On the Theory of Ethnic Conflict

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Abstract

We present a simple theory of ethnic conflict. Coalitions formed along ethnic lines compete for the economy's resources. Te role of ethnicity is to enforce coalition membership: in ethnically homogeneous societies members of the losing coalition can defect to the winners at low cost, and this rules out conflict as an equilibrium outcome. We derive a number of testable implications of the model and present some very preliminary empirical results.

1 Introduction

In many countries ethnic identity has profound consequences for its the bearer's physical safety, political status, and economic prospects. Violent confrontation along ethnic lines is the most apparent form of ethnic conflict, and currently claims lives in such diverse places as the Balkans, Rwanda, Burundi, Sudan, Indonesia, the Middle East, Afghanistan, Northern Ireland, and several other countries. Less news-making, but even more widespread, is nonviolent ethnic conflict, whereby ethnic cleavages form the basis for political competition and/or economic exploitation. In Kenya, Zimbabwe, Nigeria, India, Belgium and countless other countries rent seeking on behalf of one's ethnic group crowds out productive activities, and the constant threat of violence discourages investments in human and physical capital. Indeed, even conflicts that are mostly nonviolent often erupt in occasional bouts of open fighting or massacres. Elsewhere the rent seeking from a dominant group takes the extreme form of exploitation and discrimination: it is the case of Algeria, Malaysia, Several Latin American countries with indigenous populations, the Baltic countries, and, some would say, the USA.

This paper explores a simple explanation for the prevalence of ethnic conflict, namely, that ethnicity allows groups fighting over resources to enforce membership in the respective coalitions. Without the distinguishing marks of ethnicity, these coalitions would be porous and subject to infiltration.

We think of conflict as a conflict over a country's riches. The potential for such conflicts is present in virtually every society, as every society has some assets that could be appropriated by a coalition intent on excluding non-members from the consumption flow that derives from these assets. However, in ethnically homogeneous societies it is relatively difficult to prevent members of the losing coalition from defecting, and join *ex-post* the winning side. This makes conflict *ex-ante* sub-optimal, so ethnically homogeneous societies will be less prone to this type of rent-seeking conflict. On the other hand, if the population is ethnically heterogeneous, and hence easily distinguishable, the cost of defection may be extremely high. If ethnic diversity makes the winning coalition less susceptible to *ex-post* infiltration by members of the losing one, then it can be *ex-ante* optimal for the stronger group to initiate a conflict.

One key implication of this idea is that not all ethnic distinctions are equally effective ways of enforcing coalition membership. At one extreme, ethnic cleavages based on differences in skin color and other physical characteristics should be almost perfectly defection proof, as such physical differences offer very low-cost devices to detect infiltrators. Differences in religion or in language are not as effective, as potential defectors can assimilate through conversion or by learning the language. However, these forms of assimilation can be quite costly, whether psychologically or in terms of learning costs, or may work only imperfectly, as in the case of conversion from religions that require circumcision to others that don't, or when it is hard to eliminate the mother tongue's accent. At the other extreme, ethnic cleavages that are only marked by a shared sense of identity or history, unsupported by additional differences of color, religion, language, or other observable characteristics, should give raise to fairly porous coalitions.

The upshot of this discussion is that – for the purposes of predicting the emergence of ethnic conflict – one key piece of information is the *distance* among the potential contenders. Virtually all of the empirical work on conflict stresses the *relative size* of the groups present in a country's territory. As we discuss below, size does play an important role in our theory. Our contribution, however, is to stress that a second dimension, distance, or the cost of assimilating into the dominant group, is also critical. Empirical work on ethnic conflict must complement the data on group sizes – which is plentiful – with data on distance, which is for now almost non-existent.

We develop a simple model with two ethnic groups that captures these ideas, and derive a number of testable implications. As discussed, conflict is more likely when the characteristics that distinguish the ethnicities are more difficult to change.[1] Additionally, ethnic conflict is more likely to occur when the ethnic groups are fairly similar in size, because when one group is small the gains from conflict in terms of reduced claimants to the country's wealth are also small. The relationship between the probability of conflict and the country's appropriable resources is inverted-U shaped: when the prize is small conflict is not worth its costs; when the prize is very large, however, members of the defeated group switch identity in large numbers, in order to gain access to the spoils of conflict. Hence, only for intermediate values of the resource asset conflict can arise. Finally, conflict is more likely for intermediate values of non-expropriable assets, such as human capital. When the losing group is very poor their opportunity cost of switching identity is low, and this deters the strong group from seeking a conflict. When the winning group is very rich it has a lot to lose from conflict, and this also prevents conflict from occurring.

We then discuss the case of multiple ethnicities. With more than two ethnic groups one must study the formation of coalitions of groups, and it is harder to get sharp empirical predictions. However, most of the insights of the two-group model are robust. One difference

[1]This is not to say that conflict will *only* arise in societies with distant ethnicities. If the benefits of conflict are large enough, a coalition aiming to exclude the rest of the population may arise even in relatively homogenous societies: this coalition will tolerate a certain amount of leakage and/or will be willing to pay relatively large costs to set up artificial methods to enforce membership (e.g. party affiliation). But in countries were ethnicity offers accurate identity-tracking devices, leakage, and the cost of enforcement, are much lower, so conflict will arise under a broader set of circumstances.

is that – while in the two group model conflict is initiated (if at all) by the group that is a net gainer from it – in the multiple-group case a group that would otherwise prefer peace may be induced to participate in an aggressive coalition in order to preempt the constitution of an alternative aggressive coalition that excludes it.

Collier and Hoeffler (2001) present a battery of empirical results on the causes of ethnic war that are consistent with the predictions of our model. First, a dummy variable that takes value one if the largest ethnic group accounts for between 45 and 90% of the population positively predicts conflict. As the authors point out, this is consistent with the view that an ethnic group will try to assert its dominance when it is large - and hence strong - but not so large that the fraction of the population excluded from access to the country's resources is too small. They also find that – after controlling for the "dominance" dummy – an index of ethnic and religious fractionalization (roughly speaking, a measure of the probability that two randomly drawn individuals will belong to different ethnic and/or religious groups) negatively predicts conflict. In our model high fractionalization may make it difficult to build a winning coalition all of whose members would benefit from starting a conflict, which is a necessary condition for conflict to occur. Finally, they find that the probability of conflict is inverted-U shaped in the fraction of primary commodities in total exports, which may be a proxy for the resources whose control the conflict is about.[2]

To further explore the consistency of the data with our model we assemble a cross-country data set on conflict, ethnicity, and natural resources. Currently, we report some preliminary evidence that supports the prediction that conflict is more likely in countries where ethnic-group sizes are fairly similar and appropriable resources (as measured by the share of GDP in mining) are in an intermediate range.

2 Relation to the Literature

It is common to classify theories of ethnic conflict into two broad categories: "primordialist" and "instrumentalist." The former category includes theories were ethnicity plays a motivational role, amounting essentially to putting ethnicity in the utility function. This could reflect within group altruism (justifiable, for example, with evolutionary-psychology arguments), and/or with the fact that individuals derive "identity-utility" from their ethnic background. In the latter view ethnic conflict is the response to a perceived threat to one's identity. Instrumentalist theories view ethnicity as affecting the constraints individuals face in the pursuit of their objectives, or in other words put ethnicity in the description of

[2] Fearon and Laitin (2001) also find that – after controlling for other country carachteristics – ethnic fractionalization is not a strong predictor of the onset of civil wars. They do not include the size of the largest group.

the technology.[3] Clearly our paper belongs in this second strand of research. Within this tradition, the closest antecedent is Fearon (1999), who asks why ethnic politics and politics centered around the distribution of "pork" often tend to go together. He conjectures informally that allocating pork according to ethnicity (or other features that are not easily chosen or changed by individuals) is a way of preventing political losers from attempting to enter the winning coalition.

