] Many groups in a collectivist society have a long tradition of intra-group (e.g., intra-communal) joint property ownership and a system of informal intra-group transfers. These social arrangements may give rise to, and may also have their roots in a sense of cultural kinship.[26] Evolutionary biologists have developed game-theoretic models of how gene-sharing siblings may achieve cooperation by using a $\lambda < 1$ to transform PD material payoffs.[27]

ii) A negative weight (i.e., for the case of $\lambda > 1$) assigned for a material payoff of a rival may arise when a game player considers, as the norm, at most the status quo[28] with regard to the income or wealth position of a rival. From a player's perspective, any positive material payoff for a rival would imply the rival's income or wealth position exceeding the norm, thus giving rise to a negative sense of well-being for the player.[29] This reasoning may be extended to games between rival groups. A group may experience a negative externality (or a sense of envy) from a positive material payoff of its rival group.

By contrast, members of an individualist society do not distinguish between members and nonmembers and use a $\lambda = 1$.

Clearly, this is a simplified way to contrast collectivist and individualist societies. While the distinction between the two types of societies is a matter of degree, this formulation highlights their essential differences.

For a group, values of λ, which may be considered the *averages* of individual λ's and which the group uses to form its perceived payoffs, differ for different rival groups. This structure of perceived payoffs for an inter-group game indicates that individualism, as defined by $\lambda = 1$ is one of the special cases, which include the following additional unrealistic special cases: (i) If $\lambda = 0.5$, an inter-group *Golden Rule* would prevail. Each group would not distinguish between its payoffs and the opponent group's payoffs.

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25 Research in cross-cultural psychology shows that members of vertically oriented collectivist societies in general tolerate an equal distribution of power or of material gains, but social norms require those with power to share the benefits they receive with fellow group members.

26 See Bowles and Hopfensitz (2000) for a discussion of a model that explains how human beings might have formed groups of non-kin members and institutions for resources sharing among group members. The paper notes that inter-group conflicts could be an integral part of the processes of group formation.

27 See Hirshleifer (2001) for a discussion of how two gene-sharing siblings tend to cooperate. Members of a collectivist society, in general, are under greater social pressure than their individualist counterparts to help fellow group members. Collectivist societies tend to use greater social sanctions than their individualist counterparts to induce members to conform to social norms. This route to cooperation is different from that arising from repetition, as, for example, shown in Poundstone (1992), which shows how a zigzag flies into a crocodile's mouth to eat insects between the crocodile's teeth and flies out without being swallowed by the crocodile.

28 Or zero, without loss of generality.

29 In a collectivist society, a group member may not wish to tolerate any increase in the income of the members (outsiders) of a rival group. A positive material payoff of the latter would cause such an increase, which should give rise to a negative sense of well-being for the former. This phenomenon is not incompatible with a positive sense of well-being the group member derives from a fellow group member's rise in income.

(ii) With λ close to 0, each group would acquire *sainthood*. The groups would be selfless.

When $\lambda > 1$, the value of each group's perceived payoff declines when the opponent group's positive material payoff rises. This paper notes that this feature of collectivism aggravates *inter-group conflicts*.[30]

The analysis in this paper proceeds with the assumption that λ's, which are cultural parameters, are given for individual and group agents. The analysis of how their values change for individuals and societies is beyond the scope of this paper, although section 4 has some limited discussion of how they may change. Cross-cultural psychologists distinguish between acculturation and enculturation, which have implications for changes in the values of λ (Berry *et al.* 1992). They also note that agents go through different stages—compliance, identification, and internalization—in acquiring social values (Lieberman 1956). Anthropologists have pointed out that individualism emerged in Europe gradually through the late Middle Age, but before the industrial revolution (MacFarlane 1987). As already mentioned, evolutionary game models have analysed long-term group formation.

As stated in the beginning of this section, the discussion in this paper assumes that λ_{ij}'s, as well as the material payoffs, are known to all game-playing groups. These are not unreasonable, since λ_{ij}'s reflect the values *shared* by group members; while individuals have different λ_{ij}'s, their differences between the members of a game-playing group are smaller than those between the members of different groups. Moreover, for simplicity, the discussion assumes that $\lambda_{ij} = \lambda_{ji}$, which is denoted as λ_j, the subscript j of which is dropped when discussing a game between two specific groups. The values of λ for groups are the averages of the λ's for group members.[31]

A small λ (e.g., sufficiently less than 1) will turn a PD game, for example, with material payoffs in Matrix (1a), into a game that yields mutual cooperation. A large λ exceeding 1 (for example 2) will turn a game that has material payoffs represented by, for example, Matrix (1b), and, thus, should yield mutual cooperation in the absence of inter-group or inter-personal welfare externalities, into a PD game.[32]

Are there any mechanisms through which two groups voluntarily may choose to cooperate in a PD game without third-party enforcing rules? Game theory suggests the following conditions for cooperation:

a) Depending on the nature of transactions, the two rival groups can agree to modify the material payoffs to ensure mutual cooperation. An example is for a

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30 Excessive retaliations in inter-group conflicts and negative campaigns in a heated election might be only a couple of symptoms of a negative weight.

31 A special case would be the case in which all members of a group share a same λ_j. The analysis can proceeds with a more general case in which different group members have different λ_j's. Group cohesiveness, however, implies that group members' λ_j values are similar.

32 In general, with a payoff structure as in Matrix (2), the game becomes a PD game when $\lambda > (a-b)/(c-b)$ and $\lambda > (c-d)/(c-b)$ provided that $c-b > 0$, which says that defection pays off for a defector when matched by cooperation in a one-off game. This relation ($c-b>0$) between b and c is realistic for both a non-PD game and a PD game. With $\lambda>1$, some non-PD game payoffs would be perceived by the players as PD games.

borrowing group to assure a lending group full repayment by providing collateral to the lending group for a borrowing that will yield returns to be shared by the two groups. This road to cooperation may not be feasible in many PD games, as in the case where two social groups confront PD games of choosing policies that would imply different future payoffs.

b) If they act rationally in the sense that they act in accordance with the Kantian principles of categorical imperatives, they can develop rules of the game that require them to cooperate and subject themselves to such rules.[33] Rival groups in collectivist societies would not act in this manner.

c) Finally, the groups can choose to cooperate when they (i) care about each other or (ii) repeat to play a game.[34] As explained below, these conditions are not easy to fulfil in a collectivist society.

Consider the *precise conditions for cooperation*. A simple model may highlight key aspects of how groups succeed or fail to cooperate. Suppose pairs of groups, with different values of λ_j's are playing games with the material payoffs in Matrix (1) in a general form. The games have a variety of material payoffs. Some of them have material payoffs similar to Matrix (1a); the others have material payoffs similar to Matrix (1b). Cultural collectivism implies that the game-playing groups are internally cohesive rival groups which play games by using a value of λ_j greater than 1, as in Matrix (2), to transform the material payoffs. With a λ_j whose value is equal to or greater than 1, the players cannot attain mutual cooperation in a one-off PD game; if λ_j is sufficiently large, they may not attain mutual cooperation even in games that would normally yield such cooperation. This is the world this paper will analyse.

To show the conditions for cooperation between two groups, however, the analysis starts with the assumption that λ (with the subscript suppressed) can have a range of values, not necessarily larger than 1. How do two groups achieve cooperation in a PD game if they are allowed to be in a *most conducive environment for cooperation*? To show the conditions for attaining mutual cooperation in a PD game, assume that the groups repeat to play the game indefinitely and that what matters for them are their perceived payoffs. In this case, their payoffs are the *present discounted values* (PDVs) of their future perceived payoffs. For forming the PDVs, the players have to form their strategies and have to predict how their opponents would play the game. This paper examines the consequences of two strategies: (a) a tit-for-tat (TfT) and (b) a *trigger* strategy.

Note that this analysis has departed from the 'rational economic man' assumption by introducing the concept of perceived payoffs. The TfT strategy is based on *reciprocity* and has proven in the Axelrod experiment to be a sound strategy for players to use. The trigger strategy used in this paper is widely discussed in game theory textbooks, as a

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33 The categorical imperative requires members of a society to consider the consequences of an individual action they want to take under the assumption that all members of the society would take the same action. The players of a PD game, when they have Kantian rationality, would voluntarily cooperate with each other (Romp 1997: 264). Such rationality would help a society develop a credible rule of law that punishes defection.

34 See Axelrod (1984).

strategy that is effective in inducing cooperation between players. On the basis of each of these two strategies, this paper will show the conditions for two groups, by choosing their strategies on the basis of the PDVs of the future streams of perceived payoffs, to achieve a unique Nash equilibrium in which cooperation strictly dominates defection.

