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ABSTRACT

We present a theory of ethnic conflict in which coalitions formed along ethnic lines compete for the economy's resources. The 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 implications of the model relating social, political, and economic indicators such as the incidence of conflict, the distance among ethnic groups, group sizes, income inequality, and expropriable resources.

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1 Introduction

In many countries and many periods a person's ethnic identity has profound consequences for his or her physical safety, political status, and economic prospects. Violent confrontation along ethnic lines is the most apparent form of ethnic conflict, and recently has claimed 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, Belgium, and countless other countries rent seeking on behalf of one's ethnic group crowds out productive activities, and the threat of violence discourages investments in human and physical capital. Elsewhere, the rent seeking from a dominant group takes the form of exploitation and discrimination against the minorities: examples of this kind are Algeria, Malaysia, several Latin American countries with indigenous populations, the Baltic countries, and, some would say, the United States.

The goal of this paper is to lay out a possible explanation for ethnic conflict, and for its variation across countries *and over time*. The explanation is as follows. Each society is endowed with a set of wealth-creating assets, such as land and mineral resources. There is therefore an incentive for agents to form coalitions to wrest control of these assets from the rest of the population. Once a coalition has won control over the country's riches, however, it faces the task of enforcing the exclusion of non-members. In particular, agents not belonging to the winning coalition will attempt to infiltrate it, so as to participate in the distribution of the spoils. For example, they will apply for land titles, or for government jobs. Of course this infiltration defeats the winning coalition's purpose, as it dilutes the "dividend" each original member receives. In large communities of millions of citizens it can be quite costly to keep track of the genuine members so as to successfully discriminate against the non-members.

Our key idea is that, if the population is ethnically heterogeneous, coalitions can be formed along ethnic lines, and ethnic identity can therefore be used as a marker to recognize potential infiltrators. By lowering the cost of enforcing membership in the winning coalition, ethnic diversity makes it less susceptible to *ex-post* infiltration by members of the losing one. Hence, from the perspective of a "strong" ethnic group, i.e. a group that is likely to prevail in a conflict, a bid for a country's resources is an *ex-ante* more profitable proposition than it would be for an equally strong group of agents in an ethnically homogeneous country. Without the distinguishing marks of ethnicity, this group would be porous and more subject to infiltration. *Ceteris paribus*, then, we should observe more conflict over resources in ethnically heterogeneous societies, which is the fact we set out to explain.[1]

[1]Hence, we are clearly not saying that conflict will *only* arise in societies with deep ethnic divides. If the

An important 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 highly infiltration proof, as such physical differences offer very low-cost devices to detect "passers." Differences in religion or in language are not as effective, as potential infiltrators can assimilate through conversion or by learning the language. While in the short run these forms of assimilation can be quite costly to the passer, 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; they can generally be overcome in the span of one or two generations. 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 rise 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. One of our contributions, however, is to stress that a second dimension, distance, or the cost of distinguishing members from non-members of 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.[2]

Aside from the role of ethnic distance, our theory brings out several additional insights. Some of the implications of our theory allow us to explain why, for a given ethnic structure of the population, conflict waxes and wanes over time. The key state variable is the weight of "expropriable" assets – assets that can be captured by a coalition – in the total productive assets of the economy. For example, land and mineral resources are inherently

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 where 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.

[2]Another source of distance is of course geography. Our model applies equally well to groups that form based on the geographical base of their membership. When one group's army enters a city in enemy territory its soldiers can be pretty confident that the overwhelming majority of the civilians they encounter belong to the enemy group. Hence, our theory of conflict among geographically separated groups is isomorphic to our theory of ethnically distant groups, and one may therefore be able to use our model, together with the relevant state variables as explained in the next paragraph, to explain changes over time in the intensity of inter-regional (and perhaps even international) conflict.

more "expropriable" than physical and human capital, which can be protected from expropriation through underinvestment. In our model an increase in the share of expropriable assets has two opposing effects on the intensity of conflict. It increases the "prize" to be gained by the winning group, and hence its incentive to seek conflict. But it also increases the incentive for the losers to pass into the winning group, enhancing the dilution effect from infiltration, and thus reducing the incentive for conflict by the prospective dominant group. In our model the net effect turns out to be inverted-U shaped, with conflict intensity being maximized for intermediate levels of the expropriable-resource share in total wealth. Since the resource share of wealth changes over time, both as a consequence of long-run growth, and as a consequence of economic shocks, so will the intensity of ethnic conflict. We discuss various examples at the end of the paper.

Another theme that emerges from the analysis of our model is the importance of preemption. In a two-group world the following interesting tension arises: the largest group is more likely to have the strength and resources to win in an outright conflict, but the minority may have the strongest incentives to attempt to gain the upper hand. This is because the smaller the group that seizes a country's resources, the greater the per-capita gain. Hence, a majority that would otherwise prefer peaceful coexistence, engages in repression and discrimination against the minority in order to prevent the latter from attempting a grab for power.[3]

Our theory is developed formally in Sections 3-4. Section 3 sets out a basic model of exploitation with two ethnic groups, that captures the basic idea of ethnic distance and highlights the non-monotonic role of expropriable resources. Section 4 discusses an extension which distinguishes between two types of conflict: exploitation of one group at the hands of the other, and open conflict between the two groups. Here the issue of preemption first comes up. Section 5 applies our model to understanding a number of historical examples that we think our theory sheds light on, including Black-White relations in the United States, South Africa, and Zimbabwe; Hutu-Tutsi relations in Rwanda and Burundi; Muslims and Hindus in India; men and women everywhere; and others. Before presenting the formal theory, we discuss the relationship of our paper with the existing literature in Section 2.

2 Related Literature

Several authors in political science and (more recently) economics have proposed explanations for the salience of ethnicity in politics and/or social conflict. Some examples include Bates

[3]Similarly, in a previous version of this paper we showed that in a multi-group world, 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.

(1983), Hardin (1995), Fearon (1999), Fearon and Laitin (2000), Berman (2000, 2003), Chandra (2003), and Glaeser (2005). We do not attempt a review of this literature here because the ideas featured there are many but mostly quite different from ours. Broadly speaking we view our contribution as complementary to the existing ones. The closest antecedent is Fearon (1999), who asks why ethnic politics and politics centered around the distribution of "pork" often tend to go together, and 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. Our paper also contributes to the closely related literature on formal models of social conflict, thereby adding to previous work by Grossman (1991, 1999), Hirshleifer (1995), Azam (1995, 2001), Esteban and Ray (1999), McDermott (1997), Gershenson and Grossman (2000), Grossman and Mendoza (2001), and others.[4]

On the empirical side Collier and Hoeffler (2001) present a battery of 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. Also, again as predicted by our model, 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. Using droughts as an exogenous source of income shocks, Miguel et al. (2004) also find that economic conditions impact the probability of conflict.[5]

The empirical literature previous to our paper has overlooked the role of ethnic distance, which is central to our contribution. However, two very recent contributions by Guiso, Sapienza, and Zingales (2004), and Spolaore and Wacziarg (2005), look at some economic consequences of "genetic distance," as measured by the frequency of certain alleles in various populations. While genetic distance is not the same thing as ethnic distance (most

[4]Needless to say our paper is closely inspired by a vast anthropological literature documenting (i) the porosity of many ethnic "borders," and (ii) the variability over time and across countries in the salience of ethnic cleavages for societies with relatively constant ethnic structures. Among the classics in this literature are Barth (1969), Anderson (1983), and Horowitz (1985).

[5]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 [examples include Mauro (1995), Easterly and Levine (1997), Miguel and Gugerty (2002), Alesina, Baqir, and Easterly (1999), Alesina and La Ferrara (2000), and Alesina et al. (2002). See Collier (2001), and Alesina and La Ferrara (2004) for surveys.] We think broadly of this literature as being mostly concerned with the consequences of conflict, while our contribution is more focused on the causes.

genetic differences do not lead to visible, or phenotypic, differences), this is certainly a step in the right direction.[6] For similar reasons our contribution is also strongly supportive of work attempting to account for the attributes of different groups into summary measures of heterogeneity and polarization in the population [Esteban and Ray (1994), Montalvo and Raynal-Querol (2005), Bossert et al. (2005)]. These studies start out by criticizing simple measures of inequality and/or fractionalization, and proceed to construct richer indicators that combine information on relative group sizes and perceived differences.

