Economic interactions and social tolerance: A dynamic perspective

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HIGHLIGHTS

- We investigate the relationship between economics and social tolerance.
- Our methodological framework is the replicator dynamics.
- Result 1: A fully tolerant society is associated with a higher social welfare.
- Result 2: Intolerance is much more persistent than tolerance.
- Result 3: Cultural integration should precede economic integration.

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ABSTRACT

We propose an evolutionary game to analyse the dynamics of tolerance among heterogeneous economic agents. We show that: (i) intolerance is much more persistent than tolerance; (ii) a fully tolerant society assures prosperity; (iii) cultural integration should precede economic integration.

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1. Introduction

In this paper, we analyse how tolerance, which we define as a generic ability to accept diversity, is affected by wealth distribution between two economically interacting social groups. As pointed out by Tabellini (2010) and Florida (2004), intolerant behaviour affects economic growth and social development by reducing trust and cooperation among economic agents, obstructing the free movement of ideas and talents and favouring corruption and political patronage.

Furthermore, Bjornskov (2004) discusses the importance of individuals' tolerance for economic growth, showing that inequality reduces growth but mainly in societies where people perceive it as being relatively unfair. However we ascertain a substantial lack of theoretical economic models about the determinants and social dynamics of tolerance. To the best of our knowledge, one of the first theoretical papers on this topic is Corneo and Jeanne (2009). The authors propose a theory of tolerance using the approach of symbolic values in which benevolent parents select their children's values. They argue that society may be trapped in an intolerant equilibrium; moreover, moving from an intolerant to a tolerant society would increase aggregate income. Correani et al. (2010) propose an overlapping generations model, showing that the incentives that influence descendants' predisposition to tolerance depend on both institutional factors, where behaviour is imposed by rules and social (or cultural) factors. The authors confirm the absolute impossibility of affirming tolerance through formal rules. Intolerance is a persistent attitude and its control requires continuous interventions on the educational processes of new generations. Recently, Muldoon et al. (2011) have developed two models of rational motivation for toleration. Key to the first model is an application of David Ricardo's theory of trade and his related notion of comparative advantage. In their second model the authors assume one-on-one interactions between members of a

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Table 1
Payoffs of the interaction. The heading of the table points to tolerant (x_i) and intolerant ($\hat{x}_i$) agents of group i. The generic couple (a_i, a_j) describes the payoffs of the agents in the i-th row and j-th column.

	x_1	$\hat{x}_1$	x_2	$\hat{x}_2$
x_1	π_{11}, π_{11}	π_{11}, π_{11}	$\pi_{12} - (\alpha_1 + c_1), \pi_{21} - (\alpha_2 + c_2)$	$0, 0$
$\hat{x}_1$	π_{11}, π_{11}	π_{11}, π_{11}	$0, 0$	$0, 0$
x_2	$\pi_{21} - (\alpha_2 + c_2), \pi_{12} - (\alpha_1 + c_1)$	$0, 0$	π_{22}, π_{22}	π_{22}, π_{22}
$\hat{x}_2$	$0, 0$	$0, 0$	π_{22}, π_{22}	π_{22}, π_{22}

society, where the successful establishment of a link between two agents is constrained by their level of tolerance. The principal findings of Muldoon et al. (2011) are that individuals should be rationally motivated to become more tolerant, but only under specific conditions. First, heterogeneity in the population is necessary; second, individuals must have some material interests; third, agents must have a relatively small number of the skills available in the society.

The mathematical model developed in the present article relates to the literature on the evolution of social preferences (Bisin and Verdier, 1998, 2001; Pichler, 2010) and is a natural continuation of economic studies on fundamentalism (Iannaccone, 1997; Arce and Sandler, 2003, 2009; Epstein and Gang, 2007) and social tolerance (Corneo and Jeanne, 2009; Correani et al., 2010; Muldoon et al., 2011). To assess the evolution of tolerance in society, we use the replicator dynamics (Weibull, 1998), which implicitly assumes that tolerant and intolerant behaviour spreads on the grounds of a selection process: the behaviour (strategy) that gives a higher payoff tends to spread in the society. We introduce a random pairwise matching where two randomly selected agents are involved in an economic transaction (for example a working relationship or a business deal) which produces an amount of wealth that is assigned to the agents on the grounds of their initial economic contribution. Substantially, we assume that a group (group 1) is richer than the other and an agent of group 1 gives a greater contribution in producing wealth than the poorest agent of group 2.

Obviously, the economic transaction is strongly affected by the type of agents involved in it (Akerlof and Kranton, 2000) and, in particular, it is not carried out if the actors are agents of different groups and at least one of them is intolerant; as a matter of fact, a fully tolerant society is a Pareto dominant equilibrium, allowing the highest production of wealth.

