

Ethnic Conflict and Civic Engagement*

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Abstract

It is sometimes very puzzling that despite ethnic diversity, some places (villages, towns or cities) manage to remain peaceful, whereas others experience violence. This paper explains how the characteristics of civic engagement in a particular place influence the occurrence of a conflict there. The paper shows that a place characterized with higher "intra" ethnic civic engagement has greater chances of an ethnic conflict as compared to a place where there are more "inter" ethnic engagement. Moreover, a rich economy is less prone to conflict as compared to a poor economy. Absolute poverty also plays an important role in precipitating conflict.

1 Introduction

There has been many episodes of ethnic violence that have occurred all around the world. Political scientists often argue that there is possibly a strong link between the structure of civic life in a multiethnic society, on the one hand, and the presence or absence of ethnic violence, on the other. Scholars of ethnic conflict are struck by a puzzling empirical regularity—that despite ethnic diversity, some places (regions, nations, towns, villages) manage to remain peaceful, whereas others experience enduring patterns of violence.

Interethnic and intraethnic networks of civic engagement can play very important role in determining whether an ethnic conflict occurs or not. The pre-existing local networks of civic engagement between the two communities of opposite ethnicity or religion can help to explain the existence of peace and violence in a community. By promoting communication between members of different ethnic groups through professional or business interests, civic networks can often play an important role in prevailing peace in certain regions. A conflict may lead to mistrust between members of different ethnicities and hence the fear of losing these economic links can prevent people from engaging in conflict. The natural question that arises is that whether segregated societies are at greater risk of ethnic conflict than integrated ones?

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The recurrent episodes of Hindu-Muslim violence in India form the motivation for this paper. However the model we discuss is more abstract and can be applied to other similar situations of conflict. As Horowitz argues, all conflicts based on ascriptive group identities—race, language, religion, tribe, or caste—can be called ethnic. Under this usage ethnic conflicts can range from (1) the Protestant-Catholic conflict in Northern Ireland and the Hindu-Muslim conflict in India to (2) black-white conflict in the United States and South Africa, (3) the Tamil-Sinhala conflict in Sri Lanka, and (4) Shia-Sunni troubles in Pakistan.

According to Varshney (2001), there is an integral link between the structure of civic life in a multiethnic society, on one hand, and the presence or absence of ethnic violence. According to Varshney, there are two kinds of civic interactions: *associational forms of engagement* and the second *everyday forms of engagement*. Business associations, professional organizations, reading clubs, film clubs, sports clubs, NGOs, trade unions, and cadre-based political parties are examples of the former. Everyday forms of engagement consist of simple, routine interactions of life, such as whether families from different communities visit each other, eat together regularly, jointly participate in festivals, and allow their children to play together in the neighborhood. As Varshney points out that both forms of engagement if interethnic promote peace as compared to them being intraethnic, however the associational forms turn out to be sturdier than everyday engagement.

Varshney in his study on India compared three pair of cities in India -each pair had a city where communal violence is endemic and a city where it is rare or entirely absent. We present a comparison of a pair of cities -Calicut and Aligarh in short to have a better understanding of the motivation of the paper. Calicut is a city in the southern state of Kerala while Aligarh is a city in the north Indian state of Uttar Pradesh.

After the Baburi mosque demolition, a very famous religious place for the Muslims, at Ayodhya, in India in 1992, there was tension all around the country. This particular incident led to unprecedented violence throughout India, probably the biggest since India's independence. Rumors, tensions and small clashes broke out in two cities of Calicut and Aligarh but the final outcome was very different. In Calicut, rumors circulated that pigs had been thrown into mosques. Similarly, there were rumors that the Muslims had attacked the famous Guruvayur temple, a very important religious place for the Hindus in Calicut. Unlike the newspapers in Calicut which neutralized rumors after investigating them, two of the local newspapers at Aligarh wrote that Muslim nurses, doctors, and staff of the Aligarh Muslim University (AMU) hospital killed Hindu patients in cold blood. The rumors were believed and Hindu criminals later on went on a killing spree.

The storm of the Ayodhya agitation , the biggest since India's independence led to gruesome violence at Aligarh while Calicut remained peaceful. Both cities have 36-38 percent of Muslim population while the remaining population comprises mostly of Hindus. Despite having similar diversity in the population in terms of ethnicity, why did the two cities respond so differently?

A detailed investigation of the civic societies in the two cities shows that Calicut is much different in nature than the city of Aligarh. In 1995 as many as eleven out of twenty-six trade associations were registered with the Federation of Traders Associations at Calicut. They had

Hindu, Muslim, (and Christian) office holders: if the president of the association was from one community, the general secretary was from one of the others. Businessmen across different ethnic lines reported that many transactions were concluded without any formal contracts. Relationships were entirely based on trust and sometimes payments as large as 10 to 15 lakhs (\$30,000-\$35,000) were due between Hindu and Muslim businessmen. However the picture at Aligarh was completely different from Calicut. Aligarh also had a traders association. In the 1980s the association finally split into two bodies: a “secular” organization and a “nonsecular” one.

Unlike trade-based Calicut, Aligarh also has a significant industrial sector and is one of the largest producers of locks in India. Different units specialize in different parts of the manufacturing process, yet Aligarh has not developed a synergy between the Hindus and Muslims. There is virtually no intercommunal dependence. The informal credit market, normally dominated by Hindu lenders, was the only Hindu run economic activity on which some Muslim manufacturers depend. Over the past few decades credit societies have emerged which are intra-Muslim that tend to build trust within communities, not across them. In terms of labor unions, they thrive in Calicut where Muslim workers come in contact with Hindu workers, intercommunal links are formed, and a Hindu-Muslim division of the workforce does not take place. But trade unions hardly exist in Aligarh.

At Calicut there are associations of all kinds - business, labor, professional, social, theater, film, sports, art and so on. The civic lines of the two cities are worlds apart. The associational and everyday interactions between Muslims and Hindus lead to the formation of social trust which was observed at Calicut. In Aligarh, however, the average Hindu and Muslim do not meet in those civic settings— economic, social, educational—where mutual trust can be forged.

As we draw from Varshney, regarding the *everyday forms of engagement*, the survey results point out that nearly 83 percent of Hindus and Muslims in Calicut often eat together in social settings; only 54 per cent in Aligarh do. About 90 percent of Hindu and Muslim families in Calicut report that their children play together; in Aligarh a mere 42 percent report that to be the case. Close to 84 percent of Hindus and Muslims in Calicut visit each other regularly; in Aligarh only 60 percent do so. The Hindus and Muslims of Calicut simply socialize more often and enjoy it much of the time, whereas Hindu-Muslim interactions in Aligarh are comparatively thin.

This paper builds on Varshney’s explanation of the occurrence or absence of ethnic conflict in a game theoretic environment. We do not pretend that our formulation of interethnic interactions as the only mechanism to explain the occurrence of a conflict or prevalence of peace. This paper is not directed in addressing a particular incident or a series of incidents that have occurred in a particular country but tries to provide an explanation how ethnic engagement can have an impact on the occurrence of conflicts in a general framework.

We present a discrete time model with finite number of individuals. Individuals belong to a religious or ethnic group. The model we present has only two ethnic groups. Individuals are linked with others in the society. They have links with their co-ethnic members which we call as “intra” links while they may also have links with members of the opposite ethnic group which we term as

“inter” links. Individuals interact with whom they are directly linked with. Links are activated in the first period, “inter” links are activated with probability α while the “intra” links are activated with some other probability β . The probabilities are proxies for the degree of “inter” and “intra” linkages present in the society.