Finally, there are complementary experimental contributions with many results consistent with the spirit of our model. Habyarima et al. (2005) find that agents make both type I and type II errors in assessing whether other individuals belong to certain groups. Second, the degree of ethnic identifiability varies across group pairs, indicating that some bilateral cleavages are more porous than others. Third, given the right incentives members of some groups can send signals to members of other groups that fool them into mistakenly accepting them as members of their own. Again, the success of these attempts at "passing" varies across group pairs. Experimental evidence also confirms humans' reliance on visual cues in coalition formation: Kurzban, Tooby, and Cosmides (2002) found that experimental subjects tend to classify individuals by race when there are no other visual markers to rely on, but when other markers are added, such as, for example, one of two basketball team jerseys, observers become equally likely to switch to the new visual markers as to continue using race. Of course from our point of view it is critical that outside of the experiment people can change shirt color but not skin color.

3 A Model of Exploitation

3.1 Assumptions

We study a society populated by individuals belonging to one of two ethnic groups, A or B, of size N_A and N_B, respectively. 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. One may loosely think of y_A as human capital. In addition, society is endowed with aggregate resources that generate an income stream of Z, to be distributed among the population. Z could be the rental value of land, mineral resources, or any other endowment that is valuable to a country.

We will assume that one of the two groups is "stronger." In particular, one of the two

[6] The distinction between genetic and ethnic distance may become less relevant in the future due to changes in biotechnology. Dando (2004) argues that RNA technology can now potentially be used militarily to shut down specific mutations of important genes that are known to be prevalent in certain populations.

groups has the option of taking hold of the common resource Z, and exclude the members of the other group from enjoyment in it. We have in mind that one of the two groups has greater fire power and can impose an exploitation regime on the other. In many cases the stronger group will be the ethnic majority, i.e. the group with larger N_i. However, in some cases ethnic minorities may be stronger if they can mobilize greater resources per capita, or equivalently have greater human capital (e.g. South Africa during Apartheid). Without loss of generality we assume that A is the stronger group.[7]

Exploitation is costly. If group A decides to seize power, a fraction δ of all the country's resources is lost. There are several possible interpretations of the conflict cost δ. It could represent the cost of the repressive apparatus needed to enforce the exploitation of group B. It can also represent the deadweight cost of discrimination. For example, exploitation may call for excluding talented members of group B from administrative and managerial posts (and having to search further down the talent distribution of group A to replace them). Net of this cost, conflict results in a reallocation of the common resource Z to group A, with the *ex-post* (i.e. end-of-game) members of the group sharing equally in it. If group A decides *not* to seize power, Z is divided equally among all citizens. We will sometimes refer to the two possible actions taken by group A as C (conflict), and P (peace).[8]

Group A's conflict or peace decision takes up the first stage of the game. In the second stage, members of the weaker group decide whether to keep their ethnic identity, or to "switch" and join the majority.[9] Switching identity involves a proportional income loss of ϕ. There are many interpretations for ϕ. At the simplest level, changing ethnic group may involve considerable loss of ethnicity-specific human capital. For example, one may have to sacrifice business contacts, or leave a profession that has an ethnic connotation to it. Changing identity may also involve geographical relocation to an area where one's ancestry is not known, with attendant further loss of business contacts or location-specific human capital. It may also involve some kind of primitive surgery, the payment of bribes to counterfeit identification documents or change names, payments to families of other groups in

[7] We could formalize the definition of stronger by saying, for example, that group i is stronger if its aggregate wealth is greater, i.e. $y_i N_i > y_j N_j$, but since the formal definition of "stronger" plays no role in the subsequent analysis we leave other possibilities open.

[8] Because all of the members of group A are identical, almost all rules to aggregate preferences will give rise to the same decision as of whether to exploit or not to exploit group B, as long as the spoils are shared equally among group A's members. In turn, the equal-sharing option would be the natural choice on a "behind the veil of ignorance" basis.

[9] It will be obvious below that members of the stronger group never switch identity in this simple version of the model. We explore later a richer model where group B can "fight back," or even attempt to exploit group A. In that model, members of group A may also wish to "switch" - at least in some of the off-equilibrium paths.

order to marry (one's children) into them, etc. All these costs are likely to have a component that is proportional to one's income. Finally, there are the obvious psychic costs. A key idea in the paper is that all of these costs vary depending on the nature of the ethnic distinction (race, religion, skin color, etc.). For example, it is far more costly for a person with very dark skin to pass himself off as white than for a low-caste Hindu to become Catholic. We therefore assume that ϕ can vary continuously from zero (to capture a completely homogenous country) to infinity.[10]

Identity switchers cannot be separately identified from original members of the group. The numbers of ex-post members of the two groups are denoted N'_A and N'_B. N'_A is equal to N_A plus the number of initial members of group B who switched 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.

Society can be characterized by the initial group-sizes N_A and N_B, non-expropriable endowments y_A and y_B, aggregate resources Z, switching cost ϕ, and exploitation-cost parameter δ. Given these characteristics, group A decides collectively whether or not to engage in conflict, and individuals of group B choose their ethnic identity, giving rise to N'_A and N'_B.

3.2 Equilibrium

Consider the first-stage decision by group A whether or not to exploit group B. If A decides for peace (action P) its per-capita payoff is simply

$$U_A^P = y_A + z, \tag{1}$$

where $z \equiv Z/N$. I.e., members of group A have complete access to their initial endowment, as well as to the common resource Z, which is divided equally among all members of society. If instead, they decide to seize control of Z (action C) their payoff is

$$U_A^C = (1-\delta)\left[y_A + \frac{z}{n'_A}\right], \tag{2}$$

where $n'_A \equiv N'_A/N$. Hence, conflict leads to the loss of δy_A units of the individual endowment as well as δZ units of the collective good. On the other hand, through action C group A obtains full control of the natural resource. This amount is divided equally among the final membership of group A, n'_A.

[10] An alternative way to introduce ethnic distance in the model would be to assume that the exploiting group faces a certain cost of policing the ethnic boundary, and that this cost is decreasing in ethnic distance. We don't think any of the qualitative results wuld be affected by this choice.

It is clear by comparing the last two expressions that group A's decision as to whether or not to play C depends on the equilibrium response of n'_A if it does so: the greater the expected ex-post size of group A in the event of a conflict, the less likely group A is to seek it. For example, it is immediately apparent that there will be no equilibria where a conflict induces *all* of the members of group B to switch identity: with $n'_A = 1$ we have $U_A^C = (1-\delta)[y_A + z]$, which is certainly less than U_A^P. More generally, by comparing equations (2) and (1), we see that group A will seek to exploit group B if and only if $n'_A < \tilde{n}$, where

$$\tilde{n} \equiv \frac{(1-\delta)z}{\delta y_A + z}.$$

This "exploitation threshold" is increasing in z, falling in the cost of exploitation 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 exploitation. A very rich group has much to lose from engaging in conflict. Note that $\tilde{n} < 1$.

In case of conflict each member of group B decides his ethnic identity.[11] If he switches to group A he receives utility

$$U_B^S = (1-\delta)\left[(1-\phi)y_B + \frac{z}{n'_A}\right],$$

where the first term in the square bracket reflects the cost of changing identity and the second term is the gain represented by access to resources seized by group A. Since there is exploitation all resources are net of the cost δ. If he sticks to his original identity his utility is

$$U_B^{NS} = (1-\delta)y_B.$$

The pro of switching is that it allows the switcher to retain access to the common resource. The con is that one has to pay the switching cost.

Note that the gain from switching is large if n'_A is small, and small if n'_A is large. For low values of n'_A the gains from defecting to the winners are relatively large, as the spoils of exploitation are divided among few people. As n'_A increases an infiltrator's share falls, and so does the incentive to switch. Hence, switching by some reduces the incentive for further switching by others. Indeed, for n'_A large enough gaining access to z is not a sufficient compensation for the switching cost, and the net incentive to switch may become negative. In particular, we have that members of group B switch as long as $n'_A < \overline{n}$, where

$$\overline{n} \equiv \frac{z}{\phi y_B}.$$

[11] It should be obvious that there is no switching by members of group B if there is no conflict (they would pay the switching cost, but gain nothing).

The "switching threshold" $\overline{n}$ is increasing in the spoils of conflict z (the bigger the pie, the larger the number of people one is willing to share it with), and decreasing 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 pie to share is just too large relative to the cost of changing sides).

The equilibrium value of n'_A in the event of a conflict depends on the relative positions of the initial group size n_A and the switching threshold $\overline{n}$. If $n_A < \overline{n}$, and a conflict occurs, citizens of group B will start switching to A. If $\overline{n} < 1$ 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 $n_A > \overline{n}$ there are already "too many" people in group A to start with, and no member of group B wishes to switch. The equilibrium in this case features $n'_A = n_A$. In summary, if the dominant group A seeks to exploit group B, we have $n'_A = \max[n_A, \min(1, \overline{n})]$.