Several social scientists have argued that ethnic identities wax, wane, and shift as historical, political and economic circumstances change (examples: Anderson, 1983, and Horowitz 1985). Accordingly, endogeneity of ethnic groups is a key aspect of our model. Our framework may be said to capture two aspects of the endogeneity of ethnic identity – both of which are emphasized in the field-work literature. First, the *salience* of ethnicity is endogenous, as people's identity only becomes relevant if other motivating and enabling factors (high rewards from conflict, low opportunity costs) are present. Second, individuals' may choose to change their ethnic identities, through conversion or assimilation, if the incentives to do so outweigh the costs.[4]

The model we present contributes to a small tradition on "greed-motivated" conflict, i.e. conflict motivated by competition over resources. Most of the formal work in this line of research is in a series of papers authored or co-authored by Herschel Grossman:[5] our modelling strategy shares several features of his. The main difference is that we explicitly model the role of ethnicity, and the consequences of its endogeneity for the likelihood of conflict. This leads to distinct empirical predictions. Another difference is that in these models civil conflict tends to be interpreted as "rebellion:" a dominated group stages a (more or less local) rebellion to (re-)claim a stake in the resources the government is monopolizing. In a sense, we ask an upstream question: who is the government and how did it come to monopolize such resources. In our framework the "rebels" are more like victims, in the sense that the conflict arises precisely because of the attempt by the stronger group to exclude the

[3]For examples of instrumentalist views of ethnic conflict see Bates (1983), according to whom common language and common culture make it easier for political entrepreneurs to assemble political coalitions; Fearon and Laitin (1996), who envision ethnic groups as information networks, which make it easier for the victims of wrongs to identify and punish the individual perpetrator if the latter comes from the same ethnic group, and may instead lead to collective retaliation if the perpetrator belongs to an other group; and Fearon and Laitin (2000), who stress the elites' wilful provocation of conflict with other groups in order to solve within-group power struggles.

[4]Instrumentalist writers point out that fluctuations in the salience of ethnic identity are difficult to handle for primordialist writers. For example, there are many examples where creating state boundaries betwen seemingly well defined ethnic groups lead to emrgence of new ethnic divisions within the two nwwly separated groups.

[5]E.g., Grossman (1991, 1999), Gershenson and Grossman (2000), and Grossman and Mendoza (2001). See also Hirshleifer (1995).

weaker from access to national resources.[6]

The model is also closely related to McDermott's (1997) model of exploitation, where – as in our model – the identities of the "exploiter" and the "exploited" are endogenously determined as functions of each group's wealth and size. Again, the main difference is that we make ethnicity endogenous.[7] Another difference is that we envision the main goal of conflict to be the exclusion of a fraction of the population from access to the country's natural resources, whereas in McDermott the main objective of the group that initiates the conflict (exploitation) is to "pray" on the other group's human capital.[8]

Our work is also related to a fairly large empirical literature on the effects of ethnic fractionalization for various economic outcomes, such as growth, corruption, trust, and the provision of public goods.[9] We think broadly of this literature as being mostly concerned with the consequences of conflict, while our contribution is more focused on the causes. Our model , however, does have implications for this literature, in that it casts doubt on the appropriateness of conventional measures of fractionalization, and - even more importantly – it stresses the hitherto overlooked concept of ethnic distance as at least as important a determinant of conflict as relative group size.

3 Examples

In the United States no other ethnic group stands out for its troubled relationships with the white majority (and other groups, for that matter), and for its persistently disadvantaged socio-economic status, as the African-Americans. Interestingly, African-Americans are also the ones who stand out visually: they are "black," while everyone else is various shades of "white." From the perspective of our theory, African-Americans have the greatest ethnic distance from the majority population. Various waves of Irish, Italians, Jews, Polish, etc. suffered their own share of initial discrimination and exploitation at the hands of the "Anglo" majority, but they have eventually melted into a grand white coalition. Why? According to

[6]See, however, Gershenson and Grossman (2000), who study whether the conflict over political and economic dominance between two groups results in the acquiescence of one group to the other's dominance, or it expreses itself in never-ending conflict.

[7]In this sense, McDermott's model is a special case of ours, for the limitng case in which the cost of switching is infinity. On the other hand, his model is more general in several other dimensions (most notably, in that it studies a range of interesting intertemporal issues that we abstract from in our static model).

[8]Yet the phenomenon we study is not a "tragedy of the commons." The tragedy of the commons arises precisely when one of the groups cannot exclude the other from access to the common resource, and the conflict takes the form of excessive *rates* of extraction (see, e.g., Tornell and Velasco, 1992).

[9]Some examples include Mauro (1995), Easterly and Levine (1997), Miguel (2000), Alesina, Baqir, and Easterly (1999), and Alesina and La Ferrara (2000). See Collier (2001), and Alesina et al. (2002) for surveys (and extensions to) this literature.

our theory, this is simply because continued exclusion would have been too costly to enforce given the close physical proximity with the Anglo elite. Had the latter tried to perpetuate such discrimination, there would now be many more Americans with names like Coleman, and many fewer with names like Caselli, as the holder of the latter would have switched in mass to the former. Everything else, however, would be roughly the same.[10] Unless, that is, the Anglos had set up a vast and costly bureaucracy keeping track of everyone's ancestry – as in Nazi Germany.[11]

Discrimination against blacks, however, continued unabated for many generations, even after the most blatant exploitation – slavery – had been abolished. The gradual and ongoing phasing out of this discrimination since the 1960s is also well understood from the perspective of our model. The cost of ethnic conflict (policing and repression, inefficiencies arising from the waste of talent in the exploited group, etc.) are roughly proportional to an economy's wealth. As America got richer and industrial, the gains from excluding blacks from, say, land or education where no longer large enough to compensate for the increasing cost of maintaining the discriminatory system. Not surprisingly, poor white farm and blue collar workers represented the latest holdouts for the Jim Crow regime, as they (rightly) felt that the newly enfranchised blacks constituted direct competition for their jobs.[12,]

The South-African case presents of course many analogies, and our model describes it even better. The model identifies the dominant group as the one that has greater total resources. While whites are a numerical minority in South-Africa, their per-capita resources so dwarf those of the black majority that their "firepower" is greater. This allowed them to establish the apartheid regime. The rich mineral resources of the country provided the incentive. Over time, as the economy grew and diversified, the cost of maintaining the regime became too large relative to the benefits, and the whites decided to start a transition to the "no conflict" equilibrium. The black-white cleavage is also currently highly prominent in Zimbabwe, where – moving in the direction opposite to South-Africa – the equilibrium is going from no conflict to conflict, as the black majority targets land owned by the white minority. Our interpretation of the Zimbabwean case is that – after many years of declining incomes – the ratio between the value of the appropriable resource (land) and other forms of

[10]Imagine enforcing a policy of separate water fountains for Italians!

[11]Interestingly, the discriminaton against various waves of non-anglo European immigrants tends to disappear after one or at most two generations: this is probably the time required for the newcomers (i.e. their descendents) to learn the language well enough that they would be able to disguise their ancestry – if necessary. Of course in equilibrium this is not necessary.

[12]The other group that is both distant from the white majority and historically greatly exploited is of course the Native Americans, whose tragic experience fits our model exactly. Asians – another ethnically distant group – suffered their own share of indignities, witness for example the detention camps during World War II.

income has increased above the threshold, such that – from the perspective of the potentially dominant group – the conflict equilibrium comes to dominate the no conflict one.

The black-white gradient is of course an important physical source of ethnic distance, but by no means the only one. An illustration of this is provided by the Rwandan case, where so-called "Hutus" and "Tutsis" have been in extremely bloody – if somewhat intermittent – conflict for decades. Much has been written about the artificial birth of the Hutu-Tutsi split as part of the divide-and-conquer strategy of Belgium, the colonial power. For us, what is notable is the rich anecdotal evidence that physical attributes play a critical role in the conflict. On average, "Tutsis" are taller and more slender, they have somewhat lighter skin, and thinner noses. During the genocidal campaign that led to the death of close to one million people in 1994, "Hutus" reportedly made use of these visual cues to identify potential victims. This of course implies that many "Hutus" were also victimized, as they did not fit the stereotypical description (for example they were too tall or too thin). To us, the willingness of the genocide's perpetrators to commit such "type 2" errors strongly supports the "coalition enforcing" interpretation of ethnic conflict.[13] To put it crudely, pre-genocide Rwanda was a country on the verge of an impending famine, mainly due to excess population pressure on the land. A genocide was one way to relieve such pressures, and targeting Tutsis, or rather – as it turned out – the tall and thin, assured that the designated victims could not infiltrate the dominant coalition (i.e., in this case, escape the killers).[14]

One could keep going with examples of conflict or exploitation where physical differences play a critical role in enabling members of one group to pinpoint members of the "other" coalition. Another way this is done is through language. Examples of this go literally back to biblical times – with tales of warring tribes using the pronunciation of certain words to establish who should be slaughtered – and stretch to 21st century Northern Ireland, where, as reported by *The Economist* of June 15th, 2002, "a group of masked men [entered a school and] demanded that students produce identification or repeat the alphabet. Many Catholics pronounce the letter "h" differently to Protestants, with an aspiration influenced by the Irish

[13] And is strongly inconsistent with primordialist interpretations. The killers also targeted so-called "moderate Hutus," i.e. Hutus who did not cooperate in the genocide. This is further prima facie evidence against the primordialist view.