Individuals have an endowment to begin with, which they can keep in the bank or invest in business with individuals with whom they are linked. Business generates a higher return than keeping the money in the bank. A shock occurs in the last period which may lead to a conflict. A conflict occurs only when there are at least half of the people in an ethnic group who prefers a conflict over peace. However a conflict leads to loss of all business links with the opposite ethnicity. Individuals do not receive the payoff from these business links though she had invested in them in the initial period. Conflict may satisfy certain political or ideological attitudes but can prove to be very costly for individuals if a society is too “inter” linked. This primarily drives our major result where we show that the more interlinked an economy is, individuals would decide to invest and the probability of conflict is very low. Individuals always prefer to invest in the links of the same ethnicity as these links are not lost even in times of conflict. However if “inter” engagement is not high enough, individuals know that the probability of conflict is high, their expected payoff from investing in business with links of opposite ethnicity are low and hence in equilibrium they do not invest in links of opposite ethnicity and hence conflict occurs with probability one.

We further show that an economy with higher resources, in terms of higher endowment of individuals are less conflict prone than an economy with scarce resources. In other words, a wealthier economy tends to be more peaceful than a poorer economy. Moreover, we show an economy with one group being richer than the other group is less conflict prone than a homogeneous economy with scarce resources and more conflict prone than a homogeneous economy with abundant resources. This points out that absolute poverty plays an important role in precipitating conflict. Further we show that even if individuals are not linked to people of opposite ethnicity through business (*associational forms of engagement*) but derive utility from interacting with them (*everyday forms of engagement*), such “inter” ethnic ties can also play a role in lowering the probability of conflict.

Literature:

This paper is an attempt to formalize the argument put forward by Varshney (2001) in a game theoretic framework. Varshney (2001) argues that interethnic and intraethnic networks of civic engagement play very different roles in the occurrence of ethnic conflict. Because they build bridges and manage tensions, interethnic networks are agents of peace, but if communities are organized only along intraethnic lines and the interconnections with other communities are very weak or even nonexistent, then ethnic violence is quite likely.

There is a second area in the literature where scholars have explained how cooperation can be sustained between two ethnic groups. Though in a different context, the idea of cooperation between two groups dates back to a paper by Greif (1993) in the context of Maghribi traders. If cooperation is sustained between the two ethnic groups, peace is the outcome and there is no ethnic conflict. The pioneering paper in this area is by Fearon and Laitin (1996) where players are paired at

random to play a prisoner's dilemma every period. They present an infinitely repeated game where the social matching occurs every period. Larson (2012)¹ builds on Fearon and Laitin (1996) but allows for the possibility that some members of an ethnic group may not have perfect information about all others in the same ethnic group. This literature would only help in explaining the absence of conflicts through the cooperation that is sustained in equilibrium. However this literature fails to explain despite places having the same ethnic diversity, why some places manage to remain peaceful while others experience violence. The present paper adds to the literature by explaining the presence and absence of ethnic conflicts through civic networks.

This paper however abstracts away from any political or electoral incentives that might be present in inciting a conflict. As Wilkinson (2004), argues that when politicians need minority support, they prevent violence and when they don't, they don't. Moreover if they need to incite ethnic polarization, then they might just promote ethnic violence. Chandra (2004, 2005) argues that electoral laws, are likely to influence the type of ethnic identities that become politicized in the first place. Since electoral laws differ across countries and hence the political incentives, this paper strategically stays away from them as it will be difficult to capture them in a general framework.

Though scholars have talked of communal conflict, addressing somewhat different aspects of the "big issue", which is why communal conflict occurs where it does. Esteban and Ray (2008) points out that ethnic conflict is more likely to occur than class conflict. In ethnic alliances there is within-group economic inequality and the rich have the money while the poor their labor which makes ethnic conflict more salient than a class conflict. The ethnic and income distribution of the population are the key factors explaining which alliances will form. Esteban and Ray (2011) studies a game-theoretic model to show how within-group heterogeneity in radicalism and income help in precipitating an ethnic conflict. Mitra and Ray (2010) does an empirical study on Hindu-Muslim violence in India post independence era and they conclude that the Hindu groups have been primarily responsible for the Hindu-Muslim violence in post-independence India. Dasgupta and Kanbur (2005) and Dasgupta (2009) also studies about ethnic conflict within the working class and class conflict between workers and employers.

The current paper also points out that as a nation is more prosperous the chances of conflict are lowered which is more in line with the fact that developing countries tend to experience more conflict than the developed world. The literature in this area is mostly empirical. Certain academic research finds a strong between poverty and violence in less developed countries. Collier and Hoeffler (2004) find strong correlations between national income levels and economic growth rates on one hand and the occurrence of conflict on the other. Gurr (1968) has shown cross-nationally and Barrows (1976) has shown for Africa that economic discrimination is positively associated with strife. Mitchell reported positive results for the Philippines, Paranzino for South Vietnam, Morgan and Clark for the United States. However empirical research in conflict studies still do not have a clear stand on the relationship between poverty and conflict. Lichbach (1989) in a survey paper

¹Working Paper

points out that the literature is still not clear on the relationship. There are papers supporting the positive correlation between poverty and conflict, whereas there are empirical research papers that do not support this claim.

Section 2 introduces the model. In section 3 we analyze the game. In section 3.1, we consider the unconstrained economy, where individuals have enough resources. In section 3.2, we consider the constrained economy where individuals have limited resources. In section 4 we work out an example with two individuals belonging in each group. In section 5 we discuss where two groups have different endowments. Section 6 introduces social links, Section 7 includes heterogenous group size and section 8 concludes.

2 The Model

This section introduces the basic model. We study a three period model with a finite number of agents. Agents interact in a network where they are linked.

2.1 The Environment

Consider an economy where there are $2N$ individuals where N is even. We use the notation H and M to denote two ethnic or religious groups often referred to as Hindu and Muslim respectively. Each individual in this economy has an ethnic affiliation. We assume that each ethnic group has N individuals each. For the moment we start with an economy which has equal number of individuals in each ethnic group. At time $t = 0$ the network structure of the economy is formed. There are “potential” links between all the individuals in the economy. An individual potentially has $N - 1$ links with members of her own ethnic group and N links with members of the opposite ethnic group but all links may not be activated.

There are two kinds of links, “inter” and “intra”. The “intra” links are links between members of the same ethnicity whereas the “inter” links are formed between members of the opposite ethnicity. In the rest of the paper we use HH to denote a link between two individuals belonging to the group H and MM to denote a link between two individuals belonging to the group M . An “inter” link between an individual belonging to group H and another individual belonging to group M is denoted by HM .

2.2 Link Formation

At time period $t = 0$, “inter” and “intra” links are activated by Nature. Suppose HH and MM links are activated with probability β and let HM be activated with probability α . Let $\alpha, \beta \in [0, 1]$. When $\beta = 1$, then all the "intra" links are activated in the society whereas $\alpha = 1$ means that all the “inter” links are activated..

The values of α and β act as proxies for the degree of “inter” and “intra” linkage in an economy. These links are undirected and any two individuals who are linked can enter into a business and

enjoy a benefit. The details are spelt out later in the paper.