Recall now that group A seeks to exploit group B if it does not expect too much switching in response, i.e. if $n'_A < \tilde{n}$, where $\tilde{n}$ is the "conflict threshold." We therefore have conflict if $\max[n_A, \min(1, \overline{n})] < \tilde{n}$. Recall also that $\tilde{n} < 1$ (A never engages in conflict if, in the event of conflict, everyone switches to A), so there can never be conflict if $\bar{n} \geq 1$. This allows us to simplify the condition for conflict to

$$\max(n_A, \overline{n}) < \tilde{n}. \tag{3}$$

We summarize this discussion with the following

Proposition: *Group A exploits group B if and only if (3) holds. If, furthermore, $n_A < \bar{n}$, then there is switching from B to A, and $n'_A = \bar{n}$. Otherwise $n'_A = n_A$.*

If $n_A < \overline{n} < \tilde{n}$, then 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 $\overline{n} < n_A < \tilde{n}$ 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. For $n_A > \tilde{n}$ it is never worth it for the dominant group to exploit the small minority in B. Finally, if $n_A < \tilde{n}_A < \overline{n}$, group A would love to take control of Z if its ex-post size was the same as its ex-ante one, but it expects too much switching in equilibrium, so it does not attempt it.

3.3 Comparative Statics

Depending on the configuration of parameters $\phi, \delta, n_A, z, y_A$, and y_B, a country will or will not experience an ethnic conflict. We want to know how the "exploitation" vs. "no exploitation"

status changes as these 6 parameters vary. However, notice that all the choices in the model depend on bilateral comparisons of functions that are additively linear in the ys and in z. Hence, among y_A, y_B, and z, there are really only two "independent" parameters: $z/y_A \equiv z_A$ and $z/y_B \equiv z_B$. These z's are inverse measures of each group's non-expropriable wealth, scaled by the abundance of expropriable resources. Accordingly, our comparative statics focus on the five parameters ϕ, δ, n_A, z_A, and z_B.

3.3.1 Variation in ϕ and z/y

A convenient tool for illustrating some of the comparative-static properties of the model is Figure 1, which is drawn for the special case in which $y_A = y_B = y$, and measures the exogenous parameters z/y on the horizontal axis, and ϕ on the vertical axis.[12] The figure features a large triangle denoted "conflict." This is the set of $(z/y, \phi)$ combinations that give rise to exploitation of B by A (holding constant the other parameters). Outside of this triangle A does not attempt to gain control. The "conflict" region is further divided into two triangles. The "no switch" triangle corresponds to combinations of parameters such that all the members of group B stay in group B, while the "switch" triangle features some switching from B to A. [13]

The figure shows a (weakly) positive relationship between conflict and ethnic distance, ϕ. For given z/y, there is no conflict if ϕ is very low, and there is conflict if ϕ is high enough. Hence, ethnic proximity acts as a deterrent to conflict: the dominant group eschews any attempts at exploitation when it expects a large inflow of group B members should it try to do so. A low ϕ allows for such a massive switching.

The figure also shows an "inverted-U shaped" relationship between z/y and conflict. Moving from left to right for a given (sufficiently high) value of ϕ, we see that there is no exploitation for z low - it does not pay. However, conflict also disappears as an equilibrium for z large. The reason is that the larger is z the larger is the number of B members who switch to A in case of conflict. Anticipating this massive switching, group A backs off. Hence, A exploits B only if z is large enough to make for an appealing booty, but not large enough that it triggers a massive switching from B to A. However, the existence of a "switch" sub-region

[12] Of course we could provide a formal statement of the comparative statics based on 3, but this would be tedious without being informative.

[13] The figure is drawn as follows. Notice that (3) can be restated as: $n_A - \tilde{n} < 0$ *and* $\bar{n} - \tilde{n} < 0$. The condition $n_A - \tilde{n} < 0$ is satisfied to the right of a vertical line, the left side of the conflict triangle is the upper part of which. The condition $\bar{n} - \tilde{n} < 0$ is satisfied above an upward sloping line with positive intercept, the hypothenuse of the conflict triangle is the upper segment of which. Hence the conflict triangle is the intersection of these two regions. Finally, the condition for switching is $n_A - \bar{n} < 0$, which is satisfied to the right of an upward sloping line through the origin, the border between the "switch" and "no switch" regions is the upper segment of which.

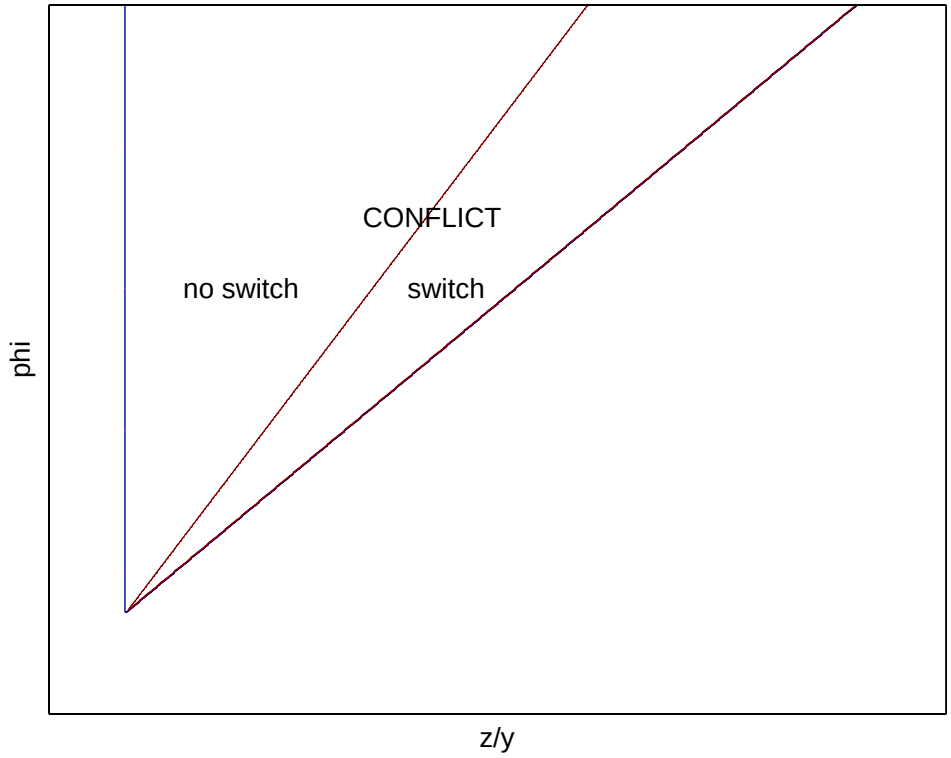


Figure 1: Comparative statics with respect to z/y and ϕ

in the conflict region shows that A can tolerate a moderate amount of infiltration and still pursue exploitation.

Figure 1 also highlights the interaction between ethnic distance ϕ and abundance of resources z. In particular, the greater the ethnic distance the larger the set of values of z such that exploitation occurs. The intuition is immediate from the previous discussion: the more costly it is to switch, the smaller the elasticity with respect to z of inter-group migration in response to conflict. Hence, the greater the ethnic distance, the more aggressive group A can be in appropriating large amounts of riches.

Finally, the figure shows that, not surprisingly given the discussion above, switching occurs for relatively low ϕ and relatively high z, with a similar interaction between these variables as found in the conflict decision of A.