[14] The infamous Radio Mille Collines broadcast: "Those of you who live along the road, jump on the people with long noses, who are tall and slim, and want to dominate us." (Peterson, 2001, p. 327).Very similar considerations, only in reverse, apply to Burundi, where the tall and thin Tutsis dominate the Hutus. There, too, physical caracheristics play an explicit role. For example, the army has a "height-by-girth" requirement that so happens to exclude from the ranks the average Hutu. And there, too, changing economic circumstances affect the incentive of the dominant group to tighten the exploitation equilibrium: when coffee prices (the export crop) fall, the relative return to government jobs increase, and the Tutsis fight Hutu "infiltration" more fiercely (Gurr, 2000).

language. Students were evacuated before it became clear what was planned for people with the wrong accent." In the Balkans, language is the greatest source of ethnic distance from the perspective of our model .

Religion is often cited as a conflict-inducing cleavage. For most people, and for most religions, however, the material costs of conversion are relatively modest, amounting in many cases to geographical relocation to a locality where one can easily establish a new religious identity.[15] Indeed, conversion out of a discriminated group is a widespread phenomenon. In the Middle Ages entire Central European populations switched back and forth between Catholicism and Protestantism as the political alliances of their princes switched between the Pope and the Emperor.[16] In Fascist Italy many Jews converted to Catholicism to escape discrimination. In modern-day India it is extremely common for lower-caste Hindus to convert to the Muslim or Catholic faiths, which are relatively less discriminated against.

Given this general ease of conversion, religion per se should be a relatively weak source of ethnic distance, so the alleged importance of religious differences in ethnic conflict is prima facie evidence against our theory. Recent empirical work, however, casts serious doubt on the importance of religion in ethnic conflict. Alesina et al. (2002), for example, find that religious fractionalization does not significantly predict the rent-seeking policy distortions usually associated to other types of ethnic fractionalization. Similarly, examining a large cross-section of conflicts, Fox (1997) finds that in only a small minority do religious issues play more than a marginal role. Hence, far from providing counter-examples to our theory, the existing evidence on religion is strongly consistent with it.[17]

So far our specific examples have involved cases of conflict, where we argued that ethnic distance played a role. In principle, we would like to offer examples were there is no conflict because there is insufficient distance. Doing so is difficult, however, because such examples in the limit become tautological: there is no ethnic conflict in Sweden because the ethnic distance among all Swedes is virtually zero! Nevertheless, we venture here a speculation that a non-trivial example of ethnic proximity leading to relatively peaceful ethnic relations may be found in the Indian case.[18] In a world were all ethnic cleavages are equally important,

[15]For some, however, there may be large psychic costs.

[16]And the so-called "religious wars" where mostly international wars that happened to involve the Papacy as one of the territorial contenders.

[17]A stark example of color working better than religion as a coalition enforcing mechanism is recounted by Horowitz (1985, p.43): "In seventeenth century North-America, the English were originally called "Christians," while the African slaves were described as "heathens." The initial differentiation of groups relied heavily on religion. After about 1680, however, a new dichotomy of "whites" and "blacks" supplanted the former Christian and heathen categories, for some slaves had become Christians. If reliance had continued to be placed mainly on religion, baptism could have been employed to escape from bondage. Color provided a barrier seemingly both "visible and permanent.""

[18]There seemingly is a lot of communal violence in India, so some readers may find it paradoxical to treat

for a very poor, over-populated country such as India, the 13% Muslim minority should constitute an attractive target for massive exploitation, if not for Rwandan-style elimination. Instead, Muslims have for the most part equal economic and political rights. Our speculation is that India enjoys this relative harmony precisely because the ethnic distance between Muslim and Hindus is quite modest: too oppressive an exploitation equilibrium by the Hindu majority would be unsustainable in the face of mass ethnic switching by the Muslims.

4 The Model

We study a society populated by N individuals. Each individual belongs to one of two ethnic groups, A or B, of size N_A and N_B respectively, and the overall size of the population is $N = N_A + N_B$. Within each group, all individuals are identical. Each member of group A (B) has an initial exogenous income stream y_A (y_B) from assets that cannot be expropriated. In addition, society is endowed with aggregate resources Z to be distributed among the population.

The population of this society is engaged in a multi-stage game. In the first stage of the game members of each group decide by majority rule whether or not to engage in conflict with the other group. Conflict arises when at least one of the two groups has decided positively. After the conflict, individuals are given a choice of switching their ethnic identity. After individuals have made (and executed) their ethnic identity decision, resources are allocated based on all prior decisions and characteristics of the society.

Individuals derive utility exclusively from consumption, and consumption equals income. In a society that experiences no conflict, each individual gets to consume his own income stream, plus a share of the common resource Z. We assume that in the absence of conflict Z is distributed equally among the citizenry. If there is conflict, a fraction δ of all the country's resources is lost. In case of violent conflict this can be thought of as the physical destruction of assets brought about by fighting. In case of non-violent conflict δ can be thought of as the resource-cost of rent-seeking activities. A conflict results in a reallocation of the common resource Z that depends on the relative strength of the two groups, i.e. the "firepower" they can mobilize against each other. Specifically, group A (B) obtains a fraction g_A (g_B) of Z, where g_A (g_B) is a function of the two groups characteristics, such as income and group size, to be specified below. The resources gained by each group during the conflict are then split evenly among the (ex-post) members of the group.

As mentioned, after observing the collective choice to engage (or not) in conflict, and, if one takes place, the outcome of the conflict, individuals have the option of changing

India as a case of relative ethnic harmony. The fact, is, however, that *relative to the size of the population*, ethnic violence in India is actually fairly trivial.

their identity. Switching identity involves a cost ϕ, and this cost may vary depending on the nature of the ethnic distinction (race, religion, skin color, etc.). We assume that ϕ can vary continuously from zero (Sweden) to infinity (South Africa). Identity switchers cannot be separately identified from original members of the group.

The above assumptions lead to the following payoff formulas. Income accruing at the end of the game to an individual who was born into group A can take four possible values. If no conflict occurs and this individual does not change ethnic identity he receives income

$$U_A^p = y_A + \frac{Z}{N}. \tag{1}$$

I.e., the individual has complete access to his initial endowment. In addition, since no conflict arose, the common resource Z is divided equally among all members of society. If no conflict occurs but this individual switched ethnic identity (something that will actually not occur in equilibrium) his income is

$$U_{AB}^p = (1-\phi)y_A + \frac{Z}{N}. \tag{2}$$

where $0 \leq \phi$ is the (proportional) cost incurred in order to switch identity.

The third and fourth cases are the ones where conflict arises. If conflict arises and the member of A does not switch identity his payoff is:

$$U_A^w = (1-\delta)\left[y_A + \frac{g_A Z}{N_A'}\right]. \tag{3}$$

Hence, conflict leads to the destruction of δy_A units of the individual endowment as well as δZ units of the collective good. Group A receives a fraction g_A of what remains of the collective good after the conflict, and this amount is divided equally among members of group A. N_A' is equal to N_A plus (minus) the number of initial members of group B (A) who switched identity.

Finally, if there is conflict and the individual switched sides his payoff is:

$$U_{AB}^w = (1-\delta)\left[(1-\phi)y_A + \frac{g_B Z}{N_B'}\right]. \tag{4}$$

Here, the individual endowment, reduced by the switching cost, is further reduced by conflict-induced destruction. Having switched sides, the former member of group A is entitled to a share of the part of the (non destroyed) collective endowment captured by group B. The payoffs for an initial member of group B follow in a straightforward manner.

Society can be characterized by the initial group-sizes N_A and N_B, endowments, y_A, y_B, aggregate resources Z, switching cost ϕ, destruction parameter δ, and allocation rule g_A, g_B. Given these characteristics, individuals choose their ethnic identity, giving rise to N_A' and N_B', and each group collectively chooses whether or not to engage in conflict.

4.1 The Ethnic Identity Decision

We proceed by backward induction. In the last stage of the game citizens know whether they live in a country at war or at peace, and, in the former case, what are the shares g_A and g_B. They then need to decide which ethnic identity they wish to have. By comparing U_A^p and U_{AB}^p it is obvious that nobody will switch identity if there is peace: switching identity carries a cost ϕ, and no benefit when the common resource is divided equally among all citizens. Hence, with peace, $N_A' = N_A$ and $N_B' = N_B$. The only equilibrium with no conflict is also one with no switching.