Certain economies tend to develop an economic symbiosis among individuals belonging to the two groups. These intercommunal linkages have developed over time, may be due to certain political or socioeconomic reasons. Consider Aligarh which has a significant industrial sector and is among the largest producers of locks in India. The lock manufacturing is mostly small scale. Moreover, different units specialize in different parts of the manufacturing process. Yet Aligarh has not developed an economic symbiosis between Hindus and Muslims. Suppose that in an economy individuals belonging to group H specialize in one part whereas individuals belonging to group M specialize in some other part in the lock industry. This specialization may have evolved over time due to certain inherent skill differences. Such an economy would tend to have a greater interlinkage as compared to Aligarh.

The interlinkage may also vary depending on the type of business or industry. Consider an economy where one of the major businesses is the trading of beef meat. Individuals from the Hindu community would not like to associate themselves with this trade because of religious practices. In this economy Muslims would tend to come closer and have would have greater "intra" linkages.

In certain places, members of the same group tend to work together to achieve collective ends not because of their discriminatory preferences but because of efficiency: they speak the same language, have access to the same types of information, and share social networks. In environments with scarce resources, they may even choose to work together against other groups, whether or not they care for or even like their peers. Thus, political coalitions form along ethnic lines not because people care more for their own but simply because it is easier to collaborate with their ethnic peers to achieve collective ends. Even when people see no efficiency gains from working with their co-ethnics and have no discriminatory preferences, they may still favor their own simply because they expect them to discriminate in their favor as well.

Even small conflicts or violences could have created mistrust among the two communities in the past. These are some of the explanations that may help the reader to understand why the values of α and β may vary across different villages, towns and cities. They have evolved over time and this paper takes as given the structure of the present society. This paper does not try to explain why there are different degrees of "inter" and "intra" linkages across different places. On the contrary this paper would try to explain that how different degrees of "inter" and "intra" linkages play an important role in preventing or escalating an ethnic conflict.

2.3 Timeline of Events

At $t = 0$ the network structure is formed as explained above. The entire structure of the network is unknown to the individuals. After the links are activated an individual is aware of the number of links she has with the same ethnicity and the number of links with the opposite ethnicity. The probabilities α and β are common knowledge.

Individuals have a per-period utility function $U(c) = c$. Each individual has an endowment e at the beginning. This can be kept in the bank as a deposit which earns a payoff of ρe in period $t = 1$ where $\rho < 1$ and $(1 + \rho)e$ in period $t = 2$. Individuals get back their endowment along with an interest in the last period. Let us denote $\delta = (1 + \rho)$.

Once the links are formed, individuals face a decision problem at time $t = 0$. An individual has to decide on whether to invest in a business link or not. The investment decision, i_d is a binary decision where $i_d \in \{0, c\}$. Investing c in a business link generates a payoff F for the next two periods. To generate a payoff from a business link both individuals need to invest in the business. If one of the paired individuals decide not to invest, i.e. $i_d = 0$, then both the individuals derive a zero payoff from the link. The proposal for investing in business are made simultaneously by the individuals. We assume that $F > \delta c$, i.e. the return from from business is always higher than the payoff from keeping the money in the bank. In this model these links represent business or professional engagements rather than film clubs or reading clubs. Varshney talks more about the civil society in general. We restrict ourselves for the moment to links where there are direct benefits in terms of trade or business involved.

At time period $t = 2$, there is a shock in the economy which may eventually lead to a conflict. A shock can be thought of as the Baburi Mosque demolition in India as we have discussed previously. Following such an incident, individuals decide on whether to enter into a conflict or not. A conflict occurs when any of the ethnic group forms an alliance. An alliance is formed if there are atleast $N/2$ people in a group who prefer conflict over peace. Once an alliance is formed the ethnic group forming the alliance attacks the other group.

A conflict would lead to a change in the payoffs in period $t = 2$. If there is a conflict then links of the opposite ethnicity are lost. Individuals do not receive any payoff from business links of the opposite ethnicity in period $t = 2$. This is introduced to capture the fact that conflicts lead to an end of cooperation and trust among the individuals. Conflict leads to a breach of trust among the players of the opposite ethnicity. Individuals who were previously engaged in business would now receive zero payoff from the links of the opposite ethnicity. It is often very difficult to rebuild the trust once a conflict occurs. Individuals become skeptical about maintaining any relation with members of the opposite ethnicity and it may take several decades to revive the trust among the different community members. If the conflict does not take place then the links of the opposite ethnicity remain and individuals receive business payoffs with the members of the opposite ethnicity with whom they are linked. A conflict however does not lead to a loss of a link of the same ethnicity.

2.4 Payoffs

In this section we describe the payoffs that each player receives in the dynamic game that we described above. At time $t = 2$, there is a possibility of a conflict. Consider that there is some societal budget that can only be used to produce public goods. If the conflict occurs then the societal budget is used to build a public good that is more favorable to one of the ethnic group,

i.e. it would have certain ethnic characteristics. Examples of ethnic-based public goods include the funding to build temples or mosques. They also include employment in or access to certain economic sectors dominated by one ethnic group or the other. They can include possible job reservations in bureaucratic or political positions.

If the conflict takes place at time $t = 2$, then each member in the winning group receives a payoff of E irrespective of whether an individual wanted a conflict or not. If a conflict occurs we assume that each group has an equal chance of winning in the conflict. The members in the losing group in times of conflict receives a payoff of 0. However if the conflict does not take place, then the budget is used to build a public good which is neutral in nature and does not favor any ethnic group. This can be thought of investing in a primary or secondary school or building a hospital. In times of peace, each individual receives a payoff of v from the public good.

We assume that²

$$\frac{E}{2} > v > 0$$

The expected payoff in a conflict is given by $E/2$. The group winning the budget in its favor earns E , which occurs with probability $1/2$ or else earns zero with an equal probability. We assume that this expected payoff is greater than the payoff that they get when the public good has no ethnic characteristics.

Consider an individual with an endowment, e and k active links. Let k_s be the number of links with the same ethnicity while k_o is the number of links with the opposite ethnicity. Hence we have $k = k_s + k_o$. The individual would receive a payoff at time $t = 1$

$$kF + \rho(e - kc)$$

At time period $t = 2$, if conflict happens the individual will lose all the links of the opposite ethnicity. Hence at $t = 2$, an individual with k_o links of the opposite ethnicity will receive a payoff

$$\begin{aligned} &= \frac{E}{2} + k_s F + \delta(e - kc) \quad \text{if conflict occurs} \\ &= v + kF + \delta(e - kc) \quad \text{if no conflict occurs} \end{aligned}$$

An individual has to decide on whether to invest in business links or not. An individual always benefit from investing in a business link rather than keeping the endowment in the bank as it generates a higher return. However an individual need to decide on whether to invest in a link of the opposite ethnicity because there may be a small probability of conflict which may lead to loss

²The amount of budget allocated for the public good provision is independent of the amount of endowment an individual has i.e.e. A later version of the paper would include where individuals are taxed on the total income and the total tax collected is used to provide the public good. Hence the amount of public good would be endogenous. In times of peace all individuals would derive the same utility from the public good while in times of conflict one group derives a higher utility as the public good will have ethnic characteristics. Conflict may still occur as it may be individually rational to do so though peace may be socially efficient. This would also take into account of the richer economies having a larger pie to share whereas poorer economies have a lower pie to fight for.

of that link. However money kept in the bank would generate a payoff with certainty irrespective of whether the conflict occurs or not.