Consider the case in which they use *a TfT strategy*.[35] Suppose each group uses a tit-for-tat rule and assumes that the opponent group will also follow such a rule. Under such a rule, at every round, each group reciprocates the opponent group's cooperation, and retaliates by defection against the opponent group's defection, in the previous round. This rule implies that both mutual cooperation and mutual defection are sustainable outcomes: C-C, C-C, C-C, … and D-D, D-D, D-D, … An initial defection matched by cooperation oscillates permanently: D-C, C-D, D-C, … Similarly, an unreciprocated initial cooperation also oscillates permanently: C-D, D-C, C-D, … . The relevant perceived payoffs, in terms of PDVs with i denoting the discount rate, for Group X are as follows, arranged in accordance with the *initial* strategies chosen by the players (see Matrix 3):[36]

Matrix (3)
Perceived payoffs in terms of PDVs

	Group Y	
	cooperation	defection
Group X		
cooperation	a/i	$[\{\lambda b+(1-\lambda)c\}(1+i)+\lambda c+(1-\lambda)b]/[(2+i)i]$
defection	$[\{\lambda c+(1-\lambda)b\}(1+i)+\lambda b+(1-\lambda)c]/[(2+i)i]$	d/i

What would be the conditions for each group to determine that cooperation is the dominant strategy regardless of whether the opponent's strategy is cooperation or defection? The conditions, solved for λ, are as follows:[37]

$$\lambda < (a-b)/(c-b) + [2a-(c+b)]/[(c-b)i] \quad (1a)$$

$$\lambda < (c-d)/(c-b) + [(b+c)-2d]/[(c-b)i] \quad (1b)$$

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35 Note that this TfT strategy may *not* be a subgame perfect equilibrium for the infinitely repeated PD game with the assumed perceived payoffs. See Osborne (2004) for a discussion of the conditions for mutual TfT strategies to be a subgame perfect equilibrium of an infinitely repeated PD game. This paper examines the consequences of a TfT strategy as a plausible strategy for players to use to achieve their respective maximum gains, not necessary to force others to cooperate, even if it may not be a subgame perfect equilibrium, because it is firmly based on reciprocation and, thus is a plausible strategy in a collectivist world, where reciprocation is widespread for inter-personal and inter-group transactions. One might challenge that it is not a subgame perfect equilibrium and, thus, is not credible. A response to this challenge would be to point out that the game theorist Anatol Rapoport won the Axelrod tournament by using a TfT while being fully aware of this property of the TfT.

36 The PDV of the infinite series of a payoff amounting to 'a' is calculated as $a[1/(1+i) + 1/(1+i)^2 + \dots]$.

37 A TfT normally means that the players begin to play a game by choosing C-C, which sustains when the players use a TfT. The conditions in Eqs. (1a) and (1b) would ensure that the players would not deviate from the TfT for short-run gains as far as they know that the opponent uses a TfT.

If these inequalities are solved for i, the same inequalities have the following forms:

$$i < [2a-(c+b)]/[\lambda(c-b)-(a-b)] \quad (1c)$$

$$i < [(b+c)-2d]/[\lambda(c-b)-(c-d)] \quad (1d)$$

provided that

$$\lambda > (c-b)-(a-b) > 0 \text{ and } \lambda > (c-b)/(c-d) \text{ or}$$

$$\lambda > (a-b)/(c-b) \text{ and } \lambda > (c-d)/(c-b)$$

Figure 1 provides an overview:[38]

a) If $\lambda < (a-b)/(c-b)$ and $\lambda < (c-d)/(c-b)$, cooperation is ensured regardless of the level of i.[39] This is the case of a sufficiently small λ (i.e., a high degree of Group X's altruism). The differences a-b and c-d are 'Group Y's gains' (the former when Group Y chooses C and the latter when Group Y chooses D) associated with Group X's switch from D to C. The difference c-b is the 'payoff differential' between Group X and Group Y associated with Group X's unsuspected defection. In this case, Group X chooses to cooperate if λ is smaller than the ratio between a-b and c-b. For a given amount of a-b or c-d, a large c-b, which tends to yield a low value of the ratio, would require a strong sense of altruism (a small λ) to induce Group X to choose cooperation. For a given amount of c-b, a large a-b or c-d can induce Group X to cooperate even with a weak sense of altruism (a large λ).

b) If $\lambda > (a-b)/(c-b)$ and $\lambda > (c-d)/(c-b)$, a low i matters for cooperation. In addition, the following factors matter:

   i) A large $[2a-(c+b)]/(c-b)$ and a large $[(c+b)-2d]/(c-b)$ (i.e., large *social gains* both groups achieve by moving from mutual defection to mutual cooperation) relative to the c-b will create a large chance of Group X's cooperation even with a large λ and a high i.

   ii) For given levels of the ratio between social gains and c-b, a low i will tend to promote cooperation with a large λ.

A trigger strategy does not alter the conclusions qualitatively: (1) Mutual cooperation or mutual defection would be sustainable and (2) unsuspected initial defection or unreciprocated initial cooperation would be followed by sustained mutual defection. In

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38 The discussion here assumes that both 2a-(c+b) and (c+b)-2d are positive. The diagram in Figure 1 is based on the assumption that 2a-(c+b)>0. When they are negative, cooperation would be achieved as far as their absolute values are small enough to ensure that Eqs. (1a) and (1b) are satisfied with a positive λ, which in this paper is assumed to be nonnegative.

39 These conditions are satisfied automatically when $\lambda = 0.5$, thus giving rise to 'unconditional cooperation', which Hirshleifer (2001) defines as the Golden Rule.

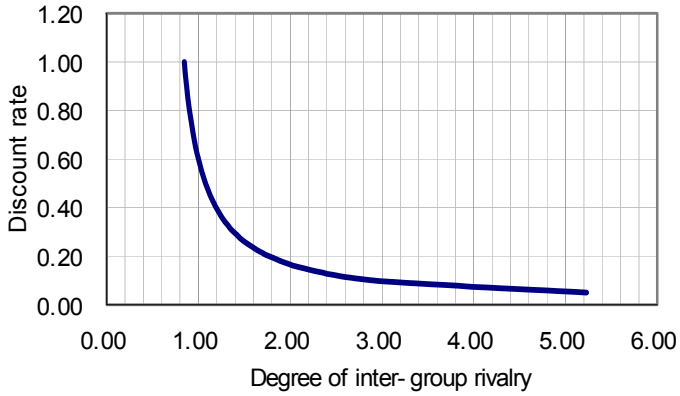
this case, the two inequalities that ensure that cooperation would be the dominant strategy is as follows:[40]

$$\lambda < (a-b)/(c-b) + (a-d)/[(c-b)i] \quad (2a)$$

$$\lambda < (c-d)/(c-b) \quad (2b)$$

The trigger strategy is more 'harshly punishing' than the TfT. When one of the players defects, both defect in all future rounds. When the inequalities for the TfT (Eqs (1a) and (1b)) and the trigger strategy (Eqs (2a) and (2b)) are compared, the first terms ((a-b)/(c-b) and (c-d)/c-b)) in the right-hand sides of both Eqs (1a) and (1b) and Eqs (2a) and (2b) are the same, but the numerators of the second terms are different (2a-(c+b) and (c+b)-2d in Eqs (1a) and (1b), compared with (a-d) and 0 in Eqs (2a) and (2b)).

Figure 1
A repeated game between rival groups



In the figure, the degree of inter-group rivalry (λ) is measured along the horizontal axis, and the discount rate (i) along the vertical axis. The assumed material payoffs are c = 15, a = 10, d = 5, and b = 2. The i-λ combinations that satisfy the inequality in Eq. (1a), $\lambda < (a-b)/(c-b) + [2a-(c+b)]/[(c-b)i]$, ensure cooperation between the two rival groups when they use a TfT strategy as described in the text. With the assumed material payoffs, the inequality in Eq. (1b), $\lambda < (c-d)/(c-b) + [(c+b)-2d]/[(c-b)i]$, is satisfied if the inequality in (1a) is satisfied. Therefore, the i-λ combinations that satisfy Eq. (1a), on the basis of which the graph is drawn, would ensure mutual cooperation under the TfT strategy. On the basis of the TfT assumption and of the PDVs of the perceived payoffs, the equilibrium is the unique Nash equilibrium in which, for both players, sustained mutual cooperation strictly dominates any other strategy.

For the first inequalities (Eqs (1a) and (2a)), the comparison in the second term is between the net social gains (2a-(c+b)) both players achieve when the group X switches its initial strategy from unsuspected defection (D-C) to mutual cooperation (C-C) (in the

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40 When the players play an infinitely repeated PD game with perceived payoffs, one can show that the trigger strategy considered here is a subgame perfect equilibrium. Not only mutual cooperation can be sustainable with no incentive for any player to defect when the discount rate is low, but also mutual defection can be sustainable with any discount rate. See Osborne (1994). The conditions in Eqs (2a) and (2b) would ensure sustained C-C as the outcome.

case of the TfT) and the per player net social gains (a-d) associated with moving from mutual defection (D-D) to mutual cooperation (C-C) (in the case of the trigger strategy).