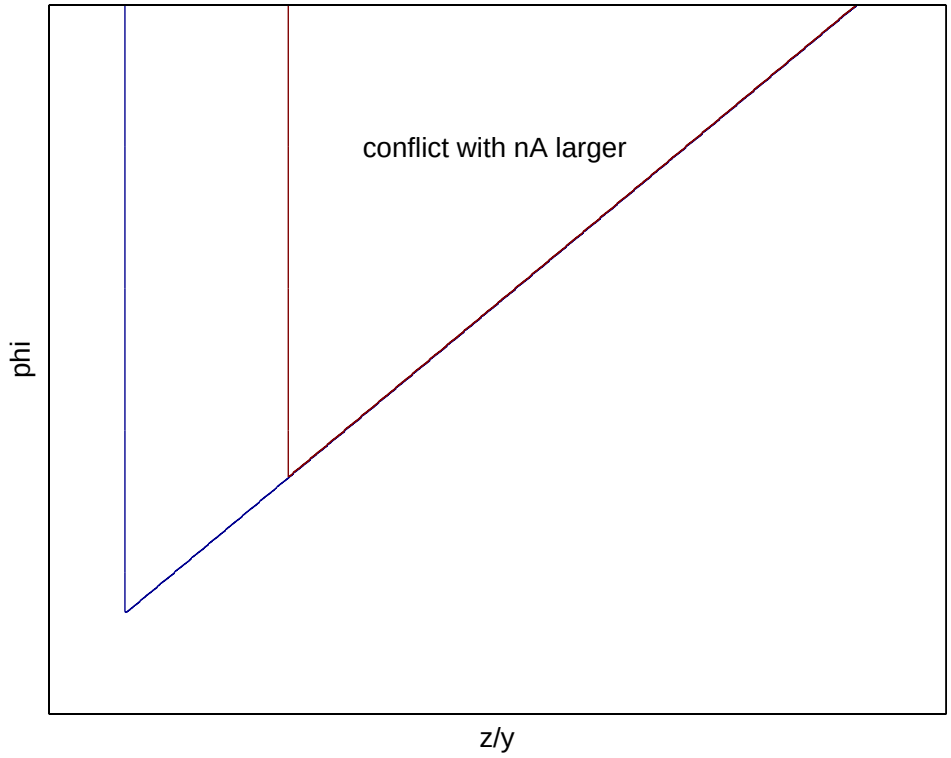


Figure 2: Effect of an increase in n_A

3.3.2 Variation in n_A

To illustrate the effects of changes in the dominant-group size, we show in Figure 2 the consequences of an increase in n_A on the size of the conflict region. The conflict region shrinks. In particular, there are now fewer values of ϕ and fewer values of z/y for which conflict occurs. A larger initial size of the stronger group implies a smaller per-capita gain in the amount of natural resources appropriated through conflict, and hence a smaller incentive. Indeed there always are values of n_A that are large enough that no conflict occurs (the conflict region disappears).

3.3.3 Variation in z_A and z_B

We can also investigate the effects of income inequality between the two groups. In Figure 3 we plot z_A on the horizontal axis, and z_B on the vertical axis. Recall that $z_i = z/y_i$ so as we

move to the right (up) on the axes the group is becoming poorer.

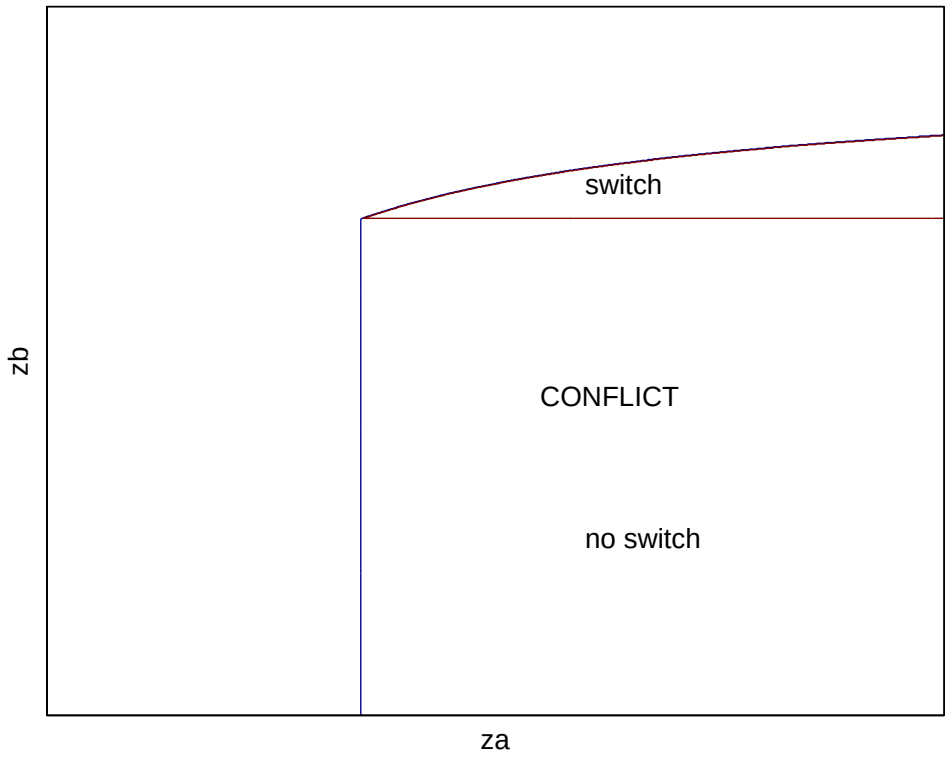


Figure 3: Income inequality and conflict

Reading the graph left to right, we see that as group A becomes poorer (relative to the resource endowment) we move from peace to conflict. This is the standard result that the stronger group is more interested in conflict when the resources at stake are abundant, relative to the cost of conflict (which is indexed by the group's human capital). Moving from south to north we also see that conflict is more likely when the weaker group is rich relative to the resource (low z_B). This is because high income groups have more to lose from switching identity. This is also seen by the fact that the switching region (above the horizontal line) obtains for high values of z_B. Hence, we can conclude that conflict is more likely when the stronger group has low per-capita income and the weaker group has high per-capita income (always relative to the resource endowment).

3.3.4 Variation in δ

Increases in δ have very similar effects as declines in ϕ. Increases in δ tend to reduce the set of other parameter values such that there is conflict (the area of conflict with a larger δ is always a subset of the area of conflict with a smaller δ). For δ large enough we are always in the no-conflict region. Destructive conflicts 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.[14]

3.3.5 Summing Up

In sum, if group A is the stronger group, we are more likely to observe exploitation of group B by group A if: (i) The ethnic distance between A and B is large; (ii) the country's endowment of expropriable resources is neither too small nor too large; (iii) group A is small; (iv) group A has low per-capita income; (v) group B has high per-capita income; and (vi) the efficiency costs of exploitation are modest.

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. This has important empirical implications. 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 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, the model predicts that we find the predicted inverted-U shape for low values of ϕ but not at high values.

4 Exploitation vs. Conflict

In the model of the previous section when group A goes to the offensive and decides to appropriate the resource Z, the only choice open to members of group B is whether or not to pass themselves off as members of the dominant group. The model does not distinguish between situations in which the losers "surrender," and give the winners free reign on the country's resources – a situation we have termed "exploitation" – and one where the losers

[14] 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 exploitation. 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.

"fight back," and try to retain control over at least some share of the country's resources – a situation for which we now specialize the meaning of the word "conflict." We now turn to a simple extension that accommodates a distinction between these two outcomes.

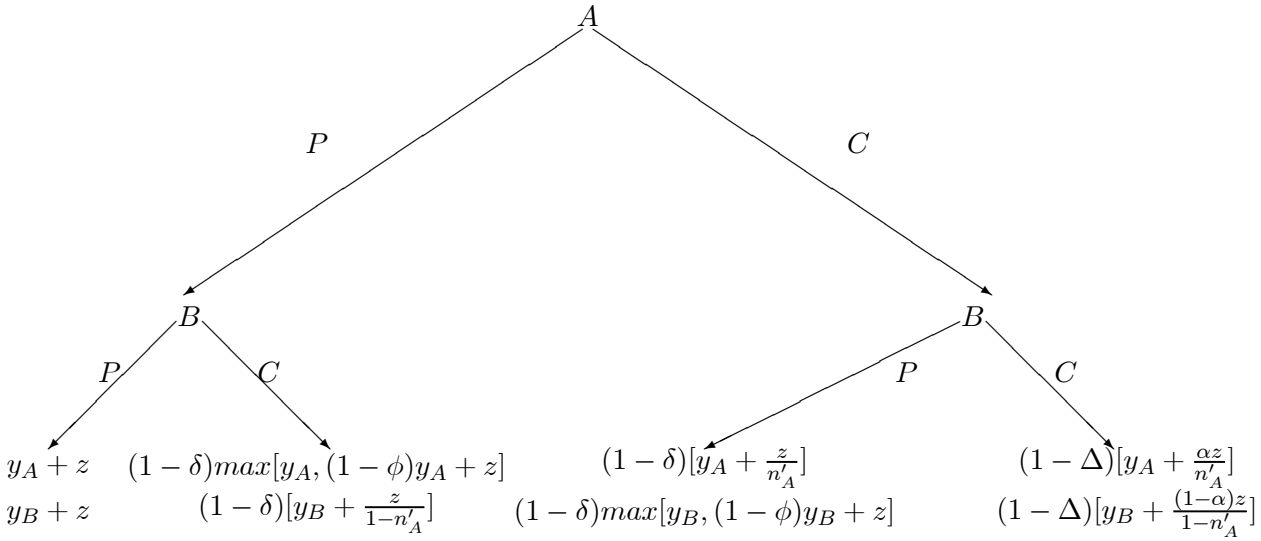
We continue to assume that, realistically, the stronger group, group A, moves first, and chooses between a "conflict action," C, and a "peace action," P. However, we now introduce a new second stage where group B can also respond with a C action or a P action. Furthermore, in the third stage we now explicitly consider not only the possibility of switching from B to A, but also from A to B.