3 Analysis

Now given the environment and the game, an individual has to make two decisions in this dynamic game. At time period $t = 0$, the individual has to decide on whether to invest in business links that are activate. Secondly at time $t = 2$, the individual decides on whether she wants a conflict or not. So depending on the probability of an alliance being formed, an individual decides whether to invest in a business link. We solve the game by backward induction and look for a subgame perfect equilibrium.

Proposition 1: *There always exist a conflict equilibrium*

Proof:

Suppose that all individuals decide to play the strategy to invest only in links of the same ethnicity and do not invest in links of the opposite ethnicity. This strategy constitutes an equilibrium where the probability of conflict is one. Given that all players follow this strategy, there is no incentive for an individual to deviate and invest in a link of the opposite ethnicity.

Given that individuals have no link of the opposite ethnicity, an individual has an expected payoff

$$\frac{E}{2} + k_s F + \delta(e - kc)$$

where k_s is the number of business links of the same ethnicity, if the conflict occurs else has an expected payoff

$$v + k_s F + \delta(e - kc)$$

if the conflict does not take place. Given that $\frac{E}{2} > v$, an individual would always prefer conflict over peace.

Given that conflict would occur with probability one at time $t = 2$, an individual has no incentive to deviate and invest in a link of the opposite ethnicity. An individual by investing in a business link of the opposite ethnicity would receive a payoff

$$\frac{E}{2} + k_s F + \delta x$$

whereas by not deviating from the strategy would receive

$$v + k_s F + \delta(x + c)$$

where x is the amount of endowment left after investing in business links. Thus we find that by following the strategy an individual has a higher expected payoff. Hence we obtain that the following strategy constitutes an equilibrium and the probability of conflict is one. ■

Now as stated before individuals have an endowment e , and there is a cost c to invest in each business link. An individual can potentially have N business links of the “inter” type and $N - 1$ business links of the “intra” type. Hence an individual who has all the links activated would require $(2N - 1)c$ amount of resources if she wishes to start business with all the activated links. Initially we start with an economy where individuals are rich enough so that there is no constraint on the maximum number of business links that they can maintain. Hence they have enough resources so that they can finance the maximum possible business links, i.e. $e \geq (2N - 1)c$. This kind of an economy is termed as “unconstrained” economy in the paper. Later we consider economies where individuals face endowment constraints so that there is a limit on the maximum number of business links that they can maintain. These economies are termed as “constrained”, because there is a budget constraint on individuals. We show that probability of conflict is higher in a “constrained” economy as compared to an “unconstrained” economy.

3.1 Unconstrained Economy

In this section we assume that individuals have enough endowment such that $e \geq (2N - 1)c$. In addition to that we assume that the following is satisfied

$$(E/2 - v) < F \tag{A.1}$$

This means that losing a single link is also costly for an individual, i.e. the expected gain from conflict is lower than the payoff received from a single business link.

Proposition 2: *Consider the following strategy: Irrespective of the value of β , an individual always invest $i_d = c$ in a business link of the same ethnicity. An individual do not invest in any business link of the opposite ethnicity $\forall \alpha \leq \alpha^*$ and invest in links of the opposite ethnicity $\forall \alpha > \alpha^*$. This constitutes an equilibrium with probability of conflict equal to one $\forall \alpha \leq \alpha^*$ and the probability of conflict is less than one $\forall \alpha > \alpha^*$.*

Proof:

An individual always invest in a business link of the same ethnicity. Investing in the business link of the same ethnicity is always profitable as there are no chances of losing the link even in times of conflict. A business link generates a higher payoff than keeping the money in the bank.

Consider an individual i , who has to decide on whether to invest in a business link of the opposite ethnicity. An individual calculates the probability of conflict. Let $\mu(\alpha)$ be the probability of no conflict.³ Then $(1 - \mu(\alpha))$ denotes the probability of conflict. This probability of no conflict is calculated so that atleast $N/2$ individuals in both the groups have atleast one link of the opposite ethnicity. This probability is independent of β , because individuals have enough resources to invest in all possible links. So what we need to take care is that individuals have atleast one link of the opposite ethnicity.

³We work out an example with two individuals in each group in details

Since links are activated independently, we obtain that $\mu(\alpha)$ is a polynomial function in α , which implies that $\mu(0) = 0$ and $\mu(1) = 1$ with $\frac{\partial\mu(\alpha)}{\partial\alpha} > 0$.

Hence the expected payoff by investing in a business link of the opposite ethnicity is

$$\begin{aligned} P_I &= \mu(\alpha)[v + \delta(e - c) + F] + (1 - \mu(\alpha))\left[\frac{E}{2} + \delta(e - c)\right] \\ &= \mu(\alpha)v + (1 - \mu(\alpha))\frac{E}{2} + \delta(e - c) + \mu(\alpha)F \end{aligned}$$

The expected payoff from not investing in a business link of the opposite ethnicity is given by

$$\begin{aligned} P_{NI} &= \mu(\alpha)[v + \delta e] + (1 - \mu(\alpha))\left[\frac{E}{2} + \delta e\right] \\ &= \mu(\alpha)v + (1 - \mu(\alpha))\frac{E}{2} + \delta e \end{aligned}$$

Now

$$P_I - P_{NI} = \mu(\alpha)F - \delta c$$

Thus the expected benefit from investment is higher when $\mu(\alpha) > \mu(\alpha^*) = \frac{\delta c}{F}$. We know that $F > \delta c$, so that $\frac{\delta c}{F} < 1$. Given that $\frac{\partial\mu(\alpha)}{\partial\alpha} > 0$, \exists an α such that $\forall \alpha > \alpha^*$, individuals invest in business link of opposite ethnicity. Since investing in one link is beneficial, individuals would also invest in more links of opposite ethnicity if activated.

Now if $\alpha < \alpha^*$, no individual invest in a link of the opposite ethnicity and hence all individuals would then prefer a conflict over peace and hence conflict occurs with probability one. ■

Suppose we relax assumption A.1, the parameter values are such that it is no longer costly to lose a single link. Now we assume that

$$\begin{aligned} (E/2 - v) &> F \\ (E/2 - v) &< NF \end{aligned} \tag{A.2}$$

This implies that losing a single link may not be very costly but at the same time losing all the links of opposite ethnicity can prove to be costly. This means \exists some $k = k^*$ such that

$$(E/2 - v) = k^*F$$

Now k^* may not be an integer and hence we take $\lfloor k^* \rfloor$, *i.e.* the largest integer not greater than k^* .

Here we should take a note that if $(E/2 - v) > NF$, then individuals would always prefer a conflict and losing even all the links of the opposite ethnicity is not very costly. In this situation conflict occurs with probability one irrespective of the value of α . Individuals while deciding to invest would take this into account and hence would not invest in any business link of the opposite ethnicity. Thus conflict always occur with probability one in equilibrium.

Hence with $(E/2 - v) < NF$, all individuals who have business links less than k^* would be interested to participate in the conflict. Consider an individual who has to decide on whether to form a business link with a member of the opposite ethnicity. Let $\mu_k(\alpha)$ as before denote the probability of no conflict as evaluated by the individual. We add the subscript k to denote that an individual with more than k links do not participate in a conflict. While calculating this probability, the individual has to calculate that there are atleast $N/2$ individuals who have more than k^* links of the opposite ethnicity.