Consider, then, the case in which conflict occurs. For this to be an equilibrium with group sizes N_A' and N_B' there must be no residual incentive to switch. For a member of group A to not choose to become a member of group B, it must be that switching does not yield a gain in consumption, or $U_A^w \geq U_{AB}^w$. The "gain-from-switching" from A to B function is:

$$U_{AB}^w - U_A^w = (1-\delta)\left[Z\left(\frac{g_B}{N_B'} - \frac{g_A}{N_A'}\right) - \phi y_A\right]. \tag{5}$$

Similarly, the gains from switching from B to A are represented by the function:

$$U_{BA}^w - U_B^w = (1-\delta)\left[Z\left(\frac{g_A}{N_A'} - \frac{g_B}{N_B'}\right) - \phi y_B\right]. \tag{6}$$

In an equilibrium with conflict, and positive numbers of both N_A' and N_B' it must be the case that these functions are non-positive

4.2 The Ethnic Conflict Decision

In deciding whether to engage in conflict members of group A proceed as follows. First they backward-induce the values of N_A' and N_B' that would prevail in case of conflict. They then plug these values into U_A^w, and compare the resulting payoff from conflict to the payoff from peace U_A^p. If the former is larger, they play "war". Otherwise they play "peace". Citizens of group B proceed in similar fashion. As mentioned, conflict prevails if at least one of the groups plays war.

Note that if $U_A^p \geq U_A^w$ playing peace is a weakly dominating strategy: if B declares war, A's payoffs are independent of whether A declares war as well. On the other hand, if B is peaceful, A is better off playing peace as well. If we rule out weakly dominated strategies, then, war is only an equilibrium if $U_A^p < U_A^w$ and/or $U_B^p < U_B^w$.[19]

[19] Technically, the condition for preferring war is that $U_A^p < \max(U_{AB}^w, U_A^w)$, i.e. group A members maximize utility keeping into account that they have the option to switch to group B. However, notice that in equilibrium if $U_{AB}^w > U_A^w$ then we must necessarily have $N_A' = 0$. As discussed below, this implies $U_A^p > U_{AB}^w$. Hence, $U_A^p < U_A^w$ if and only if $U_A^p < \max(U_{AB}^w, U_A^w)$. All this says is that a group never voluntarily commits to a war that will induce all of its memebers to change identity.

One property of this model is immediately apparent: there will be no equilibria where a conflict induces *all* the members of a group to switch identity. Suppose, for example, that $N'_B = 0$. Then we have $U^w_A = (1-\delta)\left[y_A + \frac{g_A Z}{N}\right]$, which is certainly less than U^p_A.

5 Winner-Take-All Conflict

In order to generate predictions and comparative statics results from the model it is necessary to choose a functional-form for g_A and g_B. In this section, we work with the following assumptions:

$$g_A = \begin{cases} 0 & \text{if} \quad y_A N_A \le y_B N_B \\ 1 & \text{if} \quad y_A N_A > y_B N_B \end{cases}, \tag{7}$$

and

$$g_B = 1 - g_A.$$

Hence, our example focuses on a "winner-take-all" conflict technology, where the side that can draw on the largest pool of resources wins the conflict and takes away the entire prize. We assume that the amount of fire-power mobilized by each group is proportional to their total assets, measured as income per-capita y_i times group size N_i. A useful way of thinking about this special case is that one group is dominant if it has greater aggregate resources, and that group must decide whether or not to exploit the other. If it does, exploitation involves efficiency losses δ. For example, because preferential treatment to members of the dominant group means that talent present in the minority group gets wasted.

In order to facilitate the derivation of comparative statics results, we introduce the following notation: $n_A = N_A/N$ is the pre-conflict share of group A in the population, and $n'_A = N'_A/N$ is the post-conflict share. Correspondingly, $n_B = 1 - n_A$ and $n'_B = 1 - n'_A$ are the shares of group B; $z = Z/N$ is the amount of contendible resources per capita. Also, we define $n^* = y_B/(y_A + y_B)$ as the threshold such that for $n_A < n^*$ group B is the winner of a potential conflict, while for $n_A > n^*$ group A is the winner. For the rest of this subsection we focus on the case $n_A > n^*$, i.e. A is the dominant group. The case $n_A \le n^*$ is exactly symmetric.

By our assumptions on g_A and g_B, the gain-from-switching function for group A becomes

$$U^w_{AB} - U^w_A = (1-\delta)\left(-\frac{z}{n'_A} - \phi y_A\right). \tag{8}$$

It is immediately clear that we will never observe switching out of the dominant group: not only it would entail losing the switching cost, but also foregoing one's share in the spoils of conflict, z/n'_A. For group B the gain-from-switching function is

$$U^w_{BA} - U^w_B = (1-\delta)\left(\frac{z}{n'_A} - \phi y_B\right). \quad (9)$$

Switching allows members of group B to receive a share z/n'_A of the spoils that group A will have conquered through conflict. This gain must be traded-off against the cost of switching ϕy_A. The function $U^w_{BA} - U^w_B$ is plotted against n'_A in Figure 1. The function is decreasing: for low values of n'_A the gains from defecting to the winners are relatively large, as the spoils of war are divided among few people. As n'_A increases a defector's share falls, and so does the incentive to defect. Indeed, for n'_A small enough gaining access to z is not a sufficient compensation for the switching cost, and the net incentive to switch may become negative. The cutoff point at which members of the weaker group start defecting is

$$\overline{n} = \frac{z}{\phi y_B},$$

which is increasing in the spolis of war z (the bigger the pie, the larger the number of people we are willing to share it with), and increasing in the cost of switching ϕy_B. Note that it is possible for $\overline{n}$ to be larger than 1. These are cases in which, in the event of conflict, members of the weak group have an incentive to defect at all values of n'_A.

The equilibrium value of n'_A in the event of a conflict depends on the relative positions of n_A and $\overline{n}$. If $n_A < \overline{n}$, and a conflict occurs, citizens of group B will start switching to A. If – as depicted in the figure – $\overline{n} < 1$ the flow of defectors will stop when no further incentives to switching are left, i.e. the equilibrium value of n'_A is $\overline{n}$. If $\overline{n} > 1$ the flow of defectors will stop when all members of group B have switched sides, i.e. $n'_A = 1$. On the other hand, if $n_A > \overline{n}$ no member of group B wishes to switch, and the equilibrium features $n'_A = n_A$. In summary, in an equilibrium with conflict where A is the winner we have $n'_A = \max[n_A, \min(1, \overline{n})]$.

Having determined the equilibrium value of n'_A in the event of a conflict, the two groups decide whether to be at peace or at war. We have:

$$U^p_A - U^w_A = \delta y_A + z\left(1 - \frac{1-\delta}{n'_A}\right)$$

and

$$U^p_B - U^w_B = \delta y_B + z$$

For group B playing war is clearly a weakly dominated strategy, so they'll play peace. It is therefore entirely up to group A to decide, and A will play Conflict if $U^p_A - U^w_A < 0$. We plot this function in Figure 1. $U^p_A - U^w_A$ is increasing because, as the equilibrium value of n'_A (contingent on conflict) increases, the fraction of the population excluded from access to the resource pool z diminishes, so that conflict is less profitable. The peace threshold is

$$\tilde{n}_A = \frac{(1-\delta)z}{\delta y_A + z} :$$

the dominant group A will choose conflict if and only if $n'_A < \tilde{n}_A$. This threshold is increasing in z, falling in the cost of war δ, and falling in the income of the victorious group y_A: the richer group A is, the more it is concerned about the destructive effects of war, δ. A very rich group has much to lose from engaging in conflict. Note that $\tilde{n}_A < 1$.

We are now in a position to use Figure 1 to describe the equilibrium outcome of the ethnic game. If, as depicted in the figure, we have that $\overline{n} < \tilde{n}_A$, then for $n_A < \overline{n}$ there is conflict, and the equilibrium value of n'_A is $\overline{n}$. The size of the dominant group is sufficiently small that members of group B switch, but not in large enough numbers to make conflict unprofitable for the dominant group. For $\overline{n} < n_A < \tilde{n}_A$ there is still conflict, but no switching. The exclusionary benefits of conflict are large enough for the dominant group to seek conflict, but not large enough for members of the weak group to incur the switching cost ϕ. Finally, for $n_A > \tilde{n}_A$ it is just not worth it for the dominant group to exploit the small minority in B. If the configuration is, instead, as depicted in Figure 2, i.e. with $\tilde{n}_A < \overline{n}$: the equilibrium value of n'_A under conflict is at least $\overline{n}$, but for $n'_A \geq \overline{n}$ group A prefers peace.[20]

5.1 Comparative Statics

We now revert to the general case where n_A could be either greater or less than n^*, or group A could be either the dominant or the dominated group. Depending on the configuration of parameters $\phi, \delta, n_A, z, y_A$, and y_B, a country will experience or not an ethnic conflict. We want to know how the "conflict" vs. "no conflict" status changes as these 6 parameters vary.