The consequences of various series of actions are as follows. If both groups have played P, peace prevails, and each group i receives $y_i + z$, i.e. their "inalienable"endowment y_i plus an equal stake in the country's natural resources. This is the same as the no-exploitation equilibrium in the previous section's model. If one of the two groups has played C, and the other group has played P, we are in a situation where the C-playing group is exploiting the P-playing group, which acquiesces. In this case, the $C-$playing group, say group i, gains control of all the natural resources z, which are then shared among the *ex-post* members of this group, n_i'. Exploitation has enforcement costs and/or introduces distortions that reduce all incomes by a fraction δ. This is analogous to the "exploitation" scenario of the previous section, except that we leave open the possibility that group B exploits A, and not only A exploits B.

The more radically new type of scenario that is possible in this extension pertains to the outcome when both groups play C. We now assume that in this case the stronger group, group A, receives a fraction α of the natural resource, with $\alpha > 0.5$, while the weaker group, say B, receives the remaining $(1-\alpha)$. Hence, relative to acquiescing to being exploited by A, and losing all control over z, B can "fight back" and retain some fraction, albeit less than its "fair share," of the country's endowment. However, this fighting-back option comes at a cost. We assume that open conflict causes greater social losses than exploitation. The destruction rate of output in the CC equilibrium is $\Delta > \delta$.

The extended form of the game is (partially) depicted in figure 4, where at each final node the payoff of A is listed first and the payoff of B second. The interpretation of the payoffs is straightforward in the PP case, where peace prevails. In the cases of exploitation (PC or CP) the exploiting group receives its own endowment y plus z divided by the number of ex-post group members, both depreciated at rate δ. The exploited group's payoff depends on this group's switching behavior. Non-switchers receive only their individual endowment y. Hence if there is no switching, or if switching occurs until members of the exploited group have become indifferent between switching and maintaining their identity, the payoff for members of the exploited group is y. On the other hand, if all the members of the exploited

Figure 4: The 3-Stage Game



group pass over to the exploiting group, their welfare is $(1-\phi)y+z$. In other words they pay the switching cost but recover access to their share of the country's resources. Complete switching of the group occurs when this last quantity exceeds y, which explains the formula for the exploited group's payoff.

The payoffs in case CC, or open conflict, also depend on both groups' switching behavior. Typically it will be members of group B that switch to A, if at all, but in certain situations switching may be from A to B. In particular, if α is small relative to n_A, then the *per-capita* share of the natural resource appropriated by group B through conflict may exceed that in group A, creating an incentive to pass oneself as a member of the weaker group. Switching, if it occurs, is of course either from A to B, or from B to A, but never in both directions. In equilibrium, members with the least per-capita gains from conflict either prefer to remain in their original group, or are indifferent between switching and not switching. (Note that since stayers get some positive amount of the natural resource, there is no possibility that the entire membership of the group will switch identity.) Hence, the utility of members of group i in case CC is y_i plus the per ex-post member amount of natural resource that the group manages to preserve in the conflict. This payoff is now discounted at the higher rate Δ.

Solving this version of the model is conceptually straightforward. For each of the four final nodes PP, PC, CP, and CC one needs first to determine the equilibrium ex-post group sizes, or n'_A. Given n'_A one can determine whether B prefers PP or PC, and whether it prefers CP or CC. This provides A with B's response function to its actions. Given that, A chooses its best option between P and C. The exogenous parameters are the ex-ante group sizes, n_A, switching cost ϕ, destruction rates δ and Δ, and incomes y_A, y_B, and z. However, notice once again that all the choices in the model depend on bilateral comparisons of functions that are additively linear in the ys and in z. Hence, among y_A, y_B, and z, there are still only two independent parameters: $z/y_A \equiv z_A$ and $z/y_B \equiv z_B$.[15]

[15] An interesting variant of this model would give group A the option of offering to group B a division of Z which is more favorable to A than under the PP equilibrium, but not as favorable as under the CP equilibrium. If the efficiency losses associated with this "partial exploitation" outcome are less than in the case of open conflict, as is palusible, we will then never observe open conflict, as group A is always better off offering a division of Z among the two groups that just falls short of triggering an adversarial response by B. This kind of partial exploitation is sometimes observed in reality, but obviously open conflict is also an important feature of the real world. A possible explanation for why partial exploitation may sometimes fail is that it requires a high degree of commitment on the part of the exploiting group. Typically partial exploitation will require that the dominant group controls all the resources, and hands out group B's agreed share voluntarily and on an ongoing basis. It may be very difficult for B to monitor that this is appropriately done, particularly when the government's budget accounting is murky. In other words group B may not be able to trust that A will faithfully stick to its side of the deal, and may decide to respond with conflict even when A offers a deal that looks good on paper.

4.1 Predictions of the Extended Model

As in the previous section, providing a formal characterization of how the equilibria change as parameters change would be possible but would result in highly tedious reading. It is much more informative to once again present maps of regions of the parameter space that visually illustrate the properties of the model. In Figure 5 we hold constant α, n_A, δ, and Δ, and we furthermore assume $z_A = z_B$, i.e. we assume that the two groups have the same incomes y. On the horizontal axis we measure z/y and on the vertical axis we measure ϕ. Different types of equilibrium outcome are denoted by the sequence of letters describing the three stages of the game. Hence, the first letter indicates A's initial decision between C and P; the second letter B's subsequent decision between P and C; and the third letter whether there is switching or not in that equilibrium. We do not specify switching behavior in the PP case as we already know there will be no switching if all resources are shared equally.

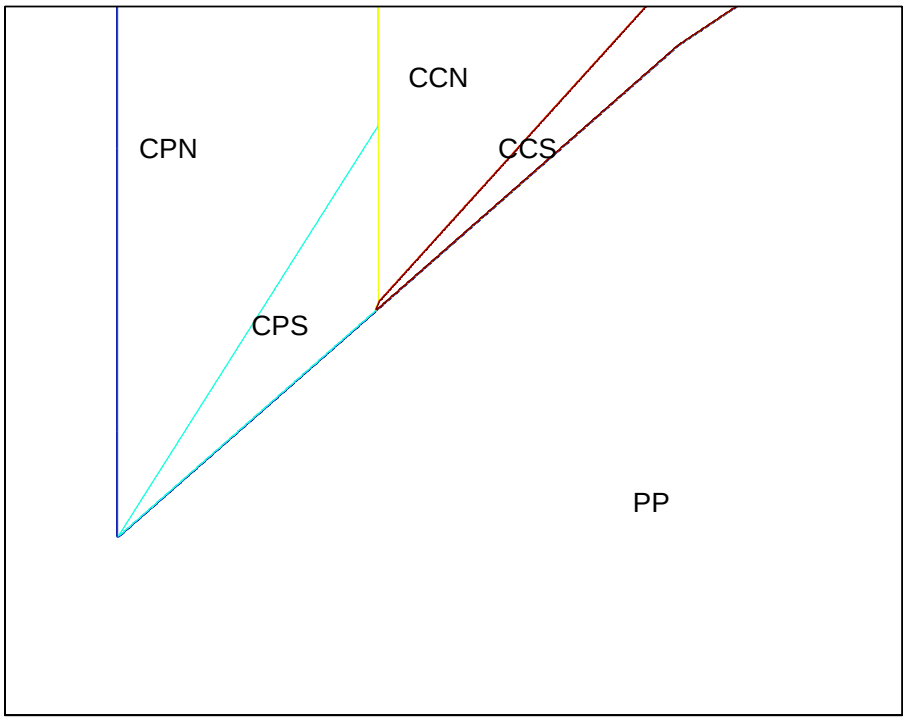


Figure 5: Variation in z/y and ϕ in extended model

Reading the figure from left to right we learn that, as in the previous section, peaceful coexistence (PP) prevails at low and high levels of the ratio z/y. In particular, when z/y tends to zero the two groups have no interest in conflict, and when z/y becomes sufficiently large infiltration by the other group renders conflict pointless. One new insight is that attempts to capture the resource z can now result in either exploitation or open conflict. In particular, as the resource z increases (relative to y) the weaker group, B, switches from an attitude of passive acquiescence to one where it fights back and tries to preserve some control over the resource z. This is seen in the figure by the fact that CP equilibria prevail for relatively low values of z/y, and CC equilibria emerge for higher values of z/y.