The model produces a large number of different scenarios, but only in one case tolerance is a globally stable steady state, confirming the empirical evidence that intolerance is much more common and persistent than tolerance (Corneo and Jeanne, 2009). In particular, we will show that the selection process of dominant behaviour is strongly affected by wealth distribution and agents' perception of cultural differences among social groups. In other words, as stated in the empirical analysis of Becchetti et al. (2007) '*not only growth but also the distribution of growth dividends matters*' for the diffusion of tolerance. Notably, we find that, even assuming an identical initial capital endowment of the two groups (economic integration), the hypothesis of fairness in the allocation of wealth produced with the economic interaction implies the dissemination of intolerance. Thus, tolerance requires persisting differences in the distribution of produced wealth (group 1 should remain richer than group 2). This strange phenomenon is less prominent if an agent's perception of diversity is less marked, that is if cultural integration between the two groups is reinforced. These theoretical results suggest that cultural integration should precede economic integration.

The remaining sections of the paper are organized as follow. Section 2 describes the model and discusses the main results. Section 3 analyses the welfare implications of the evolutionary dynamics of social tolerance. Section 4 contains our conclusions and provides prospects for further research.

2. The model

We assume that a population of N economic agents is divided into two differentiated groups. Differences, such as ethnicity, religion, country of origin and social class are almost immediately recognizable. We indicate with N_i the number of members of group i, for $i = 1, 2$ and $N_1 + N_2 = N$. The cardinality of each group is supposed large enough, i.e. $N_i > 1$, for each $i = 1, 2$. For the sake of simplicity, N_i is assumed to be constant in time, i.e. populations do not grow or decrease. Each individual can be tolerant or intolerant towards the agents of the opposite group. We also assume that the percentage of tolerance varies in time. Let $0 \leq x_i^t \leq 1$ be the share of tolerant agents in group i at time t. In order to simplify our analysis, the explicit reference to time will be omitted whenever possible. Society is shared among tolerant and intolerant individuals:

$$\sum_{i=1}^{2} x_i N_i + \sum_{i=1}^{2} \hat{x}_i N_i = N, \tag{1}$$

where $\hat{x}_i = 1 - x_i$, for $i = 1, 2$.

Let us suppose that agents interact after being randomly matched, obtaining payoffs constant in time according to Table 1.

In general, $\pi_{ij} > 0$ is the gain obtained by an agent of group i when she interacts with an agent of group j. When interaction involves two agents of the same group, each of them obtains $\pi_{ii} > 0$ irrespective of their real attitude (tolerance or intolerance). The interaction between agents of different groups is more complex because their attitude to accept diversity can affect the outcome of the transaction. Indeed, by definition, intolerance rules out any interaction with the agents of different groups. The intolerant individual 'builds' around her an exclusive network of relations excluding all the individuals of the other groups; therefore, we conclude that interaction does not occur if the involved actors belong to two different groups, and if one of them is intolerant. In this case each agent gains 0.[1] Tolerance, here, is the willingness to engage with others, regardless of their ideological commitments. When interaction involves tolerant agents of two different groups i and j they respectively obtain, $\pi_{ij} - (\alpha_i + c_i)$ and $\pi_{ji} - (\alpha_j + c_j)$. More specifically, anyone who accepts interacting with an agent of the rival group sustains both a psychological cost α_i in terms of loss of identity (see Akerlof and Kranton, 2000) and a social cost c_i paid by the agents because their behaviour is disapproved of by intolerant individuals. The psychological cost α_i is assumed to depend on the payoff π_{ii}, i.e. $\alpha_i = \alpha_i(\pi_{ii})$ with $\partial \alpha_i / \partial \pi_{ii} > 0$. Social costs depend on the level of tolerance measured by the shares x_1 and x_2; we assume the function $c_i = \beta c_i(x_1, x_2)$, $i = 1, 2$, $\beta > 0$, with the following properties[2]:

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[1] However, an agent who is highly intolerant of others may partner with an agent that she is intolerant of, but we assume that the relationship will be strained and less fruitful than a more amicable partnership: also in this case we assume that each agent gains 0 (see Muldoon et al., 2011).

[2] As in Muldoon et al. (2011) we propose individuals' rational self-interest and social diversity as the motivators for tolerant/intolerant behaviour, and social cost allows us to take into account the role played by inter-group differences such as religion or ethnicity, which cannot be captured by only considering pure economic incentives. In line with Alesina and La Ferrara (2005), 'contacts across different types of agents produce negative *utility*'.