For the special case in which $y_A = y_B = y$, a convenient tool for investigating this question is Figure 3.[21] Figure 3 measures the exogenous parameters y/z on the horizontal axis, and n_A on the vertical axis. The horizontal line at $n^* = 0.5$ marks values of n_A such

[20] A formal statement of this discussion is that, if $n_A > n^*$ this economy will experience a clash between its ethnic groups if and only if

$$\max\left[n_A, \min(1, \overline{n})\right] < \tilde{n}_A, \tag{10}$$

Because $\tilde{n}_A < 1$, this condition simplifies to

$$\max\left(n_A, \overline{n}\right) < \tilde{n}_A, \tag{11}$$

In case $n_A \leq n^*$ the condition for conflict is:

$$\min(n_A, \underline{n}) > \tilde{n}_B.$$

[21] Because differences between y_A and y_B are essentially unobservable, the assumption $y_A = y_B = y$ will have to be maintained in the emoircal implementation of the model, so the description of comparative statics

that A is dominant (above), or weak (below).[22] Let's focus on the upper sector, where A dominates. The line denoted $\overline{n}$ depicts the function $z/\phi y$. Recall from our previous discussion that, in case of conflict, $n'_A = \overline{n}$ whenever $n_A < \overline{n}$, i.e. the area below the $\overline{n}$ locus is the switching region for members of the oppressed group. The vertical arrows in the picture show this switching. For $n_A \geq \overline{n}$ there is no switching, so the area above the $\overline{n}$ locus is the no switching region. The line denoted $\tilde{n}_A$ graphs the function $(1-\delta)z/\left(\delta y_A + z\right)$. From the previous subsection we know that there is conflict for $n'_A < \tilde{n}_A$, and peace otherwise. hence, the area below the curve is a potential conflict region and the area above the curve is a peace region. The vertical line through $(1-\delta)\phi - \delta$ marks the region where $\overline{n} > \tilde{n}$. To the right of this line there can be no conflict because, as showed by the vertical arrow, equilibrium n'_A always exceeds the value that makes conflict worthwhile for the dominant group. Clearly the area with conflict is the shaded area: here and only here equilibrium n'_A is less than $\tilde{n}_A$. The region of conflict below n^*_A is just the mirror of this region, as now the situation is exactly the same except that B is the dominant group.

Note that the equilibrium combinations of $(n'_a, z/y)$ associated with conflict is just a subset of this region. This region will be the same as the (n_a, z) region minus the triangle formed by the lines $\overline{n}$, $n^* = .5$, and $z/y = (1-\delta)\phi - \delta$, as well as the mirror of this triangle across the $n^* = .5$ axis. This region of conflict resembles pacman.

Examination of this figure reveals that the configuration of parameters under wich a conflict will take place features:

- Intermediate values of n_A.
- Large values of ϕ.

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in the text is the relevant one for empirical purposes. A more general, formal statement for the case where y_A and y_B differ can be based on the indicator function $C(\phi, \delta, n_A, z, y_A, y_B)$ that takes the value of 1 when parameters are such that conflict takes place, and 0 otherwise. From the discussion in the previous section we can write C as

$$C = I(n_A \leq n^*)I(\underline{n} > \tilde{n}_B)I(n_A > \tilde{n}_B) + I(n_A > n^*)I(\overline{n} < \tilde{n}_A)I(n_A < \tilde{n}_A)$$

or, in terms of the underlying parameters,

$$\begin{aligned} C = {} & I\left(n_A \leq \frac{y_B}{y_A + y_B}\right) I\left[\frac{\delta y_B + z}{(1-\delta)\phi y_A} < 1\right] I\left[\frac{\left[\delta y_B + z\right](1-n_A)}{(1-\delta)z} < 1\right] \\ & + I\left(n_A > \frac{y_B}{y_A + y_B}\right) I\left[\frac{\delta y_A + z}{(1-\delta)\phi y_B} < 1\right] I\left[\frac{\left(\delta y_A + z\right)n_A}{(1-\delta)z} < 1\right] \end{aligned} \quad (12)$$

where $I(x)$ is 1 when x is true and zero otherwise. Note that if A is the winner, if $z/n_A > \phi y_B$ the "binding" condition for conflict is $\overline{n}_A < \tilde{n}$, while if $z/n_A < \phi y_B$ the binding condition is $n_A < \tilde{n}$. The intuition is that if $z/n_A > \phi y_B$ the rewards from defecting at $n'_A = n_A$ outweigh the costs, so the relevant equilibrium value of n'_A is $\overline{n}$, while of the cost of defecting are larger the relevant value is n_A.

[22] $n^* = 0.5$ because $y_A = y_B$.

- Low values of δ.
- Intermediate values of z/y.

For very low and very large values of n_A a conflict would generate too modest a reduction in the number of claimants to the country's wealth for the prospective winner to experience a net gain. In the extreme, if $n_A = 0$ or $n_A = 1$ there is no conflict irrespective of other parameters' values.

Declines in ϕ shift the $\overline{n}$ locus and hence the vertical line to the left. For ϕ small enough the rewgion of conflict disappears. As the cost of switching identity falls, the size of infiltrators into the dominant group swells, making conflict less attractive a proposition for the prospective winners. In the limit, if $\phi = 0$, there is no set of other parameters' values such that conflict takes place, as all the losers will for sure defect from their group. The converse is not true: an infinite cost of switching is not a sufficient condition for conflict to occur. For example, if the destructions of war δ are very large, and/or the (relative) prize of victory z/y is quite small, there will be no conflict irrespective of ϕ.

Increases in δ have very similar effects. For δ large enough we are always in the no-conflict region. Destructive wars are in nobody's interest. Indeed, there is always a neighborhood of $\delta = 1$ such that conflict does not take place, irrespective of other parameters' values.[23]

Increases in z/y have non-monotonic effects: for z/y low and high, we are in the peace region, while for z/y taking intermediate values we are (potentially, i.e. depending on n_A) in the conflict region. Ceteris paribus, a larger z/y makes conflict more attractive to the party that stands to gain. At the same time, however, for a member of an exploited group the incentive to defect also increases with the relative size of the resources to be distributed. z/y must be high enough to motivate the dominant group to exploit, but not so high to motivate the members of the exploited group to infiltrate in mass.

It is very important to stress that for *all* variables the threshold values that trigger conflict are defined in terms of the other variables in the model. For example, the lower δ the lower the required threshold for ϕ. While this complicates the formal statement of the results, we believe it has important empirical implications that can be exploited to test the model. For example, consider the potential inverted-U shaped pattern that the theory predicts for the effect of variation in z/y on the peace-vs.-conflict status of a country. the upper threshold is clearly increasing in ϕ and, indeed, if $\phi = \infty$ then the relationship between z and conflict

[23]As a technical detail, unlike in the case for ϕ, the opposite *is* true: when $\delta = 0$ conflict is a weakly dominant strategy for the stronger group: they can do no worse than with peace, and we should therefore always observe war. This is a discontinuity, however: for any $\delta > 0$ if, say, ϕ, is low enough war is no longer an equilibrium. Clearly $\delta > 0$ is the empirically relevant case.

status becomes monotonic: since switching identity is prohibitively expensive, the deterrent effect of switching does not counter-balance the incentive to fight for a larger z. Hence, one test of the model is whether we find the predicted inverted-U shape for low values of ϕ but not at high values. We are working on this.

6 Coalitions of Coalitions

We have argued that an ethnic group is a coalition of individuals intent on excluding other members of the population from sharing in the consumption flow from society's assets, using ethnic traits as a tool to enforce coalition membership. In this section we generalize the analysis of the previous section to the case of coalitions of ethnicities, which arises when there are more than two potential ethnic groups. This generalization essentially preserves the basic message from the two-group case.

Let us say then that there are I groups. Each group is characterized by its per-capita income, y_i, and relative group size, n_i. Furthermore, each *pair* of groups i, j is characterized by a switching cost $\phi_{i,j}$, which is the cost of switching identity from i to j. We continue to assume that $\phi_{i,j} = \phi_{j,i}$. The game is modified as follows. In a first stage ethnicities engage in cost-less search for potential coalition partners. Each ethnicity enters into the coalition that (weakly) maximizes its members' welfare, among the coalitions that are willing to accept it. In a second stage, coalitions decide whether to engage in conflict with other coalitions. Conflict results in a division of the excludable resource z according to the rule g_c, where g_c is the share accruing to coalition c, and a function of the profile of per-capita incomes y_i and groups sizes n_i. Sticking with the "winner-take-all" approach we assume that

$$g_c = \begin{cases} 0 & \text{if} \quad \sum_{i \in c} y_i n_i \leq \sum_{i \notin c} y_i n_i \\ 1 & \text{if} \quad \sum_{i \in c} y_i n_i > \sum_{i \notin c} y_i n_i \end{cases} . \tag{13}$$

Once conflict is over individuals choose whether to change their identity, and become members of an other ethnic group. We assume that all members of a coalition share equally in the coalition's share of z.