As before we obtain that $\frac{\partial \mu_k(\alpha)}{\partial \alpha} > 0$, and an individual would be interested to invest in business link if

$$\mu_k(\alpha) \geq \mu_k(\alpha^*) = \frac{\delta c}{F}$$

Hence we obtain that $\forall \alpha \geq \alpha^*$, individuals would invest in a link of the opposite ethnicity and $\forall \alpha < \alpha^*$, individuals do not invest in the links of the opposite ethnicity.

OBSERVATION 1: *The value of α^* increases as the critical value of k , i.e. k^* increases.*

Proof:

This observation points out that as the minimum number of links that an individual must have with the opposite ethnicity which deters an individual from a conflict i.e. k^* , increases, then for individuals to invest in a link of the opposite ethnicity we require the critical value of α , i.e. α^* also to be higher. This is intuitive because as k^* increases, the probability of no conflict is more difficult to satisfy for a given α , hence we need α^* to increase. Let $\alpha^*(k^*)$ denote the critical value of α when the critical value of k is k^* . We calculate the probability of conflict from the point of view of an individual who is willing to invest.

Here we use the properties of the binomial distribution to prove this. For large values of N , we can approximate the probability of conflict by using the binomial distribution.

First we calculate the probability that an individual has less than k^* links.

$$\Pr(\text{individual has links} < k^*) = \sum_{m=0}^{k^*} \binom{N}{m} \alpha^m (1 - \alpha)^{N-m} = \gamma \quad (1)$$

Using the probability that an individual has less than k^* links, we can calculate the probability that the alliance is formed. i.e., there are atleast $N/2$ individuals who have less than k^* links.

$$\begin{aligned} & \Pr(\text{there are atleast } N/2 \text{ individuals prefer conflict}) \\ &= \sum_{m=N/2}^N \binom{N}{m} \gamma^m (1 - \gamma)^{N-m} = \lambda \end{aligned} \quad (2)$$

Thus $1 - (1 - \lambda)^2$ gives the probability that there is atleast one ethnic group which forms an alliance and hence the conflict occurs.

Now suppose that we take $k_1^* > k_2^*$. From equation 1 we obtain that $\gamma_1 > \gamma_2$. From the properties of the binomial distribution we obtain that $\lambda_1 > \lambda_2$. Hence the probability of conflict increases as k^* increases and hence the probability of no conflict goes down as k^* increases for any given α . Hence if we plot $\mu_k(\alpha)$ for k_1^* and k_2^* , we would obtain $\alpha^*(k_1^*)$ and $\alpha^*(k_2^*)$ as in Figure 1.

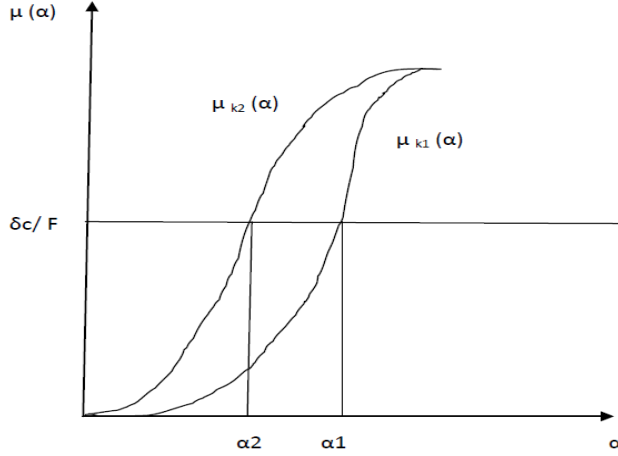


Figure 1

An individual would invest in a link of the opposite ethnicity as long as the probability of no conflict is greater than or equal to $\frac{\delta c}{F}$. From the above diagram it is clear that $\alpha^*(k_1^*) > \alpha^*(k_2^*)$. Hence an economy with a higher k^* would have more chances of a conflict as compared to the the economy with low k^* . This is intuitive because in an economy where individuals value the payoff from conflict more than maintaining the links would have higher chances of a conflict.

Now we turn to economies where there is a constraint on the maximum number of links that an individual can invest in.

3.2 Constrained Economy

Suppose that individuals are budget constrained i.e. they have enough endowment, e only to invest in one business link only. This analysis is carried out under the assumption that losing even a single link is costly, i.e.

$$(E/2 - v) < F$$

If there are multiple links that are activated, a link is chosen randomly by the individual and the proposal to invest are made simultaneously by the individuals. As before if any one of the individuals linked denies to invest in the business, then both receive a payoff of zero else they receive F .

Proposition 3: *Consider the following strategy which constitutes an equilibrium: An individual always invest in a business link of the same ethnicity whenever possible. There exists a $\beta = \beta^*$*

such that

a) $\forall \beta \geq \beta^*$, individuals do not invest in any link of the opposite ethnicity and the probability of conflict is one

b) $\forall \beta < \beta^*$, \exists an $\alpha = \alpha^*$ corresponding to each β such that $\forall \alpha, \alpha \leq \alpha^*$, individuals do not invest in any business link of the opposite ethnicity and hence the probability of conflict is one. $\forall \alpha > \alpha^*$, individuals invest in links of the opposite ethnicity and the probability of conflict is less than one.

Proof:

An individual would always invest in a business link of the same ethnicity whenever possible. This is always beneficial as there are no chances of losing the link even in times of conflict. A business link generates a higher payoff than keeping the money in the bank.

Now consider an individual who has a link activated with another individual of the opposite ethnicity. An individual calculates the probability of conflict. Let $\mu(\alpha, \beta)$ be the probability of no conflict. To calculate the probability of no conflict we need that there are atleast $N/2$ individuals in each group who has atleast one link of the opposite ethnicity and no links of the same ethnicity. This means that $\mu(\alpha, \beta)$ polynomial in α and $(1 - \beta)$.

This suggests that $\frac{\partial \mu}{\partial \alpha} > 0$, $\frac{\partial \mu}{\partial \beta} < 0$ and $\frac{\partial^2 \mu}{\partial \alpha \partial \beta} < 0$.

Now we calculate the expected payoff from investing in a business link of the opposite ethnicity

$$\begin{aligned} P_I &= \mu(\alpha, \beta)[v + F] + (1 - \mu(\alpha, \beta))\left[\frac{E}{2}\right] \\ &= \mu(\alpha, \beta)v + (1 - \mu(\alpha, \beta))\frac{E}{2} + \mu(\alpha, \beta)F \end{aligned}$$

Suppose the individual do not invest in the business link and leaves the money in the bank. We calculate the expected payoff,

$$P_{NI} = \mu(\alpha, \beta)[v + \delta e] + (1 - \mu(\alpha, \beta))\left[\frac{E}{2} + \delta e\right]$$

Now

$$P_I - P_{NI} = \mu(\alpha, \beta)F - \delta e$$

This leads us to the point that an individual would invest in a business link provided that $\mu(\alpha, \beta) \geq \mu^*(\alpha, \beta) = \delta e/F$

As β approaches one, the probability of no conflict would approach zero irrespective of the value of α . In fact, if β is high enough individuals do not invest in a business link of the opposite ethnicity. We can choose the combinations of (α, β) such that

$$\mu(\alpha, \beta) = \frac{\delta e}{F} \tag{3}$$

Now starting from $\beta = 0$, we can find the corresponding α_0 such that $\mu(\alpha_0, 0) = \frac{\delta e}{F}$. Now

corresponding to this α , we know that $\forall \alpha \geq \alpha_0$, individuals would invest in business links of opposite ethnicity. As we increase the value of β , given that $\frac{\partial^2 \mu}{\partial \alpha \partial \beta} < 0$, the corresponding α such that $\mu(\alpha, \beta) = \frac{\delta e}{F}$ would also increase. In fact we can find the value of β^* , by plugging $\alpha = 1$ in equation 3 and solving for β . Hence β^* is determined from the equation

$$\mu(1, \beta) = \frac{\delta e}{F}$$

The existence of β^* is guaranteed from the Intermediate Value Theorem. We know that $\mu(1, 0) = 1$ and $\mu(1, 1) = 0$. Since we have $\frac{\partial \mu}{\partial \beta} < 0$, we obtain that \exists a $\beta = \beta^*$ such that $\mu(1, \beta^*) = \frac{\delta e}{F}$.