Reading the figure from bottom to top confirms the insight developed in the previous section, that conflict increases in the cost of switching ϕ. Finally, considering the interaction between z and ϕ shows that as ϕ increases conflict occurs for a larger range of values of z, again as seen in the previous part of the paper. Regarding switching behavior we also see a confirmation that switching tends to occur when z is high and/or ϕ is low, and that the higher is ϕ the broader the range of z values with no switching. This is exactly as expected.

In all the non-peaceful equilibria shown in Figure 5, group A comes out "on top:" either as the exploiter, or as the stronger party in an open conflict. One important question that arises in this extension is whether these conflicts – when they occur – are always in the stronger group's best interest. Equilibria CP (exploitation) and CC (conflict) could arise because they afford higher payoffs to group A relative to equilibrium PP (peace). But they could also arise because of an implicit threat by group B to attempt an exploitation in case group A acted peacefully at the outset (played P). The idea is that group B could exploit the fact that A has lowered its guard in order to stage a power grab. In this case, it is conceivable that A would enjoy highest utility under PP, and yet it is forced to choose C because B would respond to P with C, instead of P.

Similarly, it is interesting to check whether the introduction of a credible threat by B to respond with C to C helps support peaceful coexistence. In particular, it is possible that A would prefer an exploitation equilibrium CP, but that – expecting B to fight back – it falls back on PP rather than facing the consequences of CC.[16]

Figure 6 divides the conflict triangle into areas where the conflict is indeed the preferred option of group A, a situation we call "conflict of choice," and areas where A would rather have peace but engages in conflict in order to preempt any attempt by group B to seize control of Z ("preemptive conflict"). We see that none of the situations where A exploits B (equilibria of type CP) is preemptive. Instead, preemption motivates open conflict

[16]Of course A always prefers CP to CC. Here the question we are asking, however, is whether A prefers CP or CC to PP.

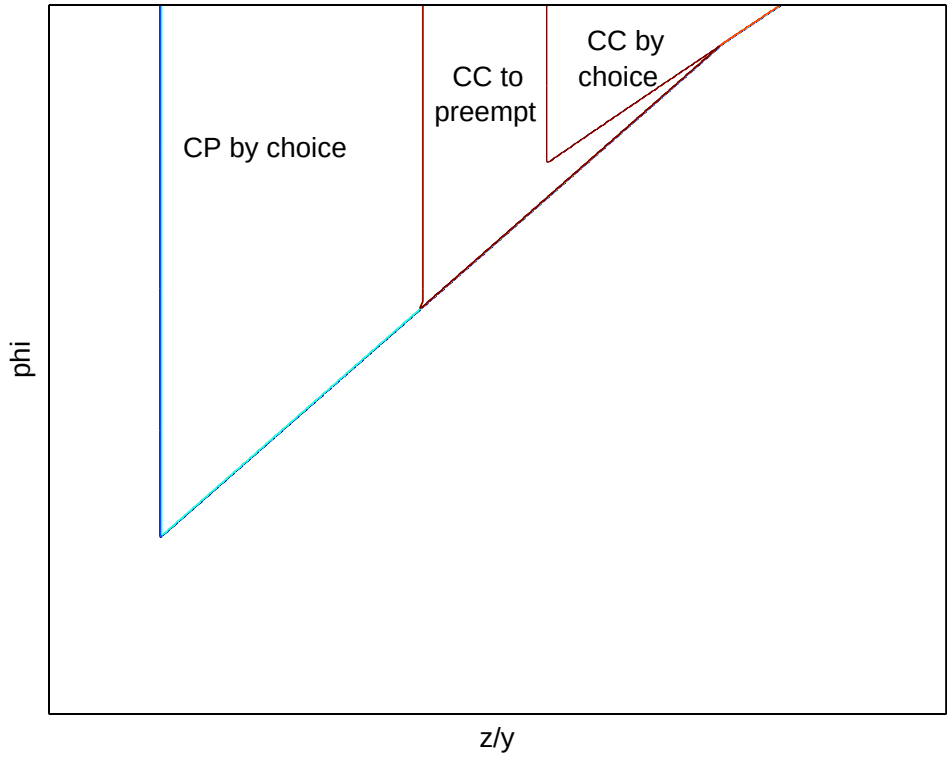


Figure 6: Pre-emptive conflict v. conflict of choice

in a sizable portion of the CC area. Preemptive conflict occurs for relatively low z/y and relatively high ϕ. The intuition for these preemptive conflicts is as follows. In this region z/y is large enough that group B stops acquiescing to being exploited and fights back. Given that B fights back, group A would rather back off and simply have peace. However, if A plays P group B is confronted with an overwhelming temptation to take power [since $(1-\Delta)(1-\alpha)z$ was a worthy object to fight over, a fortiori $(1-\delta)z$ is so as well]. Foreseeing this, group A plays C. Note that group B is also worse off. Effectively, the problem here is group B's inability to commit that it will not seek to exploit A if the latter cooperates. We believe this mechanism captures well the much cited role of "trust" – or lack thereof – in news account and political analysis of many ethnic conflicts.[17]

Conversely, in this example the PP equilibria are never supported by a threat of fighting back on the part of B. Switching from members of group B in case of attempted

[17]In a static game, we would have a similar outcome as a result of a cooperation failure.

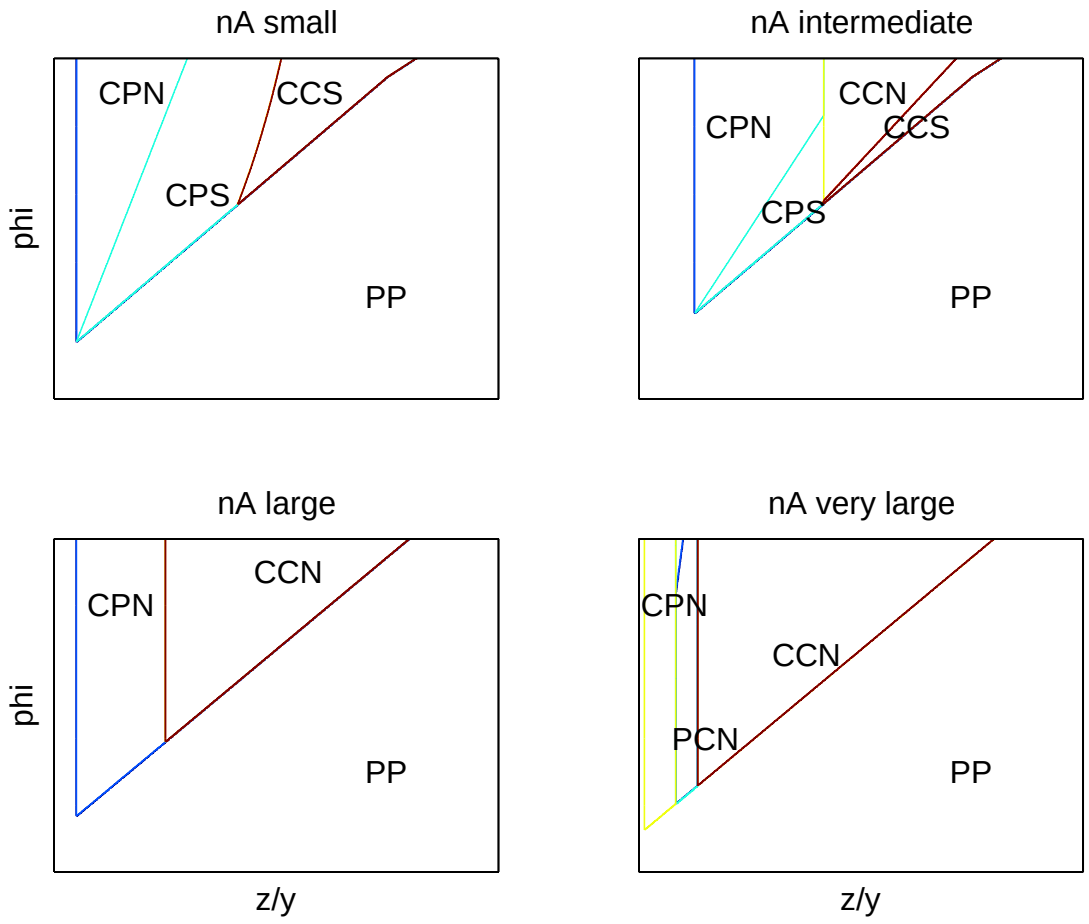


Figure 7: Variation in n_A

exploitation is effective enough as a deterrent.