Given our assumption on g_c it is clear that there is no point in building a coalition c that does not satisfy the condition $\sum_{i \in c} y_i n_i > \sum_{i \notin c} y_i n_i$, and that if one coalition that satisfies this condition exists, there can be no others. Hence, if a conflict arises it will be a conflict waged by one "winning" coalition against all other groups. For each possible winning coalition c there is an ex-post profile of group sizes $n'_{i,c}$, and corresponding utility profiles U_i^w. There is conflict is there exists *any* coalition c that is winning, and such that all the ethnicities that participate in c are better off with than without conflict. If conflicts arises, then the winning coalition is "minimal," in the sense that – among the coalitions satisfying

$\sum_{i\in c} y_i n_i > \sum_{i\notin c} y_i n_i$, it is the one such that $\sum_{i\in c} n'_{i,c}$ is the smallest.

Importantly, it is not necessarily the case that all members of this minimal winning coalition are better off with conflict than without. To see this, consider what happens if there exists an alternative winning coalition whose members would all be better off with conflict. Members of the minimal winning coalition that are *not* members of this alternative coalition will be losers. Foreseeing this, they choose to invite the potential members of the minimal winning coalition to join them and wage conflict in order to preempt the formation of the alternative coalition.

In order to analyze the equilibrium one can proceed recursively as follows. First, identify the minimal winning coalition, as defined above. For each member j of the minimal winning coalition, the peace-conflict utility differential is given by the function

$$U_j^p - U_j^w = \delta y_j + z\left(1 - \frac{1-\delta}{\sum_{i\in c} n'_i}\right). \tag{14}$$

On the other hand, for each ethnicity j not in the minimal winning coalition the gains from switching are given by the function

$$G_j = (1-\delta)\left(\frac{z}{\sum_{i\in c} n'_i} - \phi_{j,c} y_j\right). \tag{15}$$

In equation (15) we define $\phi_{j,c}$ as the cost for members of group j of assimilating to the winning-coalition member "closest" to group j, in the sense that $\phi_{j,c} = \min\{\phi_{j,i}; i \in c\}$.

In Figure 2 we plot against $\sum_{i\in c} n'_i$ the families of curves defined by (14) and (15). There is one (14) curve for each ethnicity in the minimal winning coalition; and one (15) for each ethnicity not in it. The (14) curves – which are all upward sloping – are indexed by y_j, the per-capita income of the coalition members: the higher y_j the more to the left the peace-conflict utility differential curve: richer groups need a smaller coalition size in order to be induced to engage in conflict. The (15) curves – all downward sloping – are indexed by the cost of switching $\phi_{j,c} y_j$: the larger this cost, the more to the left the gain-from-switching curve: losers with high switching costs require a small size of the winning coalition to be induced to join it.

Let us define $\underline{n}_c$ and $\overline{n}_c$ the cutoffs of the lowest and highest gain-from-switching curves depicted in Figure 2. If initially we have $\sum_{i\in c} n_i > \overline{n}_c$, then no member of any of the losing groups wishes to switch, and we have $\sum_{i\in c} n'_i = \sum_{i\in c} n_i$. If, instead, $\sum_{i\in c} n_i \leq \overline{n}_c$, then we have $\sum_{i\in c} n'_i \in [\max(\sum_{i\in c} n_i, \underline{n}_c), \overline{n}_c]$. The reasoning is this: if $\sum_{i\in c} n_i < \underline{n}_c$ then at the initial group sizes all members of all groups wish to switch identity. The equilibrium cannot be less than $\underline{n}_c$ because somebody would continue to switch. However, the switching does not necessarily continue all the way to $\overline{n}_c$ because the economy may run out of potential switchers. In particular, if the population excluded from the winning coalition belongs mostly to ethnic groups whose gain-from-switching function is far to the left, then the equilibrium value of $\sum_{i \in c} n'_i$ may be fairly close to $\underline{n}_c$. Define n^*_c this equilibrium value of $\sum_{i \in c} n'_i$ contingent on winning coalition c waging a conflict.[24]

Now take n^*_c as given, and consider the coalition's decision to engage in conflict. Define $\tilde{n}_c$ the lowest of the cutoffs of the peace-conflict utility differential curves: $\tilde{n}_c = \min\{\tilde{n}_i; i \in c\}$. If $n^*_c < \tilde{n}_c$ then all the members of the minimal winning coalition prefer conflict to peace, and conflict ensues. As discussed above, however, $n^*_c > \tilde{n}_c$ is not a sufficient condition for peace: there may be other winning, albeit not minimal, coalitions all of whose members would be better off under conflict. To check for this, it is necessary to repeat the analysis of Figure 2 for all possible winning coalitions. If one coalition c' is found such that $n^*_{c'} < \tilde{n}_{c'}$ then conflict will take place. Since, conditional on conflict taking place, it is always better to be among the winners, foreseeing that conflict will take place anyway, all members of the minimum winning coalition chose to initiate a conflict. Hence, an important difference between the two-group and the multiple-group cases is that in the multiple-group case even groups that would prefer peace to conflict may decide to fight an ethnic conflict, if by doing so they can preempt the formation of an alternative belligerent winning coalition.

How does this analysis affect the list of conditions that are necessary for a conflict? It is useful to start from the case where $y_i = y$ for every i, and $\phi_{i,j} = \phi$ for every i, j. Then, the two families of curves in Figure 2 collapse into one curve each, as in Figure 1, and the minimum winning coalition c is just the smallest coalition whose membership exceeds 50% of the population. This minimum winning coalition will prefer conflict under the exact same conditions under which a single ethnic group would choose conflict in the two-group case. Furthermore, note that equality of incomes and equality of switching costs imply that if the minimum winning coalition does not gain from conflict, then no other coalition does. Hence, in this special case the set of necessary conditions to observe conflict is the exact same as the one with which we concluded the previous section, except that n_A is replaced by $\sum_{i \in c} n_i$.

With income and switching-cost heterogeneity the predictions become considerably more complex. For example, with income heterogeneity the minimum winning coalition may be composed of less than 50% of the population. Because what matters for the incentive to fight is ex-post group size, with switching-cost heterogeneity the minimum winning coalition may not be the coalition with the ex-ante smallest number of members. If one had complete data on the profile of y_is and $\phi_{i,j}$s, one could use the model to predict what the minimum winning coalition would be and whether conflict would ensue. Without that information such 'structural' estimation is unfeasible. For now we therefore stick to the basic predictions of

[24]There is an implict assumption in this discussion that members of the group with the greatest gain from switching will switch first, those with the second-largest gain will switch second, and so on. The equilibrium value of n^*_c is sensitive to this assumption.

the two-group model, as amended to allow for a minimum winning coalition.

7 Empirical Evidence

In this section we take a preliminary look at some data on the incidence of ethnic conflict in countries characterized by different values of (proxies for) n_A and z. We are trying to collect additional data on ϕ, y_A, and y_B so as to extend the reach of our empirical investigations.

7.1 Data

Gurr and Harff (1997) collect data on internal conflict for a large sample of countries between 1954 and 1997. They use a four-fold taxonomy for their conflicts: Ethnic Wars, Revolutionary Wars, Abrupt or Disruptive Regime Changes, and Genocide/Politicides. Here are the codebook's definitions: "Ethnic wars are episodes of violent conflict between governments and national, ethnic, religious, or other communal minorities (ethnic challengers) in which the challengers seek major changes in their status;" "Revolutionary wars are episodes of violent conflict between governments and politically organized groups (political challengers) that seek to overthrow the central government, to replace its leaders, or to seize power in one region;" "Adverse (sic) or disruptive regime transitions are defined as major, abrupt shifts in patterns of governance, including state collapse, periods of severe elite or regime instability, and shifts away from democratic toward authoritarian rule. Abrupt but nonviolent transitions from autocracy to democracy are ... not included; "Geno/politicide is the promotion, execution, and/or implied consent of sustained policies by governing elites or their agents – or in the case of civil war, either of the contending authorities – that result in the deaths of a substantial portion of a communal group or politicized non-communal group." There are quantitative criteria for a conflict to be included in the data set: for example, ethnic and revolutionary wars must mobilize 1000 or more people on each side "(armed agents, demonstrators, troops)," and kill an average of 100 or more people per year. In the appendix we reproduce the "List of Episodes" from the Gurr and Harff data set.