Since links are activated independently of each other, if $\beta = 1$, then we would obtain that $\mu(\alpha, \beta) = 0$. Hence $\forall \beta \geq \beta^*$, irrespective of α , probability of no conflict is lower than the critical value, individuals do not invest in any link of the opposite ethnicity and hence the probability of conflict in equilibrium is one.

$\forall \beta < \beta^*$, we know that \exists an $\alpha = \alpha^*$ corresponding to the β such that $\mu(\alpha, \beta) = \frac{\delta e}{F}$. Given that $\frac{\partial \mu}{\partial \alpha} > 0$, this implies that $\forall \alpha < \alpha^*$, individuals never invest in links of the opposite ethnicity and hence the probability of conflict is one. ■

This result is intuitive because if the “intra” links are formed with very high probability then an individual when deciding to invest in a link of the opposite ethnicity would know that most individuals would have a link of the same ethnicity and hence would invest in them. Thus the probability of conflict is very high and hence would not invest in a business link of the opposite ethnicity even if the value of α is one. This is driven by the fact that there are resource constraints. Investing in link of the same ethnicity is always preferable under any circumstances.

In the unconstrained economy, the probability of conflict is one only when the “inter” linkage are not activated with a sufficiently high probability. However in this constrained economy even if the “inter” linkages are activated with a high enough probability we need that the “intra” linkages are activated with a low enough probability so as to avoid a conflict with probability one.

At this juncture the natural question that arises is that what happens if the individuals have enough resources to invest in m possible business links where $m \leq (2N - 1)$. We still carry our analysis under the assumption A.1 i.e. $(E/2 - v) < F$.

OBSERVATION 2: *The value of β^* increases as the value of m increases.*

Proof:

As we have shown in Proposition 3, we calculate the probability of no conflict $\mu(\alpha, \beta)$. An individual would invest in a link of the opposite ethnicity provided that

$$\mu(\alpha, \beta) \geq \mu^*(\alpha, \beta) = \delta e/F$$

Now while calculating the probability of no conflict from the point of view of an individual, we need to calculate that there are atleast $N/2$ individuals who have atleast one link with the opposite

ethnicity and the rest $(m - 1)$ links of the same ethnicity.

Hence $\mu(\alpha, \beta)$ is decreasing in the power of $(1 - \beta)$ as m increases. The expression $\mu(\alpha, \beta)$ will be in power of $(1 - \beta)$ because links are formed independently.

Thus we obtain that as we relax the constraint the value of β^* increases. In fact in the unconstrained economy the results are independent of β as we have shown in Proposition 2. Moreover comparing to Proposition 3, the corresponding α^* for each $\beta < \beta^*$ would also be lower as m increases. Hence the chances of conflict with probability one decreases. ■

Proposition 2 and 3 along with Observation 2 brings us to the following corollary,

Corollary 1: *A wealthier economy tends to be more peaceful than a poor economy.*

Proof: In the unconstrained economy, if the “inter” linkages are activated with a very high probability, we can avoid a conflict with probability one. This is obtained from Proposition 2. However from Proposition 3 we obtain that even if “inter” linkages are activated with a very high probability, i.e. even if $\alpha = 1$, if “intra” linkages are simultaneously activated with a high enough probability, then also the probability of conflict is one.

Now as we relax the maximum number of links that an individual can invest in, we obtain that the critical values of β increases and α decreases from Observation 2. Hence conflict occurring with probability one is lowered, thus proving the corollary that a wealthier nation tends to be more peaceful than a poor economy. ■

4 Example

At this point it would be nice to work out an example and calculate the probability of conflict in equilibrium. We consider an economy where there are two individuals in each group, i.e. there are two individuals in group H and two individuals in group M . So there are a total of 4 individuals in the economy.

Let us call the two individuals in group H as H_1 and H_2 . Similarly for the two individuals in group M , let us denote them by M_1 and M_2 .

Let us denote the set of “inter” and “intra” links. There are 2 possible “intra” links i.e. H_1H_2 denoting the link between the two individuals in group H and M_1M_2 denoting the link between the two individuals in group M .

Similarly there are four possible “inter” links. They are H_1M_1 , H_1M_2 , H_2M_1 and H_2M_2 . All the links are undirected, so H_1M_1 is equivalent to M_1H_1 . This holds for all the possible 6 links in the economy.

As stated in the model before, the “inter” links are activated with probability α while the “intra” links are activated with probability β .

4.1 Unconstrained Economy

An individual in this economy potentially has 3 possible links, two “inter” links and one “intra” link. We assume that individuals have enough endowment to invest in all the 3 links.

Consider individual H_1 who has a link activated with M_1 . Consider the decision of individual H_1 . The decision of M_1 is symmetric. In this economy a conflict occurs when there is atleast one individual in either group who prefer conflict over peace.

From the point of view of H_1 , he knows whether he has a link with M_2 or not. His decision depends upon whether the link H_2M_2 is formed. Even if H_1 has a link with M_2 , but the links H_2M_2 and H_2M_1 are not active then H_2 will start a conflict.

From the point of view of individual H_1 , conflict does not happen when both the links H_2M_2 and H_2M_1 are active or atleast any one of them are active. Hence we have

$$\begin{aligned}\mu(\alpha) &= \alpha^2 + 2\alpha(1 - \alpha) \\ &= 2\alpha - \alpha^2\end{aligned}$$

As stated before we obtain that

$$\frac{\partial \mu}{\partial \alpha} = 2(1 - \alpha) > 0$$

and $\mu(0) = 0$ and $\mu(1) = 1$

Conflict occurs when none of these links are formed, i.e. probability of conflict is given by $(1 - \alpha)^2$

Let us now calculate the expected payoff from investing and not investing. The expected payoff from investing in the link is given by

$$\begin{aligned}P_I &= (2\alpha - \alpha^2)[v + \delta x + F] + (1 - 2\alpha + \alpha^2)\left[\frac{E}{2} + \delta x\right] \\ &= (2\alpha - \alpha^2)v + (1 - 2\alpha + \alpha^2)\frac{E}{2} + (2\alpha - \alpha^2)F + \delta x\end{aligned}$$

where x is the amount of endowment kept in the bank.