For the second inequalities (Eqs (1b) and (2b)), the comparison is between the net social gains ((c+b)-2d) both players achieve when the group X switches its initial strategy from mutual defection (D-D) to unreciprocated cooperation (C-D) (in the case of the TfT) and zero (in the case of the trigger strategy). In the trigger strategy, the second inequality (2b) is independent of i; a lower i does not help even when the play is repeated, or repetition does not improve chances for cooperation.[41]

A comparison of the inequalities for the TfT and the trigger strategy suggests that, for a given i and under the following conditions, C would strictly dominate D with a higher level of λ when both players use the TfT than when they use the trigger strategy: $2a–(c+b)>a–d$ and $(c+b)–2d>0$, which can be restated as $a+d>c+b>2d$.[42]

These conditions highlight the difficulties for internally cohesive rival groups to achieve cooperation without third-party coordination. They suggest that, with either the TfT or the trigger strategy considered here, even with $\lambda = 1$, only a sufficiently low i would ensure mutual cooperation when c-b (seduction to defection) is large. With $\lambda > 1$, i should be even lower. Neither λ (a reduction of which is the most straightforward road to cooperation) nor i is under the control of either the game-playing groups or, if there is one, a third party (e.g., a coordinator or a rule enforcer). The value of λ exceeds 1 in collectivist societies by their nature. Moreover, societies with collectivist values are often those in which rules are not well established, established rules are enforced with discretion, future is uncertain, and, therefore, i is high. That is, game players, in general, heavily discount gains that they might attain in a *distant* future.

How can rival groups with a λ in excess of 1 achieve cooperation without a low i? The following subsection discuss how forming hybrid groups can do so.

3.4 Forming hybrid groups

Can there be a road to cooperation via third-party coordination? Clearly, it is possible for an *outsider* to force the groups to cooperate. For example, a foreign army or a UN peacekeeping force could force itself into a warring society. Alternatively, a degree of rationality could induce two warring tribes, X and Y, in a country to accept the authority of a foreign peacekeeping force to coordinate their actions. Thus, there could be effectively enforced rules that require the two groups to choose only cooperation. This would provide higher payoffs to both. Such steps are, however, normally unrealistic.[43]

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41 As mentioned, however, note that mutual D-D is a subgame perfect equilibrium with any discount rate.

42 These conditions are satisfied if, for example, c=11, a=10, d=4, and b=2. In the context of Cournot models, Abreu (1986) has used a stronger credible punishment strategy. As shown by Gibbons (1992), however, Abreu's strategy also requires a low discount rate, although it achieves cooperation at a higher discount rate than the trigger strategy considered in this paper.

43 Hofstede's analysis indicates that collectivist nations tend to have a higher degree of nationalism than individualist nations.

How could cooperation emerge without third-party enforcement from *within* a society? The rest of this paper analyses a seemingly unrealistic road to cooperation, that is, via *forming hybrid groups* and, thus, changing the nature of the games. The paper then interprets three historical episodes, in which three societies tamed inter-group conflicts by travelling on this road. The rest of this section considers the mechanics of a set of rules aimed at promoting cooperation by forming *hybrid groups* and discusses how, in conjunction with repeating the game, they may lead two rival groups to cooperation.

Suppose two rival tribes of an equal size (i.e., each with Z members) were engaged in a PD game with a material payoff structure as shown in Matrix (1a). Each tribe would select its representative, and the two representatives would play the game repeatedly on behalf of their respective tribes. The solution would be mutual defection unless i is low. A value of λ exceeding 1 by a large margin would imply intense conflicts, and would make it even more difficult for the two groups to choose mutual cooperation.

How would these two tribes achieve mutual cooperation by forming hybrid groups? The discussion proceeds, initially, without considering *how* the two rival groups would agree on these new rules of the game. Later, however, the paper addresses the question of how they may agree on such new rules of the game.

Suppose the members of X and Y were to agree to form two new groups, XN and YN. This agreement could be achieved internally or via a third-party intervention.[44] Suppose XN, one of these two new groups, were to draw a certain fraction ($0.5 < \alpha < 1$) of its members from X, and the rest ($1-\alpha$) from Y. Similarly, YN were to draw a fraction ($1-\alpha$) of its members from X and the rest (α) from Y. The change in groups would be as follows:

Original groups

Group X	Z members of the X tribe
Group Y	Z members of the Y tribe

Hybrid groups

Group XN	αZ members of the X tribe and $(1-\alpha)$Z members of the Y tribe
Group YN	$(1-\alpha)$Z members of the X tribe and αZ members of the Y tribe.

Suppose these two hybrid groups were engaged in playing political and economic PD games. They were to play a game with a material payoff matrix resembling Matrix (1a). How would XN and YN play each game if they were to play the game, on behalf of, respectively, X and Y and with a material payoff structure as in Matrix (1a)? For example, X and Y could be two pure ethnic groups, and XN and YN could be new ethnically-mixed groups.

Note that XN and YN would play the game that provides payoffs to X and Y. For example, X and Y are the groups of residents in two regions RX and RY. The game to be played by XN and YN provides payoffs to the groups X and Y, whose members receive benefit from their groups' payoffs. More specifically, XN and YN would play

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44 Forming hybrid groups are not necessarily simple as it seems here. When it is feasible to form them, why it has happened in some societies, how it can happen in other societies, and whether it fits in a longer, broader game-model framework are discussed in the following section of this paper.

a policy game that provides specific payoffs to the residents of RX (i.e., members of X) and the residents of RY (i.e., members of Y).[45]

The outcome of this game would depend on their *internal decision rules*. If the majority members of XN and YN were to select their representatives who would play the game only to maximize the interests of the majority members (i.e., members of X in XN and members of Y in YN), the solution would still be mutual defection. This would happen when the political system allows either (1) a winner to take all or (2) the majority to be tyrants.

Suppose, however, that political competition within hybrid groups forced the candidates, who would need the minority votes to be elected and re-elected, to commit their strategies as follows: Each elected representative, likely to be a member of the majority group in each hybrid group (e.g., a member of the X tribe in the new group XN), would play the game on the basis of *weighted averages of perceived payoffs*, defined to have as its elements the weighted averages of the perceived payoffs for X and Y, with the weights equal to β and $1-\beta$.[46]

How would the representative choose β? Suppose that the representative of XN were to choose the value of β to be equal to α.[47] With α and $1-\alpha$ assumed to be the proportions of the tribes X and Y in XN, the perceived payoff matrix for XN would be as given in Matrix (4) .

The game is assumed to have a symmetric payoff structure, and the perceived payoffs for YN would be similarly formed. The perceived payoff matrix would turn to the original material payoff matrix when $\alpha = \lambda = 1$.

Matrix (4)
Perceived payoffs in terms of PDVs

	Group YN	
	cooperation	defection
Group XN		
Cooperation	a	$\alpha[\lambda b+(1-\lambda)c]$ $+(1-\alpha)[\lambda c+(1-\lambda)b]$
Defection	$\alpha[\lambda c+(1-\lambda)b]$ $+(1-\alpha)[\lambda b+(1-\lambda)c]$	d

45 There are many real-world examples of this problem. A reform could provide different benefits for the RX region and the RY region, which, respectively, have pure ethnic groups as residents. The two regions are likely to be in a defection trap in PD games. Creation of hybrid ethnic groups for political decisionmaking would not alter how the residents benefit from the reform. It would only alter incentives for the politicians who play PD games on behalf of their hybrid constituencies.

46 Why would the representatives use weighted averages of perceived payoffs, not of material payoffs? Because perceived payoffs, not material payoffs, are what voters would care about.

47 The weighted averages of the payoffs based on, for example, α and $1-\alpha$ as weights for XN are equal to the aggregate payoffs of XN under the assumption that the material payoffs, c and b, are distributed equally among the members of X and Y in XN. In this case, if all the group members have a same value of λ, promising to use α and $1-\alpha$ as weights is equivalent to promising to play the game fairly to the two constituency groups.

An α sufficiently smaller than 1 and close to 0.5 would ensure that cooperation would be the dominant strategy. Suppose that the rules were to require that the representatives would have to reveal to the voters in their respective groups the weights with which they would form the perceived payoffs. Suppose that, during their term, they were to play many games with different material payoff structures. The games would still be played *without* third-party rules, and if they were PD games on the basis of the weighted averages of the perceived payoffs, there would be no *third-party* intervention to ensure cooperation.[48] The voters in hybrid groups (i.e., XN and YN) would assess the representatives' records of playing games during their term and would re-elect them if they have played the games faithfully with the value of α to which they were committed at the time of their election.[49]

Intuitively, cooperation would be easier to achieve if the hybrid groups, through their representatives, played the game repeatedly with a low i (e.g., close to zero) and a low α (i.e., less than 1 and close to 0.5 in this example). The following conditions would ensure that cooperation becomes the dominant strategy in an infinite series of plays of a game between groups XN and YN with a PD perceived payoff structure:[50]

$$\alpha < [(a-\lambda b)+(\lambda-1)c]/[(2\lambda-1)(c-b)] + [2a-(c+b)]/[(2\lambda-1)(c-b)i] \quad (3a)$$

$$\alpha < [(\lambda c-d-(\lambda-1)b)/[(2\lambda-1)(c-b)] + [(b+c)-2d]/[(2\lambda-1)(c-b)i] \quad (3b)$$

The game is now played between XN and YN (to put it exactly, between their representatives), not between X and Y. With a sufficiently low α, less than a threshold, the hybrid groups achieve mutual cooperation without repeating the play. With the value of α exceeding the threshold, only repeating the play with a low i would ensure mutual cooperation. The α-i combinations satisfying these inequalities could be shown as the area under hyperbolas satisfying equations obtained by replacing each inequality sign in Eqs (3a) and (3b) with an equality, with α and i measured, respectively, along the horizontal and vertical axes. While the two hyperbolas may cross, when they do not cross, the area under one of them will indicate sufficient conditions for sustained mutual cooperation to be the unique Nash equilibrium when the groups play the game on the basis of the *PDVs of the future streams of the weighted averages of the perceive payoffs* and by using the TfT.