It is abundantly clear from the definitions that none of these measures – nor combinations of them – maps perfectly in what we call "a conflict" in the model. We believe the closest choice is to combine "ethnic war," "genocide/politicide," and "revolutionary wars," and our preliminary results below are based on this variable. It is clear, however, that there is much noise in our dependent variable. On the other hand, we should also notice that similar explorations using "ethnic" alone; or "ethnic" and "genocide/politicide" gave qualitatively similar preliminary results. The conflict variable thus constructed varies over time and across countries. We further aggregate over time, so that our dependent variable, C_i, takes the value of 1 if, country i ever experienced at least one conflict between 1954 and 1997, and zero otherwise.[25]

For relative group sizes we rely on data collected by Alesina et al. (2002), who have combined information from three sources: Encyclopedia Britannica, CIA Factbook, and Ethnologue. For each country, the Alesina et al. data set reports the percentage in the total population of each ethnic group present within the country's borders. It goes without saying that there is an abundant measure of subjectivity in defining ethnicity, so these measures of relative group sizes are only as good as the authors of the three background sources' judgment. Somewhat reassuringly, it seems that Alesina et al. have found that the three sources tend to be highly consistent.

There are many conceivable measures of the size of the expropriable economic resources, z, that form the object of the potential conflict. Here we follow previous authors, such as Collier and Hoeffler, in mainly focussing on the share of primary commodity exports in GDP, as drawn from the World Bank's World Development Indicators data set. Specifically, for each country we use the post-1960 average (for most countries 1960 is the earliest year with available data).We have also looked, with similar results, at the share of the mining sector in GDP, as reported in United Nations (1985, 1995, 2000).

7.2 A Cross-Tabulation and a Regression

Our model has especially sharp empirical predictions for the special case in which there are only two ethnic groups in the country. In order to begin exploring the model's consistency with the data, therefore, we start by focussing on a sub-sample of countries that closely approximate this special case. In particular, we work with countries that satisfy one or both of the following two criteria: (i) the two largest groups account for at least 90% of the population; and/or (ii) the largest group accounts for at least 50% of the population. The first criterion closely matches the idea of isolating countries wit (for practical purposes) only two groups. The second criterion is essentially meant to increase sample size, and it can be loosely justified on the basis of the multiple-group model. When one group exceeds 50% of the population, but the largest two groups do not exceed 90%, it is highly likely that the minimum winning coalition will be the one constituted by the largest group with no additional allies. This makes these countries for all practical purposes indistinguishable from

[25] An alternative widely used data set on civil wars is Singer and Small (1994), which varies somewhat from Gurr and Harff (1997) in coverage and in criteria for inclusion. In general, the Singer and Small data set appears to be more demanding – it implies fewer conflicts – but it is hard to say on an ex-ante basis that one is better than the other. Fortunately, when we use Singer and Small for the empirical exercise described below we obtain very similar results.

those with only two groups. Applying these criteria we obtain a sample of 110 countries.[26]

Now consider again our list of conditions for conflict in section 5.1. Two of them are:

- Intermediate values of n_A.
- *And* intermediate values of z.

As a preliminary check to see if we are on the right path we ask if countries that match these conditions seem more likely to experience conflict than the others. Define n_1 the relative size of the largest ethnic group. It is clear that n_A will be intermediate when the largest ethnic group is not to large. Hence, these conditions can be rewritten as

- Small values of n_1.
- *And* intermediate values of z.

We perform the following exercise. We classify countries as "small n_1" if n_1 is below the sample median, and high n_1 otherwise. Similarly, we break them down into three $z-$groups: bottom third, intermediate, and top third. We thus have 6 n_1-z cells and we can look at the incidence of conflict, measured as the fraction of countries such that $C_i = 1$, within each of these cells. The results are reported in Table 1 (the numbers in parenthesis are the numbers of countries in the various cells), and are quite consistent with the theory. For the low n_1 group we seem to observe a pronounced inverted-U shaped relationship in z, but no such curve appears in the high-n_1 group.

In order to put standard errors on this result, in Table 2 we repeat basically the same exercise in Probit form. The regression estimates the probability of conflict as a function of a dummy variable that takes the value of 1 if n_1 is below the sample median; a dummy variable for intermediate z; and a dummy variable that interacts the two. In one specification we further control for the log of per-capita income (in 1960). Qualitatively, the coefficient on the interaction term has the predicted sign, but it is barely significantly different from zero – indeed, insignificant when per-capita income is controlled for – unless the interaction term is entered by itself.

However, the predictive power of the model is restored when, instead of using the dummy for n_1 below the median, one uses n_1 directly. The results are displayed in Table 3: countries with intermediate values of z have significantly larger probabilities of conflict, but this effect (significantly) dissipates as n_1 increases.

[26] The first criterion selects 83 countries, and the second ads the remaining 27. The results *are* sensitive to whether or not the second criterion is used: on the sample of 83 countries selected by the first criterion alone we get no significant pattern in the data. The results are not significant, owever, to a 95% threshold on the first criterion.

Table 1: Incidence of Conflict by n_1 and Share of Commodity Exports in GDP

	Size of Largest Group (n_1)	
Primary Commodity Share	Below Median	Above Median
Bottom Third	.42	.24
	(19)	(17)
Middle Third	.62	.24
	(13)	(25)
Top Third	.22	.31
	(23)	(13)

Table 2: Incidence of Conflict by n_1 and Share of Commodity Exports: Probit Version

Probability of Conflict			
Intermediate z	.88	.87	.61
$\times$ Low n_1	(2.33)	(1.59)	(1.063)
Intermediate z		-.08	.13
		(-0.23)	(0.34)
Low n_1		.13	.25
		(0.40)	(0.77)
log(y)			-.46
			(-2.76)
N	110	110	109

8 Conclusions

We have developed a new, simple explanation for ethnic conflict (broadly construed). Our explanation is that ethnicity serves the purpose of enforcing membership into coalitions: the members of the winning group use the physical or cultural differences that separate them from other groups to enforce the exclusion of the losers from sharing into the spoils of the conflict. In ethnically homogeneous societies such ex-post enforcement is much more costly.

The economics literature on ethnic conflict has emphasized relative group size. One implication of our theory is that another key dimension is ethnic group "distance": ceteris paribus, ethnic groups are more likely to clash the more pronounced the differences that mark the ethnic cleavage. We argued that physical differences are probably the most impor-

Table 3: Incidence of Conflict by n_1 and Share of Commodity Exports: Probit Using n_1

Probability of Conflict			
Intermediate z $\times\, n_1$	.13 (0.43)	-4.37 (-2.26)	-3.86 (-1.92)
Intermediate z		3.85 (2.36)	3.50 (2.07)
n_1		1.29 (1.27)	1.45 (1.36)
log(y)			-.46 (-2.77)
N	110	110	109

tant sources of distance, followed by language. Consistent with empirical evidence religion, instead, is not as significant.

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Country	WB code	Confl.	n_1	Comm. Exports	P.C. GDP
Albania	ALB	0	0.95	1.63	3160.25
Antigua and Barb.	ATG	0	0.91	3.73	11596.80
Armenia	ARM	0	0.93	3.95	3106.57
Australia	AUS	0	0.95	6.10	15170.14
Austria	AUT	0	0.99	2.15	12852.59
Bahamas	BHS	0	0.85	74.12	11340.50
Bahrain	BHR	0	0.63	77.55	11077.20
Bangladesh	BGD	0	0.98	0.50	1198.78
Barbados	BRB	0	0.80	0.78	10854.08
Belarus	BLR	0	0.78	3.16	7157.22
Belgium	BEL	0	0.55	6.42	14033.22
Brazil	BRA	0	0.54	1.43	4564.31
Brunei	BRN	0	0.67	70.65	
Bulgaria	BGR	0	0.85	8.59	5742.79
Comoros	COM	0	1.00	0.74	2816.92
Congo	COG	0	0.51	44.71	1501.62
Costa Rica	CRI	0	0.87	1.38	4462.67
Czech Rep.	CZE	0	0.81	4.29	14097.89
Denmark	DNK	0	0.96	2.35	15726.61
Djibouti	DJI	0	0.60	0.34	1525.89
Dominica	DMA	0	0.89	0.27	6171.14
Ecuador	ECU	0	0.55	10.51	3110.33
Estonia	EST	0	0.62	9.08	8006.43
Fiji	FJI	0	0.49	1.02	4043.14
France	FRA	0	0.88	1.35	13630.31
Germany, West	DEU	0	0.95	1.04	9253.09
Ghana	GHA	0	0.52	7.29	1457.70
Greece	GRC	0	0.95	1.82	8122.10
Grenada	GRD	0	0.85	0.11	4470.64
Haiti	HTI	0	0.95	0.18	1145.49
Honduras	HND	0	0.90	2.06	2031.86
Hong Kong	HKG	0	0.95	1.87	13187.26
Hungary	HUN	0	0.92	3.59	8484.72
Iceland	ISL	0	0.96	3.06	14181.84
Ireland	IRL	0	0.94	1.81	8899.45
Italy	ITA	0	0.94	0.92	12466.27
Jamaica	JAM	0	0.76	4.30	3343.15
Japan	JPN	0	0.99	0.22	12450.90
Kyrgyzstan	KGZ	0	0.52	6.39	3297.20
Latvia	LVA	0	0.52	6.53	7296.67
Lithuania	LTU	0	0.80	6.99	7253.50
Macedonia	MKD	0	0.65	7.56	4811.86
Malawi	MWI	0	0.58	0.43	673.22