The expected payoff from not investing in the link is given by

$$\begin{aligned}P_{NI} &= (2\alpha - \alpha^2)[v + \delta x + \delta c] + (1 - 2\alpha + \alpha^2)\left[\frac{E}{2} + \delta x + \delta c\right] \\ &= (2\alpha - \alpha^2)v + (1 - 2\alpha + \alpha^2)\frac{E}{2} + \delta x + \delta c\end{aligned}$$

Hence we obtain that

$$P_I - P_{NI} = (2\alpha - \alpha^2)F - \delta c$$

An individual will be willing to invest only if $P_I - P_{NI} \geq 0$

Solving for α^* , i.e. where an individual is indifferent between investing and not investing we obtain that

$$\alpha^* = 1 - \sqrt{1 - \frac{\delta c}{F}}$$

Hence we obtain that $\forall \alpha < \alpha^*$, an individual would not invest in a link of the opposite ethnicity and hence conflict occurs with probability one. at $\forall \alpha \geq \alpha^*$, individuals would invest in links of opposite ethnicity.

This also brings us to the point that the value of α^* depends on the relative cost of forming a business link. δc is the amount of payment an individual has to forego by investing in a business link whereas F is the amount an individual gets from a business link. Let $\eta = \frac{\delta c}{F}$. We obtain that

$$\frac{\partial \alpha^*}{\partial \eta} = \frac{1}{2\sqrt{\eta}} > 0$$

Hence as the relative cost of forming a business link goes down, the value of α^* decreases. Hence economies where the relative cost of a business link is low, there are lower chances of a conflict.

Let us calculate the probability of conflict in equilibrium under this situation. Conflict occurs when none of the “inter” links are formed. The probability of this event is $(1 - \alpha)^4$. It also occurs when H_1M_1 , H_1M_2 is formed but the other links are not formed i.e. H_2 would initiate the conflict. So this can happen for any individual and hence the probability is given by $4\alpha^2(1 - \alpha)^2$. Conflict happens also when only one of the “inter” links are formed. This can also happen in four different ways. Hence the probability is given by $4\alpha(1 - \alpha)^3$. Thus the probability of conflict is given by

$$\begin{aligned} & (1 - \alpha)^4 + 4\alpha^2(1 - \alpha)^2 + 4\alpha(1 - \alpha)^3 \\ &= 1 - 2\alpha^2 + \alpha^4 \end{aligned}$$

So when the value of $\alpha = 1$, then the probability of conflict is zero.

Hence the probability of no conflict is given by

$$2\alpha^2 - \alpha^4$$

Now suppose that we turn to the constrained economy case, where individuals have limited resources for investment in business links.

4.2 Constrained Economy

Suppose that individuals in this economy have enough resources so that they can invest only in one link. Consider individual H_1 and suppose that the link H_1M_1 has been activated. M_1 would be willing to invest only if there is no link activated with a member of the same ethnic group, i.e. M_2 . Similarly for individual H_1 .

In the two person case from the individual point of view $\mu(\alpha, \beta)$ is independent of β . This holds

for all values of β except when $\beta = 1$. If $\beta = 1$, then individuals invest in links of their own ethnicity and hence the probability of conflict is one. Now for all $\beta < 1$, by the same analysis, as above we obtain that $\forall \alpha < \alpha^*$, an individual would not invest in a link of the opposite ethnicity and hence conflict occurs with probability one. $\forall \alpha \geq \alpha^*$, individuals would invest in links of opposite ethnicity. However the probability of no conflict in equilibrium is given by

$$(1 - \beta)^2 [2\alpha^2 - \alpha^4] < 2\alpha^2 - \alpha^4$$

To calculate the probability of no conflict we need that in addition all the events under which conflict does not take place, we need that the “intra” links are also not formed. This gives us that the probability of no conflict is lower in the constrained economy as compared to the unconstrained one.

This once gain reinforces corollary 1.

5 Heterogeneous Endowment

Suppose that individuals in group H have a higher endowment than the individuals belonging in group M , i.e. $e_H > e_M$. We consider two cases where $c > e_M$, i.e. they do not have enough resources even to invest in a single link. We consider the other case where $e_M > c$.

Case 1: $e_H > c > e_M$

In this economy the individuals belonging to group M have so low endowment that they cannot invest even in a single link. Hence Muslims cannot form any business links. Hindus may form business links among themselves. Hence in this economy, irrespective of the values of α and β , only “intra” links are formed and hence conflict occurs with probability one.

Case 2: $e_H > e_M > c$

Suppose e_H is such that, individuals belonging to group H have enough endowment to invest in all possible links. We assume that e_M is such that individuals in group M have enough endowment only to invest in a single link. Now we compare the economy where all individuals have e_H and another situation where all individuals have e_M . Under this situation we obtain the following result

Proposition 4: *A heterogeneous economy is less prone to conflict as compared to a homogeneous economy with constrained resources but more prone to conflict than the unconstrained economy.*

Proof:

As before let $\mu(\alpha, \beta)$ be the probability of no conflict. The probability of no conflict is calculated so that there are atleast $N/2$ individuals in each group with atleast one link with the opposite ethnicity and atleast $N/2$ individuals in group M who have no link with members of the same ethnicity.

Now we calculate the expected payoff from investing in a business link of the opposite ethnicity

$$\begin{aligned} P_I &= \mu(\alpha, \beta)[v + F] + (1 - \mu(\alpha, \beta))\left[\frac{E}{2}\right] \\ &= \mu(\alpha, \beta)v + (1 - \mu(\alpha, \beta))\frac{E}{2} + \mu(\alpha, \beta)F \end{aligned}$$

Suppose the individual do not invest in the business link and leaves the money in the bank. We calculate the expected payoff,

$$P_{NI} = \mu(\alpha, \beta)[v + \delta e] + (1 - \mu(\alpha, \beta))\left[\frac{E}{2} + \delta e\right]$$

Now

$$P_I - P_{NI} = \mu(\alpha, \beta)F - \delta e$$

In the economy where all individuals have endowment e_H , we obtain the result as in Proposition 2.

An individual would invest in a link of the opposite ethnicity provided that

$$\mu(\alpha, \beta) \geq \mu^*(\alpha, \beta) = \delta c/F$$

In the homogeneous economy with endowment e_M , $\mu(\alpha, \beta)$ has higher degree of power in $(1 - \beta)$ as compared to the heterogenous economy. So $\mu_{HET}(\alpha, \beta) > \mu_{HOM}(\alpha, \beta)$. Now plugging $\alpha = 1$, and equating $\mu(1, \beta) = \delta c/F$, we obtain that $\beta_{HET}^* > \beta_{HOM}^*$. Now we know from Proposition 3 that $\forall \beta \geq \beta^*$, the probability of conflict is one. Hence we have that the heterogenous economy is less conflict prone.

Moreover $\forall \beta < \beta_{HOM}^*$, using similar logic we obtain that $\alpha_{HET}^* < \alpha_{HOM}^*$ ■

Now going back to the previous example, suppose that individuals in group H have enough resources to invest in all the three possible links while the individuals in group M have resources so that they can invest only in a single link.

The probability of no conflict in equilibrium is given by

$$(1 - \beta)[2\alpha^2 - \alpha^4]$$

To calculate the probability of no conflict we need that in addition all the events under which conflict does not take place, we need that the “intra” links in group M are not formed. Now we have the following inequality to hold

$$[2\alpha^2 - \alpha^4] \geq (1 - \beta)[2\alpha^2 - \alpha^4] \geq (1 - \beta)^2[2\alpha^2 - \alpha^4]$$

Hence we have that a heterogenous economy is more conflict prone than a homogeneous economy with abundant resources but less conflict prone than a homogeneous economy with scarce resources. Thus absolute poverty plays an important role in precipitating conflict.