We now investigate the comparative statics of the model with respect to group sizes. It turns out that in the case of the extended model they are quite non-monotonic. Figure 7 illustrates how the configuration of equilibria varies as n_A increases from very small (top-left panel), to intermediate (top-right), large (bottom-left), and very large (bottom right). The top right panel reproduces Figure 5. All the figures show the now-familiar pattern that, as z increases, peaceful coexistence gives way to some form of conflict, to subside again into peaceful coexistence for large values of z. Similarly, conflict is associated with high values of ϕ. However, the size of the conflict region and the types of conflict that prevail change significantly with the size of group A.

If the stronger group is very small, the overall conflict region expands (relative to the case of equal-sized groups). The intuition is straightforward: a strong minority has more to gain from conflict - of any kind - than a larger dominant group. For, the spoils of conflict will be divided among fewer people. Hence, the model accommodates the frequent pattern of powerful minorities exploiting the weaker majority (e.g. Sunnis exploiting Shias in pre-war Iraq). We also see that the area of open conflict shrinks relative to the area of exploitation. Recall that a portion of the open-conflict region in the case of equal-sized groups was associated to preemptive conflicts. Since B is a numerical majority, however, it now has less of an incentive to try to exploit A, or to resist exploitation by A. Finally, there is much more switching from B to A, as switching pays more the smaller the group one switches into. All of the conflicts depicted in this panel are conflicts of choice.

The size of the conflict region initially narrows down as n_A increases, but as seen in the remaining panels after a while it starts increasing. The enlargement of the conflict region is due to B's progressively stronger incentives to resist exploitation, or indeed its temptation to exploit (should A take a peaceful set of actions), as group B's size diminishes. In order to preempt such attempts, group A is forced to play C more frequently. As a result, we have that the open-conflict region becomes an increasingly important part of the overall conflict triangle. For very large n_A and quite low z/y, however, group A prefers to entirely acquiesce to group B's voracity (even though z/y is small, B is strongly motivated because the size of the group is very small). We then have a weaker minority exploiting a stronger majority. Perhaps the current treatment of the surviving "American-Indians" in the US, and the Indian Tribes' fierce policing of their ethnic boundaries against (what they consider to be) infiltrators, may resemble this situation. All of the CP and CC conflicts in the bottom two panels are preemptive in nature.

We summarize by saying that the relationship with conflict, broadly defined, is inverted-U shaped in the size of the stronger group. However, as the size of the stronger group increases, the prevailing nature of conflict switches gradually from exploitation to open conflict (with exploitation by the weaker group becoming a possibility for very high values of n_A). Equilibrium switching tends to decline monotonically with the size of the stronger group. Lastly, although we do not report the analysis here, results concerning the affects of income inequality and costs of conflict on the equilibrium are similar to those found in the previous version of this model.

Many of the results in this sub-section highlight an important tension: the larger the group, the greater its power, but the less its incentive to engage in exploitation. This result may explain why the persecution of minorities is often accompanied and fueled by accusations that the minority is conspiring against the majority. It is true that in open

conflict the minority does not stand a chance. But it is also true that if the majority lowers its guard and opens itself to exploitation by the minority the latter has enormous incentives to seize the opportunity. This tension is behind the main change in results between the model with open conflict and the one where only exploitation is possible: when group B can fight back it is no longer necessarily the case that the larger the disparity in group sizes the smaller the likelihood of conflict.

5 Historical Examples

5.1 Pigmentation

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 socioeconomic status, as the African-Americans. Interestingly, African-Americans are also the ones who most stand out visually: they are "black," as opposed to "white." Hence, the greatest amount of conflict is associated with the greatest ethnic distance, ϕ, as suggested by our theory.[18]

The black-white conflict in America is particularly striking because there would have been no shortage of alternative (or additional) minorities to discriminate and exploit: Irish, Italians, Jews, Poles, and other migrant communities could have been equally attractive objects. Why haven't they been targeted in the way blacks have? According to our theory, this is simply because continued exclusion of these white immigrants would have been too costly to enforce given the close physical proximity, or low ϕ, with the Anglo elite. Had the latter tried to perpetuate such discrimination, there would now be many fewer Americans with names like Coleman (an Irish name) and Caselli (Italian), as the holders of such names would have switched in mass to names like Smith. Hence, the "Anglo" majority backed out from a systematic attempt to disenfranchise the white immigrants - who have therefore been able to preserve their ancestral identity.

It is not that these immigrant communities did not suffer their own share of initial discrimination and exploitation, but that the "Anglos" have "backed off" fairly soon, say

[18]The other group that is both distant from the white majority and historically greatly exploited is of course the Native Americans. As argued in Section 4, our model can explain both their tragic experience in the 19th century, and their currently privileged status. Asians – another ethnically distant group – suffered their own share of indignities, witness for example the detention camps during World War II. But their "luck" was to arrive in the US mostly during the industrialization phase, when the incentives for exploitation had already declined considerably. There is a widely held perception that blacks of West Indian origin have much better outcomes once in the US than other groups of African-Americans. Waters (1999) has recently argued that this is a miconception.

within one or two generations. One or two generations is probably the time required for the newcomers (i.e. their descendents) to learn the language well enough, and to overcome the physical baggage of pre-migration malnutrition, that they would be able to disguise their ancestry – if necessary. Of course in equilibrium this is not necessary. Also, it is not that it would have been impossible for the Anglos to set up a vast bureaucracy keeping track of everyone's ancestry, but in the case of physically similar individuals it was simply too costly.[19]

The importance of phenotype in Black-White relations is underscored by the vast anecdotal evidence and lore on "passing" and "living on the other side" by white-skinned children of black couples [New York Times, 9/7/2003, Vian (1997), Roth (2000)]. In line with our central contention, social practice has historically insisted on phenotype as the basis for ethnic identity in the case of mixed race individuals. According to Brues (1977), in the 19th century South it was common <<for a phenotypically white quadroon [someone with three white and one black grandparent] to walk away to a better life with the tacit consent of a master. ... These individuals joined the white community and bestowed their genes upon it. ... However, a later marriage of two persons who are both of minor Negro ancestry may cause a *visibly* Negroid phenotype to surface. ... *Because American society has maintained an irresistible pressure for every individual to be identified with one race or the other, the phenotype, as judged by the public, may determine the social affiliation of persons of mixed ancestry.* ... Genes for traits such as skin color and hair form, which are recognized by the layman as indicative of race, will cause their bearers to join the racial community to which the genes are appropriate. But these individuals take with them genes derived from the other parent race, *which do not happen to have any visible effect. Thus, social pressure maintains visible differences between the races*, although considerable gene flow in both directions is taking place.>> (p. 310-311).

It is now increasingly widely recognized that discrimination against blacks is on the decline in the US, especially since the 1960s. The gradual and ongoing phasing out of this discrimination is also well understood from the perspective of our model. The US, and the American South in particular, has experienced over the last century an immense structural transformation from predominantly agricultural to industrial. In this process the importance of control over expropriable assets, such as land, has waned enormously. Our model predicts that, for any given ethnic structure of the population, the intensity of conflict declines when the share of expropriable assets into total assets, z/y, declines. 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.

The South-African case presents of course many analogies with the US case, and

[19]Imagine enforcing a policy of separate water fountains for Italian-Americans!

our model describes it even better, if one 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, coupled with the small number of whites to divide them, provided the incentive. In other words South Africa has historically been a high ϕ, low n_A, and high z/y country, making it "ideally suited" for exploitation. Over time, as the economy grew and diversified away from the primary sector, and the sanction regime against the white government became increasingly aggressive, z/y fell, and the cost of maintaining the regime became too large relative to the benefits.[20] The whites decided then to start a transition to the "no conflict" equilibrium. The model of Section 4 suggests that the nature of the apartheid regime may have changed from "by choice" to "preemptive" before further changes in the state variables made it safe enough for the whites to relinquish power.[21]

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 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. Here, though, the overall "firepower" is greater for the black population, and the white population has become exploited.

One could keep going with examples of conflict or exploitation where differences in skin color and texture play a critical role in enabling members of one group to pinpoint members of the "other" coalition. The Dominican police openly uses skin complexion and texture as a criterion for identifying "Haitians" to be mass deported from the country.[22] Humphreys

[20] Mineral Sales as a fraction of GDP for South Africa declined from 25 percent in 1980 to 11 percent in 1994 (the end of apartheid).

[21] In Apatheid South-Africa, too, phenotype was of the essence to solve mixed-race cases. Again Brues (1977): <<Classification is based on phenotype.... As a result, genetic recombinations and unexpected phenotypes become legal, rather than merely personal, problems. For instance, a child may be classified as Coloured though both parents remain legally White.... The net result, like that in the uncodified system in the United States, will be to fix certain phenotypic characteristics in the legally defined "races.">> (p. 311).