Country	WB code	Confl.	n_1	Comm. Exports	P.C. GDP
Malaysia	MYS	0	0.59	20.47	4440.30
Malta	MLT	0	0.96	0.49	4331.93
Mauritius	MUS	0	0.68	0.41	6333.71
Mexico	MEX	0	0.60	6.05	5908.02
Mongolia	MNG	0	0.90	34.72	1802.00
Nepal	NPL	0	0.53	0.31	1025.23
Netherlands	NLD	0	0.96	9.00	13988.45
New Zealand	NZL	0	0.88	6.02	13540.15
Niger	NER	0	0.56	10.00	1264.87
Norway	NOR	0	0.99	17.02	14680.82
Panama	PAN	0	0.70	0.59	4086.61
Papua New Guinea	PNG	0	0.84	23.86	3579.41
Paraguay	PRY	0	0.95	2.93	3486.43
Poland	POL	0	0.98	3.39	6359.45
Portugal	PRT	0	1.00	2.23	7233.71
Saint Kitts and Nevis	KNA	0	0.95	0.04	8543.09
Saint Vincent and Grenanda	VCT	0	0.65	0.50	5599.68
Saudi Arabia	SAU	0	0.90	41.21	8930.48
Seychelles	SYC	0	0.89	9.08	6484.74
Singapore	SGP	0	0.76	30.45	12518.82
Slovak Republic	SVK	0	0.86	5.31	10650.75
Slovenia	SVN	0	0.91	3.16	12747.33
Solomon Islands	SLB	0	0.93	16.83	1668.44
Spain	ESP	0	0.72	1.17	9028.10
St. Lucia	LCA	0	0.90	0.12	5082.95
Sweden	SWE	0	0.90	3.84	14867.18
Switzerland	CHE	0	0.65	1.11	20180.18
Tunisia	TUN	0	0.98	6.68	4113.21
Uruguay	URY	0	0.88	2.89	6877.82
Venezuela	VEN	0	0.67	21.46	6752.92
West. Samoa	WSM	0	0.93	0.42	1843.67
Zambia	ZMB	0	0.99	25.39	1532.02
Algeria	DZA	1	0.80	22.43	4489.62
Argentina	ARG	1	0.85	1.04	8752.49
Azerbaijan	AZE	1	0.83	11.49	2728.20
Chile	CHL	1	0.90	14.01	5185.55
China	CHN	1	0.92	1.97	1458.26
Colombia	COL	1	0.58	3.61	3739.27
Croatia	HRV	1	0.78	4.65	8045.75
Cyprus	CYP	1	0.78	1.32	7148.83
Dominican Republic	DOM	1	0.73	0.26	2686.78
Egypt	EGY	1	0.99	5.04	2542.45
El Salvador	SLV	1	0.89	1.35	3933.98

Country	WB code	Confl.	n_1	Comm. Exports	P.C. GDP
India	IND	1	0.72	0.65	1264.10
Iran	IRN	1	0.51	12.80	4091.52
Iraq	IRQ	1	0.77	35.08	4393.37
Israel	ISR	1	0.82	1.13	9896.29
Jordan	JOR	1	0.98	6.55	3569.42
Liberia	LBR	1	0.95	40.46	912.70
Moldova	MDA	1	0.64	0.92	2631.00
Morocco	MAR	1	0.99	4.13	2616.35
Nicaragua	NIC	1	0.69	2.82	3457.55
Oman	OMN	1	0.74	32.16	6939.46
Philippines	PHL	1	0.92	2.27	2621.80
Romania	ROM	1	0.89	3.56	3626.44
Rwanda	RWA	1	0.90	0.99	990.95
Somalia	SOM	1	0.98	1.21	891.37
South Africa	ZAF	1	0.75	4.36	6569.00
South Korea	KOR	1	1.00	1.23	5309.61
Sri Lanka	LKA	1	0.74	3.51	2030.24
Sudan	SDN	1	0.52	2.83	847.39
Syria	SYR	1	0.90	12.47	2742.59
Thailand	THA	1	0.75	2.54	2799.92
Turkey	TUR	1	0.80	1.00	4355.75
United Kingdom	GBR	1	0.94	3.00	13319.71
United States	USA	1	0.83	0.67	19362.00
Zimbabwe	ZWE	1	0.71	5.27	2484.76

Fig. 1: Determination of the Equilibrium

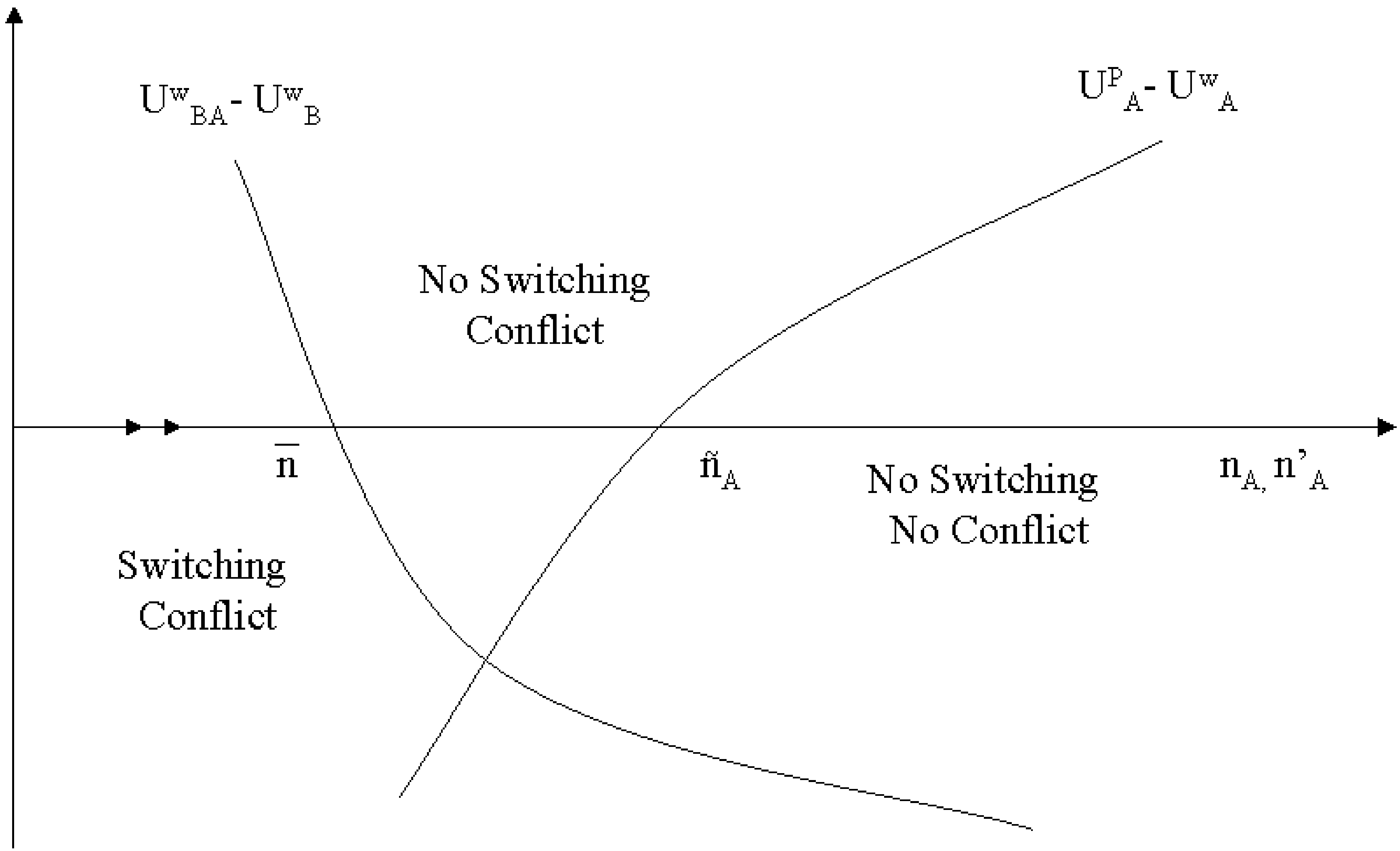

Fig. 2: Region of Ethnic Conflict