6 Social Links

Suppose that we have the constrained economy where individuals have enough resources to invest only in one single link. An individual as before would always invest in a business link of the same ethnicity as before.

Now in this set up there is another kind of link called the social link. Social links would represent friends and relatives with whom individuals can interact and derive some pleasure. We assume that an individual has a social link with the rest of the members in the same ethnic group. This may be due to the fact that individuals of the same ethnic group have similar cultural and religious activities whereby they tend to come closer to each other. Let an individual derive an utility θ from interacting with a person. An individual can have a social link as well as a business link with a member of the same ethnicity. Let p be the probability that an individual interacts with a person of the same ethnicity with whom she has a social link every period. On meeting the person she derives an utility θ else zero. Thus the expected utility is $p\theta$ which is additive to the utility function.

In a constrained economy, inspite of active links an individual may not have enough resources to invest in business. An individual who has an active link with a member of the opposite ethnicity but has no business relationship is automatically considered as a social link. Let q be probability that an individual interacts with a person of the opposite ethnicity with whom she has a social link. Hence in each period there is an expected utility gain of $q\theta$ from each of the social link of the opposite ethnicity. We assume that $q < p$, because interactions among the same ethnic members is expected to happen more than interactions with opposite ethnic members.

An individual would be more interested to form a business link because we assume that $F > q\theta$. Hence utility from business payoff is higher than the payoff from a social link. Hence individuals whenever possible would try to form business links as they fetch a higher payoff. However this may not be possible in a constrained economy. However a conflict would lead to a mistrust and all the social links of the opposite ethnicity would no longer exist. Conflict would lead to the probability of interaction, i.e. q to be equal to zero. This brings us to our next proposition

Proposition 5: *In the constrained economy the probability of conflict is less than one under the presence of social links even when $\beta > \beta^*$.*

Proof:

An individual would always invest in a business link of the same ethnicity. Now consider an individual who has a business link with the same ethnicity and k social links of the opposite ethnicity. An individual would prefer conflict over peace only when

$$\begin{aligned} \frac{E}{2} + F + (N - 1)p\theta &\geq v + F + (N - 1)p\theta + kq\theta \\ \Rightarrow k &\leq \frac{(E/2 - v)}{q\theta} = k^* \end{aligned}$$

An individual who has less than k^* social links with members of opposite ethnicity would prefer a conflict over peace. This is the same even if the individual has no business link with a person of the same ethnicity.

Now suppose $k^* < N$, individuals who have more than k^* social links with members of opposite ethnicity will prefer peace over conflict. Suppose that $\beta > \beta^*$, in the unconstrained economy with no social links the probability of conflict is one. Now suppose that there are social links. Individual strategy is to invest in a business link of the same ethnicity whenever possible and to invest in a business link of the opposite ethnicity only if $\alpha > \alpha^*$. An individual would prefer peace over conflict if the number of social links with the opposite ethnicity is greater than k^* . α^* is determined from

$$\mu(\alpha^*) = \frac{\rho e}{F}$$

where $\mu(\alpha)$ is the probability of no conflict and is calculated so that there are atleast $N/2$ individuals in both the groups who have atleast k^* social links of the opposite ethnicity.

This leads us to the point that even when $\beta > \beta^*$, the probability of conflict is not one in equilibrium. ■

An implicit assumption underlies the above Proposition. We assume that the expected utility that an individual derives from a social link of opposite ethnicity i.e. $q\theta$ is sufficiently high enough so that $k^* < N$. If $k^* > N$, then individual have a higher expected payoff from a conflict than losing the social links of the opposite ethnicity. Hence social links have no impact on the probability of conflict and we would obtain the same results as in Proposition 3.

This proposition brings us to the point that even if there are "inter" ethnic social interactions the probability of conflict can be lower as compared to the situation where there are no social interactions.

Going back to the example suppose that in the constrained economy we have $k^* = 0$. Hence an individual who has any link of the opposite ethnicity would never want to enter into a conflict. Now if $\beta = 1$, in absence of social links the probability of conflict is one. However in presence of social links the probability of conflict is given by

$$2\alpha^2 - \alpha^4 < 1$$

Hence social interactions when "inter" ethnic can promote peace even in a constrained economy.

7 Heterogenous Group Size

Suppose that there are N_H individuals in group H and N_M individuals in group M . Hence the total population in the economy is given by $N = N_H + N_M$. We assume that both N_H and N_M are even. Suppose this economy has a Hindu majority where, $N_H > N_M$.

Suppose when a conflict occurs then the probability of winning in the conflict is given by the

function

$$p(n_H, n_M)$$

where n_H and n_M are the number of individuals participating from group H and group M respectively. We assume that $p_1 > 0$ and $p_2 > 0$, i.e. the probability of winning the conflict increases as the number of people participating in the conflict increases.

All other specifications remain unchanged as was stated previously. Given that Hindus form a majority in the economy, the individuals in group H would have higher “intra” linkages and lower “inter” linkages as compared to the individuals in group M in probabilistic terms. Individuals in group H would have less active links and given that the probability of winning is increasing in the number of people participating, hence more individuals would be willing to participate and hence ex-ante the expected payoff from conflict would be higher. Thus the group H would be more prone to form the alliance and hence the majority group will be responsible for the conflict.

This is in line with the empirical research by Mitra and Ray (2010), where they point out that the Hindus who are the majority group is mainly responsible for the Hindu-Muslim violence in post independence India. Varshney’s study chose similarity in demographic proportions as the minimum control in each pair of cities that he studies. Both in India’s popular political discourse and in theories about Muslim political behavior, the size of the community is considered to be highly significant. However Varshney pointed out that similarity in demographic proportions coexists with variance in outcomes—peace or violence. To capture this the model has same population size for both the groups.

When we increase the inequality in group sizes, then the chances of conflict would also increase and group H would be more prone to form an alliance.

8 Conclusion

This paper explains how different degrees of inter and intra engagement can help in lowering the probability of a conflict. What matters for an ethnic violence is whether the associational ties cut across the ethnic groups. This paper shows that the more are the ties across the ethnic group members the lower is the probability of a conflict in equilibrium. Trust based on interethnic ties are very important than intraethnic ties. The results of this paper is not specific to India and the focus is on inter and intra ethnic civic ties which plays a critical role in the occurrence of a conflict.

The occurrence of a conflict largely would depend upon the ethnic ties locally or in region. Though networks of communities can be built nationally, internationally or even through the electronic channel, the fact remains that most people experience civic or community life locally. Business associations or trade unions may well be confederated across local units and business or labor leaders may also have national arenas of operation, but most of the time most businessmen and workers who are members of such organizations experience associational life locally. The nature of

the local networks- “inter” connected or “intra” connected plays an important role in explaining the observable patterns of ethnic violence and peace.

Moreover we show that the levels of wealth in an economy can have a role to play in maintaining peace in certain regions. With the same kind of heterogeneity in ethnicity among the population and similar kind of interconnectedness, less developing regions may more often get into a conflict as compared to the more developed ones.

This paper proposes that interethnic ties should be encouraged which can act as a mechanism of peace. Interethnic ties even in the form of social links can also help in lowering the probability of conflict. The way forward is to study these kind of links in more detail in places which have remained peaceful and also places where violence has taken place. Investigation needs to be done whether civic associations—labor unions, business associations and so on—are on the whole ethnically better integrated in the peaceful cities.

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