[22] According to Human Rights Watch (2002) <<the Dominican authorities have conducted mass expulsions of Haitians and Dominico-Haitians. ... Snatched off the street, dragged from their homes, or picked up from their workplaces, "Haitian-looking" people are rarely given a fair opportunity to challenge their expulsion during these wholesale sweeps. Questioned by Human Rights Watch as to how undocumented Haitians are identified, the subdirector for Haitian affairs of the Dominican government's migration department insisted that they can be spotted ... Noting that Haitians also have "rougher skin," the subdirector declared that "they're much blacker than we are. They're easy to recognize">>

and ag Mohamed (2005) compare Southern Senegal and Northern Mali, and argue that in the former ethnic tensions are much less severe than in the latter – despite broadly similar socioeconomic conditions – because in Mali the minorities (Tuareg and Maures) are more readily physically distinguished from the majority than the in Senegal (Diola).

5.2 Body size

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 more than one half of a 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 I" errors strongly supports the "coalition enforcing" interpretation of ethnic conflict over explanations based on hatred or within-group altruism.[23] 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).[24]

The use of height in the Rwandan case raises the interesting question of why is height not used more systematically around the world as a boundary-enforcing marker. In particular, it would seem that in ethnically-homogeneous countries one should observe winning coalitions of individuals below or above a certain height threshold. Our conjecture is that the typical

[23]The killers also targeted so-called "moderate Hutus," i.e. Hutus who did not cooperate in the genocide.

[24]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 characteristics 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).

shape of the height distribution makes it unsuitable to the purpose of boundary enforcement. In particular, within ethnic groups height distributions are unimodal and have thin tails. These features imply that any coalition boundary that makes conflict worthwhile must be drawn at a point which leaves large masses of people on both of its sides. Because height is not easily measured perfectly, this means that the number of type I and type II errors is vast, and the scheme may become unworkable. The difference with the Rwandan case is that the height distribution is bimodal, with a fairly deep valley in between the two modes. As a result, height works relatively well (particularly when complemented by other markers used in this case).

5.3 Language

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 [Judges 12:4-6] – 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 language. Students were evacuated before it became clear what was planned for people with the wrong accent."[25] Another example is provided by the 1937 massacre of Haitians in the Dominican Republic, where victims were identified by their inability to pronounce the word *perejil* (parsley) "correctly" [e.g. Danticat (1998), who also highlights the occurrence of type I errors.]

5.4 Religion

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 – though there may be large psychic costs for the first generation to switch. Indeed, conversion out of a discriminated group is a widespread phenomenon. In post-Reform Europe entire populations switched back and forth between Catholicism and Protestantism, as the political alliances of their princes switched back and forth between the Pope, the Emperor, and other

[25] We pointed out above that language-based markers can be overcome over a couple of generations, so at first sight it may seem unlikely that they would sustain a multi-generational conflict such as the Northern Irish one. However, Northern Ireland may be a special case of our model where the two groups have virtually equal strength, so that there is no clear winner or loser. As we show in Section 4 in this case conflict and persistent ethnic differentiation can coexist.

potentates.[26] In Fascist Italy many Jews converted to Catholicism to escape discrimination. In modern-day India it is 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.[27]

5.5 No conflict

So far our examples have involved cases of conflict, and we have asked whether our model can shed light on these episodes. 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 that the model may be useful in explaining Norway's escape from the "natural resource curse." Because of its rich oil reserves Norway is probably a high z/y for the purposes of our model. While most countries with a high share of natural resources in income seem to have fraught social relations and poor economic outcomes, Norway has neither. Perhaps its high degree of ethnic homogeneity is the key to this success. A similar example may be Botswana, where the physical similarity of different groups is cited by Acemoglu et al. (2003) as a possible reason why conflict over natural resources has not erupted there.[28]

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

[27] 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.">> An argument could probably be made that a similar shift occurred at various times from religious to racial anti-Semitism, for example after the expulsion of Jews from Spain.

[28] The only shadow on Botswana's reputation as a model of ethnic harmony is cast by the advocacy group Survival International's claim that the government is mistreating the San, a tribe of Bushmen. Needless to

A more subtle example of ethnic proximity leading to relatively peaceful ethnic relations may perhaps be found in the Indian case.[29] In a world were all ethnic cleavages are equally important, 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 Muslims 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.

5.6 Gender

It is possible, and indeed very tempting, to use the model to investigate gender relations as well. In most cases women are readily distinguished from men, and changing sex is still prohibitively costly for most people. Hence, gender differences are characterized by a very high ϕ. This of course fits very well with the fact that women have historically been exploited by men everywhere and in every time. Such exploitation has typically taken the form of assigning full property rights to women's bodies (and the income stream deriving from them) to their fathers' first and their husbands' later. The gradual recent enfranchisement of women seems to be highly correlated both over time and across countries with economic development and in particular with a lessened importance of natural resources. In particular agricultural economies seem to lag significantly behind industrialized ones in their treatment of women. In the language of our model women are exploited in high z/y countries and eras. More concretely, industrial development increases the importance of intellectual inputs in production and makes it costly to eschew the cooperation of women.

At the same time we should recognize that the model may work better as a model of within-family husband-wife relations than of country-wide discrimination of women. The reason is that it is difficult to discriminate against women without at the same time discriminating against their husbands. For example, husbands of talented women may lose out if their wives are excluded from lucrative jobs. Also, it may make very little difference in practice if men only receive payments from a country's natural resources or both men and women do, if men in either case succeed in sharing in the bulk of family income, perhaps

say, the Pigmy-sized Bushmen have very high ϕ vis-a-vis other Southern Africans.

[29] There seemingly is a lot of communal violence in India, so some readers may find it paradoxical to treat 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. For example, Varshney (2002) estimates that between 1950 and 1995 there was a total of 7,173 deaths caused by communal rioting, which leads to an average of 155.9 deaths per year for those 46 years.

because most of consumption is joint within the family.

6 Conclusions

In this paper we attempted to developed a new, simple explanation for the salience of ethnicity in exploitation and conflict around the world. Ethnicity provides a technology for group membership and exclusion which is used to avoid indiscriminate access to the spoils of conflict. Without such a technology groups become porous and the spoils of conflict are dissipated. In relating the incidence of ethnic conflict to variables such as group size and the share of expropriable assets in overall wealth, we were able to derive various implications that seem to shed light on a wide variety of historical episodes of conflict (and lack thereof).

It is tempting to use the insights of the model to suggest policy recommendations to minimize the incidence of conflict. Since we argue that an important cause of conflict is greed, there ought to be some set of policies that have the ability to alter incentives so as to prevent conflict. Foremost, the model suggests that economic development alone will remove the incentives for conflict. Clearly, then, a long-term policy of promoting growth around the world, especially amongst the relatively poor but resource rich countries, is one clear implication of the model (and, of course, there are many benefits other than reducing conflict that stem from such a policy). Secondly, the model of Section 4 suggests that ethnic conflict is sometimes preemptive, in that the stronger group preempts with conflict to protect itself from aggression by a smaller group. If the smaller group could commit to no conflict, then the larger group would feel no need for preemption. This is certainly not a paper about how to form institutions that facilitate commitment, but it highlights the role of such institutions in avoiding conflict. Lastly, the model highlights the role of expropriable resources, which often generate significant export revenues, in fueling conflict. This might give an additional reason for investment in education, to the extent that this can help shift the export composition of a country away from natural resources. A policy of discouraging primary commodity exports and encouraging a larger human-capital content to exports would be another policy that would seem to reduce the incentives for conflict.[30]

[30]Policies that increase transparency on the magnitude and destination of natural-resource export revenues, such as the Extractive Industries Development Initiative (EITI), in which participating governments and oil companies agree to disseminate detailed information on quantities extracted, revenues, and royalties paid to the government, also find support in our model. Likewise for certification processes that keep conflict diamonds out of rich-country markets, as was done for the fighting in Sierra Leone. On the other hand, our paper provides very little *prima facie* support for increased aid flows to countries in or at risk of conflict. This is because aid flows are very similar to increases of other appropriable resources, and may therefore increase the incentive of groups to fight over them. Peterson (2000) makes a very compelling case that aid exacerbated the conflict in Southern Sudan.

We would hope, too, that this paper motivates additional research on the role of ethnicity in conflict. Our theory highlights the role of ethnic "distance" in leading to ethnic conflict: 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 important sources of differences. At the moment systematic data on physical differences among ethnic groups is nonexistent. Hopefully research such as ours would motivate the collection of this type of data.

7 References

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