Severe inter-group conflicts (i.e., a large λ) require a low α. The value of λ is a cultural parameter and is not under the control of the reformer, or, as discussed later, of an institutional entrepreneur. The value of α, however, is a *political parameter* subject to negotiation at the time of forming hybrid groups. A low α will increase chances for cooperation. Under the decision rule discussed above, forming hybrid groups alters the

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48 Thus, the games XN and YN play are noncooperative games.

49 The parameter α would be an issue for a reform; the parameter β would be an issue for an election campaign. Competition among candidates for minority votes would keep pressing the candidate to promise a β equal to α, which is the value of β assumed to be chosen by the representatives in this paper. There is no reason why this campaign promise should not be revealed to the opposition group. Therefore, the transformed payoffs are shared knowledge of the players, and the game is still a game of complete information.

50 The required α to achieve cooperation is a function of not only the material payoffs, but also λ. When λ approaches infinity, an α close to 0.5 would ensure cooperation.

nature of the game. The earlier rival groups, X and Y, sought their own *special interests*; the new groups, XN and YN, with a value of α sufficiently close to 0.5, would seek *encompassing* interests.[51]

Note that forming hybrid groups (XN and YN) for political games would not do away with the existing natural groups (X and Y). If X and Y are residents of two different regions, forming hybrid groups does not imply that they have to be relocated. They simply will agree to be members of new hybrid groups, which will agree to play with each other for certain political games through their representatives. If the natural groups (residents in certain regions or tribes) exist as political groups, they will continue to exist and use new political rules to play some (not necessarily all) political games with one another.

The original groups will be effective for advocating some political agenda of their own. As noted, however, the political games among the original groups tend unable to get out of defection traps in divisive political agenda. In these cases, the games between hybrid groups could form a second tier of political decisionmaking, providing checks and balances to the first-tier process involving pure groups and a way out of defection traps.

4 Applications of the model

Group-oriented values make it more difficult for a collectivist society than for an individualist society to achieve the *potential gains* $x_j = 2c_j - 2d_j$, j = 1, 2, 3, …, J, where j is an index of different PD games. The preceding analysis suggests that forming hybrid groups will increase chances for the society to attain these gains. The hybrid groups, XN and YN, become *institutionally engineered political siblings*, comparable to gene-sharing biological siblings. Forming hybrid political groups can change the nature of games. Chances of cooperation will increase. There have been at least three historical episodes in which societies have tamed inter-group conflicts by forming hybrid political groups and promoted cooperation, in accordance with the preceding principles.

4.1 Reforms in ancient Athens, colonial America, and Singapore

The Cleisthenes Constitution helped ancient Athens, a collectivist society, promote inter-group cooperation. Colonial America, suffering from group-orientation without being collectivist, formed a political union under a constitution that established the US Senate, which provides a political game-playing field among sectorally and ethnically hybrid groups of states. Singapore adopted group representation constituencies (GRC) that help tame inter-ethnic conflicts. The particular manner in which these historical episodes unfolded was not unlike the manner in which Schumpeterian technological innovations take place, and their emergence can be

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51 The Cleisthenes Constitution, discussed in the following section, designed the 10 new tribes largely to have balanced representation of diverse interest groups. In a two-group context, this implies an α of 0.5. The US Constitution does not have legally-fixed proportions, the shares of interest groups are determined by the composition of interest groups in each state. In Singapore, each GRC includes one minority member. Since the size of the GRC varies, however, the proportion of the minority member in a GRC varies across GRCs. The system seems to allow an *over*representation of minorities, and this very feature of the system may be a key factor underlying the success of the system.

explained in the framework of evolutionary game theory. In these episodes, widely dispersed throughout space and time in history, *institutional entrepreneurs* helped the societies introduce new rules (e.g., constitutions, an election law) that turned inter-group conflicts into more productive political interactions that have resulted in cooperation. As shown below, the *phyle* in ancient Athens, the states as the electoral districts for the US Senate, and the candidate groups running for group representation constituencies in Singapore are historical examples of institutionally engineered political siblings.

In 682 BC, *Athens* abandoned monarchy and adopted a government of elected officials *(archons*), but had serious economic, social, and political problems—most of all, strife among tribes, between low-income groups and wealthy aristocrats, and among regions.[52] In spite of Solon's reform, including debt cancellations, Athens fell into the hands of tyrants. Some of these tyrants pursued land reform and other populist policies, but could not resolve deep-rooted factionalism and economic stagnation.

In 510 BC, Athens turned to Cleisthenes, the head of a prominent family, to lead a constitutional reform effort. Cleisthenes led Athens to establish a constitution aimed at a new system of political competition. The constitution (i) required all men 18 years or older to belong to one of the villages (*demes*), which numbered about 170 throughout Attica; (ii) divided Attica into three regions, which had a common agricultural basis, but each representing one of Attica's three diverse interests: handicrafts, fishing, and timber; (iii) organized each of the three regions into 10 groups or thirds (*trittyes*) in such a manner that the *demes* of a single group were not necessarily contiguous pieces of land, thus creating 30 groups in Attica; (iv) formed 10 new artificial tribes (*phyle*) by drawing by lot three groups from each region; (v) and formed the Council of 500 representatives.[53]

The constitution removed from the political process a source of inter-tribal and other inter-group conflicts. Thus, the reform 'transformed Attica from a country of squabbling clans … preoccupied with zero-sum redistribution into the world's first democracy' (Mueller 2001).[54] When accepted, the 500 councillors took the oath 'to advise what is best for the state' (Hammond 1986: 190).

Following the Declaration of Independence, the *13 American colonies* clashed over regional and sectoral interests. Hamilton and others advocated a strong federal

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52 This summary is based on Everson (1996), Finley (1959), Hammond (1986), and Mueller (2001).

53 The Council of 500 was chosen annually not by election, but by lot, 50 from each tribe. The tribes took the presidency in rotation (by lot) for 1/10 of the year. The system reflected the Athenian preference for democracy over efficiency (Jones 1957: 117).

54 With regard to the Cleisthenes Constitution, Aristotle has noted that the constitution made old groups (e.g., extended families) less influential by forming new groups (e.g., new tribes): 'Fresh tribes and brotherhoods should be established; the private rites of families should be restricted and converted into public ones; in short, every contrivance should be adopted which will mingle the citizens with one another and get rid of old connexions'. (Everson 1996). The administrators (magistrates), the Council of 500 (representatives), and the assembly (open meeting of all interested citizens) had an elaborate system of checks and balances. The magistrates were chosen by lot. The ten new tribes took turns to take the presidency in rotation by lot for a tenth of the year each. The presiding (artificial) tribe's foreman was also drawn by lot. This system, while criticized by Socrates for not being efficient, reflected the Athenian preference for democracy over efficiency (Jones 1957: 17) and, at the same time, helped the Athenians avoid destructive inter-group or inter-personal rivalry (Jones 1957).

government and promotion of manufacturing; others, such as Jefferson, strong states and promotion of agriculture. The Founding Fathers' role was important in building a new nation based on the principles that reveal deep insights into both human strengths and limitations. Madison's and Hamilton's role was particularly critical in framing the US Constitution (see Ellis 2001). A guiding principle was to protect the constitutional process from factional influences. North stresses this aspect: 'Thus, Madison … maintained that the constitutional structure was devised in 1787 not only to facilitate certain kinds of exchange, but also to raise the costs of those kinds of exchange that promote the interests of factions' (North 1990: 47).[55] Hamilton, beginning as a strong advocate of a strong national government, was a tireless supporter of the new constitution through the end of the making of the constitution, writing a large number of the Federalist Papers, some of them in collaboration with Madison.

One of the features of the constitution was the US Senate.[56] A conventional interpretation of the political meaning of the US Senate is that the creation of the Senate was based on the principles of state independence (e.g., de Tocqueville 1848: 118-9). Moreover, a bicameral system provides checks and balances within the legislative branch. This is true. The Senate's another important institutional significance was, however, that it has turned the nature of political games. Buchanan and Tullock (1962: 235) note that the bicameral system established rules of the game in which 'no legislation could find majority support in both houses unless it was genuinely to the "general" interest of the whole social group'.

A way to look at this phenomenon on the basis of the analytical framework presented in this paper is to compare how the US representatives and the senators play legislative games. The members of the House represent relatively small districts, which have fairly well-defined, relatively narrow sectoral, regional, or even ethnic interests. For example, a district that elects a representative to the House may be an agricultural district, a Hispanic district, an automobile district, or an urban district. A district that elects a senator, however, is a whole state. In general, even a small state is relatively large and includes both urban and rural areas, several industries, and a number of ethnic groups.

Therefore, in a legislative PD game concerning a sharply conflictive rural-urban issue, members of the House are likely to form clear coalitions along rural-urban lines. Senators, however, must be prepared to represent encompassing interests, including a variety of sectoral, regional, and ethnic interests, which comprise their constituencies, which may be compared more to Cleisthenes' artificial tribes than to Attica's original tribes (i.e., to either XN or YN than to X or Y discussed in the preceding section). Kennedy (1956) has noted that a US senator should have national perspectives.[57] Unlike Cleisthenes, the American Founding Fathers did not *form* hybrid political groups. Establishing the Senate, however, meant the emergence of the states as hybrid groups with political significance over time.

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55 See also Mueller (2001) for a similar view.

56 The Federalist Papers reveal that the framers of the new constitution had considered the lessons of the political institutions in history, including in ancient Greece and Rome. It is, however, not evident that they had considered the lessons of the Cleisthenes Constitution, although the Federalist Papers make it clear that the Senate should have *longer-term national* perspectives.

57 Federalist Papers also stress this point. See Federalist Paper No. 62.

Singapore transformed itself in merely 35 years from a poor third-world economy to a highly competitive, wealthy, and modern rules-based economy. Singapore is a culturally collectivist country, where majority Chinese and Malays, Indians, and other ethnic minority groups comprise a diverse population. Racial strife was not uncommon. Establishing a rules-based economic system without abandoning a collectivist culture has been a notable achievement.

Under the leadership of Lee Kuan Yew, the government pursued policies to help Singaporeans put the interests of the nation above those of ethnic groups (Lee 2000).[58] In one of the efforts to this end, the government instituted a housing policy aimed at promoting ethnically integrated neighbourhoods. To discourage one ethnic group from occupying an entire apartment building, the government imposed a quota for each ethnic group in each building in new apartment complexes. While helping Singapore achieve racially integrated neighbourhoods, however, this housing policy made it virtually impossible in Parliamentary and local elections for non-Chinese minority candidates to defeat Chinese candidates customarily supported by group-oriented Chinese majority voters.

To ensure that minority groups are represented in the Parliament, the government instituted a system of group representation constituencies (GRCs), which were created by amalgamating three or four single-member constituencies and then contested by groups of three or four candidates each. Each candidate group is required to include a minority candidate (Lee 2000: 206-10).[59] In this example, the hybrid candidate groups are comparable to XN or YN, rather than to X or Y. Their collective campaign promises would be different from a collection of campaign promises that would be put forward by them individually as separate candidates. The GRC system obviously has achieved more than merely allowing minority candidates to be elected. That this is clearly an intended result is obvious in the Select Committee report.

> The GRC system of election will encourage, if not compel, political parties to accommodate the interest of all racial groups in their election manifestos and programmes before their election to Parliament. With political parties fielding multi-racial teams of candidates in GRCs, no party contesting in a GRC can afford to campaign on extreme communal platforms without losing the support of the candidates whose community's interests are being undermined. The result is the need for negotiation, bargaining, and compromise among the leaders of the different races *before* their election to Parliament… (Sixth Parliament of Singapore 1988: vii)

Moreover, the GRC system could have been breeding a new type of politicians who have broader perspectives and are prepared to work with other politician to form policy agenda aimed at promoting encompassing interests.

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58 Also see Tan (1999) for a discussion of various aspects of the GRC system, including its weaknesses.

59 Lee (2000: 210) states that, 'One advantage of a GRC is that Chinese candidates cannot make Chinese chauvinist appeals without losing the 25 to 30 per cent non-Chinese vote. They need a Malay or an Indian who can win over the minority votes to be a member of their GRC team of candidates'.

4.2 Interpretation of the three reforms

All three episodes show the importance of the composition of game-playing groups. The hybrid groups in these episodes were designed to respect encompassing interests, not special or sectoral interests. It may also be true that the group's very characteristics, which induced them to cooperate, also made the regimes of their games endure.

Note the crucial role of institutional entrepreneurs. In all three cases, productive political competition did not emerge as a result of spontaneous cooperation between rival groups. There were a handful of individuals—institutional entrepreneurs, so to speak—who, from within, persuaded rival groups to agree on new rules of the game. Although they were members of one of specific groups, a handful of persons, such as Cleisthenes, James Madison and Alexander Hamilton, and Lee Kuan Yew, rose above factional interests. James Madison and Thomas Jefferson were members of the Virginia delegation to the Constitutional Convention, but it appears that their perspectives were more those of the Union than of a region.[60]

Note that the introduction of these hybrid political groups did not do away with old ethnic or political groups. In Athens and Singapore, old ethnic groups continued and continue to exist, but together with new political groups. In the United States, the Constitution gave old colonies a new political meaning as electoral districts for the US Senate. These political groups have evolved over time to include a mix of ethnic, sectoral, and other interest groups.

Note, however, that these three systems do not necessarily ensure a balanced political representation of the ruling party and the opposition party. Under the Cleisthenes Constitution, the ten artificial tribes took turns to assume the presidency in each year. The US Constitution does not institutionally guarantee a balanced representation of the Republican Party and the Democratic Party in the US Senate. In Singapore, the GRC system has not prevented the sustained dominance of the People's Action Party.

The system based on transactions between hybrid groups is effective in restraining divisive inter-group conflicts, but may also make it difficult for the interest groups to promote their own interests. For example, critics of the GRC system in Singapore argue that the system has weakened special-interest groups' chances to advocate their own interests. Thus, a political system should have a balanced mix of both components—one aimed at promoting special interests and the other aimed at promoting encompassing interests. A bicameral system can be effective in this regard, although an ill-designed bicameral system will simply add another layer of political institutions, without solving inter-group conflicts.

4.3 Other examples

There are a range of phenomena to which the preceding analytical framework can shed light: The two following examples illustrate institutional realigning.

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60 As a result of his effort for the cause of the Union, parochially-minded Virginians denied Jefferson his cherished dream to become a first US senator from Virginia (see Ellis 2001).

Inter-ethnic marriages can lead to a realigning of groups without third-party coercion. Over time, inter-group conflicts can diminish. For example, inter-ethnic marriages resulting from inter-cultural compatibility have altered Sino-Thai inter-ethnic games in Thailand.[61] Inter-dynastic marriages could alter the nature of inter-dynastic games. The Koryo-Yuan and Yi-Japan inter-dynastic marriages, however, were forced on the Koryo and Yi Dynasties, respectively, by Yuan and Japan. It was obvious, however, that they were intended by the powerful Yuan and Japanese governments to force changes in the nature of the games they played with the Korean dynasties to their advantage.

In urban-rural conflicts, the composition of rival groups may change through time for a number of reasons. These changes tend to alter the nature of the games they play. Rural farmers and urban consumers of farm products often play PD games as net producers and net consumers of agricultural products, for example, over trade policy. While it is not easy to regroup them, migration over time in a collectivist society may change the composition of the groups. For example, a massive migration of young people from rural to urban areas in Korea during the past decades may have had important implications for the way urban and rural residents play urban-rural PD games. Urban residents in collectivist Korea have strong family ties to rural residents, and vice versa. The two groups resemble gene-sharing siblings. This implies that opening up the domestic market for agricultural products is not a simple PD game as in some other countries with individualist values.

The following institutional changes illustrate the issues and are conceivable, but their feasibility is not obvious.

The management of a company normally plays games of bargaining with the labour union. In countries with severe labour strife, industrial relations may often be characterized more as PD games. When the degree of distrust is high between the management and the union with no credible rules that promote cooperation, their games can turn into PD games. The players may choose to defect: that it, the union does not compromise on wages, and the management responds with a work-stoppage. A third-party arbitrator can play a useful role,[62] but often fails to persuade the two parties to compromise. Among other factors, group-oriented values and intra-group cohesion intensify this tendency. An institutional redesigning of the two boards—the company's and the union's—in principle, might increase chances of mutual cooperation.

For example, a company's labour union and its management can exchange some of their members on their decisionmaking boards. In this case, the role of the board members who cross the management-labour line could be limited to those cases in which their voting power would help the company avoid mutual defection. This is clearly a controversial idea, but, when both the union and management are culturally cohesive groups, it might be sensible for the union and the management to use this approach, with the help of a third-party, when they know that they both lose because they cannot

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61 The author is indebted to Professor Peter Kilby for this point.

62 Many countries have a tripartite system of governing labour-management relations, with government participating as a third-party arbitrator.

compromise under the existing rules of the game.[63] A potential risk of this approach is the possibility of management-labour collusion that endangers the interest of stockholders. This approach would be counterproductive when the management is not a faithful agent of stockholders. This risk would be reduced, however, if a *bicameral* system of labour-management decisionmaking were introduced, with their pure boards and hybrid boards, the former working with their parochial perspectives and the latter working with encompassing perspectives.

Countries are often engaged in trade policy and monetary policy PD games. Changing the composition of trade policy boards of the countries that are major trade partners might help the two countries avoid a trade war.[64] This is a different approach from relying on a global organization such as the WTO and could reinforce the role of the WTO. The former tends to keep the international trade games with uncooperative games, the latter tries to institute a system of cooperative games.

Political competition in Korea has shown features of classic PD games.[65] Political parties have had strong regional roots. In general, members of the National Assembly (NA) tend to represent strong regional or sectoral interests. Leading politicians have been making unsuccessful efforts to broaden their parties' membership beyond their regions. A number of ideas have been under consideration. One of them is to increase the size of electoral districts and allowing two or more representatives to be elected in one district. The reasoning is that this system would ensure a more balanced regional representation in major political parties. While this is true, this may or may not reduce regional political conflicts, as explained below on the basis of a simple example:

Suppose there are two regionally-oriented political parties X and Y and two regions RX and RY that elect NA members.

i) Under a system of small single-member electoral districts, voters with strong regional ties in RX will elect only the candidates from X; those in RY only those from Y.

ii) Under a system of large multiple-member electoral districts, there is a chance, albeit no certainty, that candidates from both parties will be elected in each. Even if the candidates of both X and Y were elected from RX, however, it is unclear how the members of Y elected in RX would act on legislative matters of *special* importance for RX. On matters of special regional importance, voluntary coalitions are likely to form at the NA along regional lines and across party lines. The representatives would have split loyalty—to their region and to their party. In a strongly group-oriented society where *regional ties matter*, loyalty to their region may matter more than loyalty to their

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63 This arrangement will succeed only if it the management is the true representative of the shareholders. Otherwise, the arrangement could yield a management-labour collusion that works against the interest of shareholders.

64 In a slightly different context, with regard to monetary policy, there has been a suggestion that the US Open Market Committee (OMC) may include foreign central bank officials. This idea is based on the recognition that US monetary policy has far-reaching implications for the global economy and that a redesigned OMC would be guided by broader interests, rather than by purely US interests

65 While using a Korean case, the discussion here may be adapted to many political problems in collectivist societies.

respective parties unless either (1) charismatic heads rule the parties with iron fists or (2) the parties have a set of rules that would transform the diverse special interests within them into policy agenda aimed at promoting encompassing interests. These requirements, the former in particular, are not conducive to the development of democratic institutions, including a system of political parties that make their decisions democratically, not through central command, and that promote the expression of diverse individual views of NA members.

iii) There can be, however, other ways to redesign political groups. For example, in the tradition of the Cleisthenes Constitution, a new system may *form inter-regional* electoral districts by merging electoral districts in RX and RY. In this case, each electoral district would include some voters from both RX and RY. If political competition is vigorous and if election is fair, the representatives of such districts would become *political siblings* and would tend to seek cooperation in inter-regional political PD games they play in the National Assembly. This system would tend to make it difficult, if not impossible, for regional coalitions to form on key regionally-divided issues.

5 Broader issues

Without effective rules, collectivist societies need charismatic, benevolent, and authoritarian leaders to coordinate the interests of fierce rival groups. Without such leaders, a collectivist society can be fractured, as rival groups keep choosing defection, thus failing to attain the societies' potential gains from cooperation. This is a problem facing collectivist societies trying to establish democratic institutions that rely more on rules and less on such charismatic leaders. This paper has argued that instituting new political groups (e.g., political siblings) would reduce their need to rely either on such leaders or on effective third-party rules to avoid defection traps. This section discusses a number of issues that would put the model in a broader and dynamic context. In particular, this section comments on why forming hybrid groups may be feasible.

5.1 Learning to cooperate?

So far, this paper has assumed that λ is exogenous, noting that λ changes only slowly. The analysis, therefore, has been static. Developing a dynamic model by endogenizing λ would require a broader framework than introduced in this paper. While this section later discusses the preceding analysis in the context of longer-term game models, it begins by considering possibilities for λ to change.

An analysis of how λ may change can highlight the severe difficulties collectivist societies face in achieving inter-group cooperation in a realistic timespan. To see this, one can ask: Can there be an approach for rival groups with collectivist values to achieving voluntary cooperation through learning? To see how difficult this road is, consider a large number of pairs of rival groups playing one-off games with different material payoffs. Assume the following: (i) Different pairs of groups have different degrees of conflicts (i.e., different values of λ_j). (ii) The material payoffs are symmetric, but different games have different degrees of potential gains ($x_j = 2a_j - 2d_j$, $j = 1, 2, \ldots, J$, with $x_j > 0$) when they switch from mutual defection to mutual cooperation. The games played between rival groups (with $\lambda_j > 1$) may be grouped as follows:

a) Consider games with a material payoff structure (i.e., non-PD games) the standard solution of which is mutual cooperation. Between collectivist groups, with $\lambda_j > 1$, these games would be played in two ways:

   a(i) games with cooperation as actual outcome: the value of λ_j is not large enough, and the groups attain $2a_j$.

   a(ii) games with mutual defection as actual outcome: the value of λ_j is large enough, and these groups know that they could gain $2a_j$, but attain only $2d_j$.

b) Consider PD games that yield defection. Game-playing groups gain only $2d_j$, regardless of the value of λ_j as far as it is not less than 1—the case that is ruled out because the groups are collectivist.

A tabular list of these cases may be as follows:[66]

Games with material payoffs (i.e., before transformation) for which the dominant strategy in the standard solution is			Actual outcomes based on perceived payoffs
cooperation	a(i)	λ_j >1, but small	Cooperation
	a(ii)	λ_j >1 and large	Defection
defection	b		Defection

If the rival groups with collectivist values *learn* by watching how other rival groups realize the potential gains through cooperation, those who play the games in case a(ii) might learn, over time, to emulate the groups playing the games in case a(i). They would learn that these players attain the potential gains (x_j) because their λ_j's are low, while they do not. Over time, they might learn to reduce the value of λ_j's with which they transform the material payoffs. Thus, an increasing number of the games in case (a) would yield mutual cooperation.

Are these conditions for mutual cooperation easy to fulfil in a world of inter-group conflicts? The answer is no. It is unclear to what extent the players in category a(ii) will emulate those in group a(i) in a realistically short timespan. This does not seem to be a matter of knowledge or intelligence, but a matter of culture and values. Even if the players were capable of learning, the evolutionary process described above would be very slow.[67]

Moreover, the process would lead the players in category (b) to mutual cooperation only if λ_j were reduced to less than 1. For λ_j to be reduced to below 1 implies that the game-playing groups stop being culturally collectivist. History suggests that this is a realistic

66 In this list, λ_j's for all groups are greater than 1. Any groups that use a λ_j less than 1 are considered a group. This simplification helps makes the essential point in this paper.

67 Evolutionary game models have considered possibilities for an increasing number of players to learn from 'cooperators' to choose cooperation in PD games. This process requires even a longer timespan.

prospect only for an extremely long timespan. Poor countries are poor to a considerable extend because they cannot agree on rules that would promote mutual cooperation.

5.2 Inter-group conflicts, power distance, and cooperation

The preceding analysis has shown that, in theory, collectivist societies could promote inter-group cooperation via two approaches, (i) forming hybrid groups and (ii) repeating to play the game. With a relatively high α, a low i would promote cooperation between the two groups, XN and YN. A low α would induce them to cooperate with a relatively high i. A sufficiently low α would induce them to cooperate regardless of the level of i. As mentioned, having a low i is a difficult condition to satisfy in a collectivist society, which tends to have weak rules and, thus, in which groups tend to discount heavily future payoffs.

The limited promise of the repetition of game, a large λ (exceeding 1), and a high i leave forming hybrid groups as one of the few realistically feasible roads to cooperation in a society with collectivist values and inter-group conflicts. Forming hybrid groups is *not* the same as making the rival groups care about each other. The outcome from forming hybrid groups is not predicated on changes in the degree of inter-group conflicts (λ), which reflects cultural values of the members of X and Y. With a sufficiently low α, cooperation would emerge between XN and YN.

It is, however, important for the two rival groups to *agree* to form hybrid groups. They might not agree if they were severely antagonistic. Moreover, hybrid groups must have proper *internal decision rules.* The representatives should play the game in accordance with the rules described in the preceding discussion. The outcome would not be cooperation under, for example, either a *despotic tyranny* allied only with the majority or a *majoritarian tyranny* in the name of democracy.

How would a society meet this challenge? The following part of this section introduces a broad framework that may be used to discuss how a society might respond to destructive inter-group conflicts. To this end, it is necessary to continue the discussion on the basis of more than two game-playing groups, which play a range of games with different material payoff structures. A simple representation of this situation can highlight a few essential points as follows:

Some of the games are games with a non-PD structure of their material payoffs (cases a(i) and a(ii)) in the preceding subsection, but the others are games with a PD structure of their material payoffs and, thus, with mutual defection as their solution (case b). While the cases in a(i) (with relatively small λ's, but still in excess of 1), on the basis of perceived payoffs, yield mutual cooperation, the rest (cases in a(ii)) (with large λ's, in excess of 1 by a large margin), on the basis of perceived payoffs, yield mutual defection. There is no third-party coordination. Severe inter-group conflicts (a large λ_j) imply that the category (b) games and a large number of games in the category (a) yield mutual defection. This, in turn, means large aggregate *unattained net potential gains*, since a large share of games will have mutual defection as solution.

In a situation like this, it is not unreasonable to postulate that (i) as a society has severe inter-group conflicts (a large λ_j) and (ii) as games with large potential payoffs ($2c_j–2d_j$) are PD games, the rival groups' demand for third-party rules will be large, unless one of

the groups can dominate the other(s). The rival groups will recognize the need for *binding rules*, but conflicts and mutual mistrust will not allow them to agree on, or enforce, such rules. The essential function of such rules is *to induce* or even *to force* the players away from mutual defection toward mutual cooperation.

Up to this point, taking a rather unusual approach that characterizes social processes as strategic games between various groups, this paper has explored how the demand for third-party rules might arise. The discussion has highlighted two elements: potential gains from cooperation and inter-group conflicts arising from collectivist values.

How the society responds to this demand is more difficult to postulate. There may be a range of possibilities between the following two extreme cases:

a) A society might not be able to provide any coherent rules. This would be anarchy. While an evolutionary process toward uncoordinated cooperation is conceivable, any institutional reform for mutual cooperation would be limited even in the long run.

b) A society might respond by producing a coherent, effective authority, which can establish effective rules that ensure cooperation.

History shows that societies have responded to the demand for an effective rule in a variety of ways. It appears that at least two factors mattered. One is whether a society had individualist or collectivist values. Individualist societies have established a rule of law.[68] Collectivist societies have not been as successful in establishing such a rule. The other is whether a society was uni-polar or multi-polar in its initial power structure. Societies with a multi-polar power structure and political competition have developed a democratic rule. Societies with a uni-polar power structure in which power was monopolized have developed an authoritarian rule.[69] These societies have tended to have a large power distance. A large power distance, however, does not necessarily imply a despotic rule. Confucianism has tended to idealize a paternalistic, benevolent rule, although its ideals, relying excessively on refined leaders rather than on effective rules, do not necessarily always materialize in practice.

5.3 Would forming hybrid groups be politically feasible?

The analysis in this paper has shown that, once established, *hybrid groups* can achieve cooperation that *rival groups* cannot achieve in a collectivist society. This conclusion leads to two important questions: (i) Can societies *establish* such a system? (ii) If it is feasible, why do they institute such a system, but not a system in which rival groups, not hybrid groups, are induced or forced to cooperate?

The remaining part of this section answers these questions in reversed order. This subsection compares the feasibility of two institutional changes aimed at promoting cooperation: (i) imposing a system of rewards or punishments for two rival groups to choose cooperation rather than defection and (ii) forming hybrid groups that by design

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68 This ideal is well captured in Madison's Federalist Paper No. 9 quoted earlier in this paper.

69 Olson (1965) and Moore (1966) seem to agree on this point.

have incentives in themselves to choose cooperation. The following subsection discusses the crucial role of *institutional entrepreneurs* as catalysts in forming hybrid groups and interprets their significance in a framework of evolutionary game models.

The central point in this regard is that the rival groups are aware of the potential gains (x =2a-2d) they can collectively obtain by moving from defection to cooperation. This powerful incentive exists in both categories of (a(ii)) and (b), which yield defection, in the preceding subsection. The groups, however, cannot achieve this change because there is no effective coordination. The following analysis assumes that the members of the two groups together comprise the population of a whole country (e.g., a country divided by two ethnic groups).[70]

Consider rewards and punishments. Any rewards aimed at inducing the groups to cooperate should be powerful enough to raise the payoff for each of the two groups to a level above c in the payoff Matrix (1). This means that, relative to the status quo, collective *net gains* a system of rewards offers would have to be larger than 2a-2d, which is the maximum extent of the gains to be achieved by a movement from mutual defection to mutual cooperation. In the case of two competing political groups in a country, such a system of rewards would not be financially feasible for a third party to promise.[71]

The only financially viable incentives, therefore, would be *negative* incentives. The groups could be threatened to be taxed for their defection. In principle, the groups could be forced to cooperation if a credible punishment (or taxation) scheme turns cooperation into the dominant strategy on the basis of after-punishment (or after-tax) payoffs. In a typical collectivist society, however, punishment, taxation, and other rules, are not credible, and the enforcer implements them with a large degree of discretion. The groups, therefore, are unlikely to choose cooperation under such a punishment rule. Moreover, an ineffective punishment scheme, while not effective enough to induce them to cooperate, might still cause the groups to feel threatened for possible punishment for choosing defection. Therefore, instituting a system of punishments is unlikely to be politically viable, compared with the status quo.

There still is a way. It is for a tyrant, as a third party with a large stick, to force the groups to cooperate. Such a third-party rule, however, has been accompanied by a sharing of the realized net gains between the game-playing groups and the rule enforcer.[72]

Forming hybrid groups would meet different obstacles, but can be shown to be more viable. A clear indication of its viability is that, as earlier shown, three societies (ancient Greece, colonial America, and Singapore) have successfully instituted the system, and, as shown below, they have not been historical accidents. Moreover, under the conditions (e.g., reasonably fair, transparent elections) discussed in section 3, in no conceivable circumstances would the members of the rival groups be worse off (or

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70 The argument also holds for many parts of these two groups playing inter-group games.

71 The incentive system would imply promising the material payoffs beyond the confinement of *the feasible payoff sets.*

72 On the basis of a different model, research has explored how a despot might go further to tax away parts of these gains (McGuire and Olson 1996; Olson 2000; Mueller 2003).

threatened to be worse off) with the system of hybrid groups than with the status quo. Unlike in the case of a system of punishments above, there is no risk they would have to consider in this case. There are circumstances in which the system of hybrid groups would not bring about the promised net gains. For example, the elected representatives—members of the dominant groups in their respective electoral districts—might still choose to defect. *Even in this worst-case scenario, the members of the hybrid groups would not be worse off than in the status quo*.[73]

Establishing a system of hybrid political groups implies a potential Paretian improvement, but does not pose any risk for the members of the groups. What is also attractive about this system is that the society already has a system of how the gains would be distributed among members of rival groups.[74] While not easy, particularly when rival groups are severely antagonistic, the conditions for this change do not seem insurmountable in many modern societies with collectivist values.

The essential difficulties associated with trying to achieve cooperation between rival groups without forming hybrid groups arise from their reliance on an *effective third-party rule*, which is a difficult condition to fulfil in a collectivist society. By comparison, forming hybrid groups relies minimally *on a third-party rule*. If a third-party rule were comparable to trying to establish conditions for rival groups to play *cooperative games*, forming hybrid groups would be creating realistic conditions for rival groups to achieve cooperation in *noncooperative games* by mimicking the manner in which biological siblings achieve cooperation in their games. The former is more difficult to achieve than the latter in general and in collectivist societies in particular.

Possible resistance to forming hybrid groups, however, might come not from members of rival groups, but from their leaders whose positions might be weakened in the new rule. In an authoritarian society, in which the leaders of rival groups have authority, the transition to a system of hybrid groups would not take place spontaneously. A new breed of leaders, or institutional entrepreneurs, should emerge.

5.4 Forming hybrid groups—the rise of institutional entrepreneurs as catalysts

Thus, forming hybrid groups can be considered a least-resistance path to a Paretian improvement. Political hybrid groups, however, did not emerge without the role of institutional entrepreneurs. How can one explain the rise of institutional entrepreneurs—the Cleistheneses, the Madisons, and the Lees? Evolutionary game theory suggests a broad framework. A brief sketch of an evolutionary framework may be as follows.

Game theory, on the basis of theoretical models and through experiments, has shown that in repeated PD game situations, it is plausible for at least some human beings to practice strong reciprocity—'a propensity to cooperate and share with others similarly disposed, even at personal costs, and a willingness to punish those who violate cooperative and other social norms, even when punishing is personally costly, and even

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73 Note that the games are played between AN and BN, but the payoffs accrue to A and B, which have a well-established mechanism to distribute the payoffs.

74 An example would be a change in economic policy that yields collective gains for the residents in two rival regions.

when there are no plausible future rewards or benefits from so behaving' (Gintis 2000: 255). Thus, through an evolutionary process, human beings can develop institutions for cooperation.

This evolutionary process takes a long time. Evolutionary game models characterize this process as a learning process of groups of humans (e.g., strong reciprocators or the *homo reciprocans*) responding to opportunities by multiplying at a higher rate over time than others (e.g., the *homo economicus*). The timespan in these models is *scores of thousands of years*. This is an excessively long timespan to discuss institutional reforms. Moreover, the *homo reciprocans* in evolutionary game models are faceless. In a shorter timespan, two armies cannot wage battles without heroes. To interpret history or to derive lessons from history for improving or reforming institutions, one must be able to explain what happens during a much shorter timespan and to formulate a framework to allow the role of generals (or catalysts) on the battlefronts. In the forming of political hybrid groups, the catalysts were institutional entrepreneurs—the heroes or generals who played the role of *early* homo reciprocans.

To this end, it is helpful to note a wide range of cognitive and other human capabilities.[75] In inter-group PD games, some humans become strong reciprocators much earlier than others. Some societies have had such early strong reciprocators, while other not.[76] Athens, colonial America, and Singapore produced Cleisthenes, Madison, and Lee, but many others did not. A long process of human learning can be described as a process in which a limited number of early strong reciprocators (i.e., the early *homo reciprocans*) lead and the others follow. The rise of such early strong reciprocators is in line with the predictions of evolutionary game-theoretic models. Institutional entrepreneurs may be characterized as such early reciprocators, who recognize an opportunity (and are ready to act) for the society to gain by moving from D-D to C-C.

The emergence of hybrid groups may have been an outcome of both demand-side conditions (i.e., opportunities for Paretian improvements) and supply-side conditions (i.e., the availability and specific traits of institutional entrepreneurs), as well as the political and socioeconomic environment (including those factors earlier discussed in section 5.2) in which these early reciprocators catalyzed the forming of the hybrid groups. These early strong reciprocators could consider different routes to this goal—establishing third-party rules prohibiting defections, creating a system of incentives and punishments, and creating hybrid groups. As discussed earlier in this section, establishing hybrid groups could obviously be a least-resistance path. The early strong reciprocators would also have different means, including use of force and persuasion, in achieve the goal. The specific personal traits of these early strong reciprocators were conditioned by genetic and cultural factors. The political and socioeconomic conditions offered alternative paths for these leaders with different traits.

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75 In formulating a framework in which institutional reforms are constrained by the limited supply of institutional entrepreneurs, the author would like to acknowledge his indebtedness to Peter Kilby, who has pointed out that technological innovation is constrained by the limited supply of Schumpeterian entrepreneurs (see Kilby 2003, 1971).

76 Even in a more mundane situation, one sees the emergence of such a person in some case, and not in other cases. For example, a crowd might create a chaos by trying to go through a small gate to a stadium for a free concert. In some cases, only in some cases, a couple of persons, at the costs of their personal discomfort, rise to the occasion and keep the order.

5.5 Would the hybrid political groups be too artificial to be sustained?

The proposed hybrid political groups would be artificial groups, but so are geographical areas as electoral districts with diverse ethnic groups. When two geographical regions are in conflict, forming political groups that draw their members from geographically noncontiguous regions would not offer causes for violent clashes between the groups at a district level. The candidates would campaign by travelling between noncontiguous sub-districts. If the number of geographical areas in one hybrid electoral district is relatively small, having a parliamentary member to represent an electoral district comprising a number of noncontiguous geographical regions would not be a problem with current communication and transportation technology. It is true, however, that there would be a threshold of inter-group rivalry beyond which the proposed system of political competition would not be feasible.

5.6 Feasibility of broader cohesion in a collectivist society?

The model in this paper analytically supports the findings of the research in cross-cultural psychology suggesting that a typical collectivist society tends to be more fractious than a typical individualist society. Collectivist values tend to make group members perceive non-PD games as PD games.

These findings are not necessarily in conflict with remarkable national cohesion found in certain circumstances in a collectivist society. A common external threat would create different opportunities for rival groups in a collectivist society. The opportunities would include possibilities for coalitions, including one with the outside force. When the threat poses a choice for the rival groups—a choice between a certain foreign domination and a chance for them to avoid the domination via inter-group coalition, their payoff structure would change, and rival groups would be able to achieve inter-group cohesion.

6 Summary and conclusions

Cultural collectivism can promote social cohesion, but is often a source of inter-group collisions, which are politically, economically, and socially destabilizing. It is an important factor underlying institutional inefficiencies that deny collectivist societies the achievement of their full economic potential in the short run and in the longer run. Institutional reform can help these countries achieve these potential gains by promoting productive interaction between rival groups.

A secure road for rival game-playing groups to achieve mutual cooperation is for the groups to pay attention to the interests of their rivals (i.e., by moving toward observing the Golden Rule). This is how gene-sharing siblings succeed to cooperate and how collectivist groups achieve intra-group cooperation. This is also what rival groups fail to achieve by the nature of their relationship.

This paper suggests that inter-group cooperation is difficult to achieve, particularly in societies with group-oriented values and severe inter-group conflicts. Reforming the nature of rival groups in a collectivist society to care about the opponents' interests is as difficult as reforming human beings to be altruistic. Mutual cooperation through the

repeated playing of a game is not an easy condition to fulfil for rival groups to achieve in a culturally collectivist society. Rival groups may not choose to repeat a game, even if they are forced to, and a high discount rate and the inter-group antagonism reduce chances for mutual cooperation. This explains the failure of many collectivist societies to establish effective rules for political and economic cooperation.

Rival groups, however, can begin to cooperate by forming hybrid groups, which become the *political equivalents of gene-sharing siblings*. Institutionally engineering hybrid political groups that resemble gene-sharing siblings is not easy, but may be easier to achieve than either reforming the cultural characteristics of rival groups or establishing an effective third-party rule for cooperation between rival groups.

For mutual cooperation to emerge, these hybrid groups must have an exact set of features. Each group should have a mix of the members of both rival groups. These mixed groups, not their subgroups or members, should be the game players. For example, (i) when ethnic groups are engaged in playing PD games, hybrid groups should be mixed ethnic groups; (ii) when rival groups playing PD games are the residents of rival regions (e.g., urban and rural regions), hybrid groups to play political games should have a balanced representation of the residents of rival regions.

They also should have proper internal decision rules to transform members' preferences to group preferences. All this condition requires, however, is for each group to have a representative and to hold fair elections to choose the representative. Indirect democracy is crucial. Each hybrid group should be represented by an *individual*, not by a group of individuals, unless the group is designed to vote *as a team*. *Hybrid groups* and *indirect democracy* requiring an individual to represent a hybrid group prevent the formation of special-interest coalitions. This is a condition that is not impossible to fulfil in many, although not all, collectivist countries in the present circumstances.

The following discussions further illustrate how hybrid political groups work:

a) Suppose the members of the US House and the US Senate from New York and Iowa are engaged in a political PD game over a critical issue that sharply divides rural and urban residents. New York is a relatively urban state, while Iowa is a relatively rural state. Both states, which are the electoral districts for their senators, however, have both urban and rural electoral districts for their members of the House. If the issue was truly important, the members of the House are likely to be divided along rural-urban lines. They would tend to defect in urban-rural PD games. The senators, however, who represent the whole states, which include both urban and rural areas, would have to consider the interests of both urban and rural residents in New York and Iowa. There are greater chances for the senators to choose cooperation in urban-rural PD games.

b) The candidate groups, including ethnic Chinese, Indians, and Malays, in GRC districts in Singapore run as *teams*. Their campaign promises would be different from those that would emerge from ethnically-oriented individual Chinese, Indian, and Malay candidates who would run, respectively, in separate ethnic Chinese, Indian, and Malay districts. Candidates running in hybrid electoral districts would have incentives to promote encompassing interests, in comparison with ethnic candidates running, respectively, in their

own ethnic districts. Hybrid candidate groups competing in GRC districts would have greater incentives to cooperate with each other on divisive ethnic issues.

Historically, the Cleisthenes Constitution, the US Constitution, and the Singaporean Group Representation System have achieved to form sibling-like political groups out of squabbling tribal, regional, and ethnic groups. But such rules do not appear to have emerged spontaneously. In each historical episode of the emergence of political hybrid groups, institutional entrepreneurs played key roles.

Hybrid groups, of course, are not an answer to all institutional problems. The institutional engineering of political siblings is a specific reform aimed at enhancing cooperation. They may not work in certain circumstances; they may not achieve any objectives. The tendency for hybrid groups to pay attention to encompassing interests may imply an inadequate attention to special needs of specific groups. Hybrid groups would not solve this problem. Therefore, transactions among proposed hybrid groups should be an additional layer of political transactions. This is clearly the case of the US Senate. The bicameral system offers checks and balances between the promotion of relatively narrow interests for smaller electoral districts and broader interests for larger ones.

When two regionally-based rival political parties are engaged in playing PD games, it is not sufficient for these two parties to broaden their membership if individual party members have incentives to promote their own regional interests. The results may be fractured parties that have divisive regional subgroups in each of them. In this case, forming hybrid political groups and institutionalizing indirect representation may help a society get out of defection traps in political PD games. The hybrid groups, by political construction, would seek *encompassing* interests. These artificial coalitions, which cannot be formed voluntarily in a collectivist society, prevent the emergence of special-interest coalitions.

The three historical episodes suggest both optimistic and pessimistic outlooks. On the optimistic side, they suggest that it is possible for a society to promote cooperation by forming hybrid political groups. Clearly, engineering political siblings is feasible; changing human values, such as collectivism, may take centuries or even longer. The formation of hybrid groups is in line with the manner in which evolutionary game models explain how human society has evolved toward cooperation. Societies that try to establish these groups would not be swimming against the evolutionary tide.

The paper also has noted that forming hybrid groups may be viewed as a least-resistance path to cooperation. It is like establishing a ground for noncooperative games that yield cooperation with little effective third-party coordination—that is, without achieving sufficient conditions for cooperative games.

On the pessimistic side, however, it is unclear exactly *how* collectivist societies, in general, can emulate the successful episodes of ancient Athens, colonial America, and Singapore. It is clear that their successes benefited from the role of a number of individuals. Analogy between Schumpeter's entrepreneurs and institutional entrepreneurs is instructive. As Schumpeter's entrepreneurs introduce new technology that raises firms' and a society's productivity, institutional entrepreneurs introduce new institutions and raise a society's overall productivity. As the former assemble talented

people and capital to use new technology to produce new products, the latter persuade stakeholders to institute new rules for more productive political, economic, and social interactions.

The paper has highlighted that institutionally engineered political siblings have tamed factionalism and that they have done so not accidentally. This is a notable lesson for the designers of political institutions. The paper, however, has not fully addressed the question of how they, but not others, have succeeded, although the supply of institutional entrepreneurs seems to matter. Under what conditions can other societies emulate their experiences? More broadly, what are the roles of institutional engineers and other stakeholders? What are the role of ideas and vested interests? These are questions for further studies.

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