Conflict or Compromise: Theory and Evidence from Africa and Asia

by

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Abstract

Civil wars are a recurring phenomenon undermining development in weak states. Faced with the possibility of costly conflict, why don't leaders share power? I investigate the role of an unexplored commitment problem, both theoretically and empirically. The model features a leader who can appease challengers by sharing power, but doing so increases their effectiveness at launching a rebellion. I show that commitment worsens as the opposition becomes stronger, and derive testable non-monotonic implications of group strength and distributional shocks on power-sharing and conflict. As challengers become stronger, the likelihood of inclusion (positive transfers) increases up to a threshold, beyond which the leader prefers to exclude an opposing group and face conflict. I test the model using data on politically relevant ethnic groups in Africa and Asia, their access to executive power, and armed organizations claiming to represent them. To that end, I use three complementary strategies: (i) within-country variation in population share to proxy for group strength; (ii) quasi-randomly split groups across countries; and (iii) conflict-inducing distributional economic shocks within a country, by combining geo-referenced data on the ethnic homelands, cropland maps and international prices. The empirical findings strongly accord with predictions of the theory. I then structurally estimate the model parameters and explore policy relevant counterfactuals, including the effects of democratization, changes in military capacity, financial aid, sanctions and quotas.

Lay Summary

Civil conflict has been the most predominant type of conflict since World War II. They are generally organized along ethnic lines, and typically launched by groups underrepresented in the executive power. Why don't leaders share power instead of excluding opposing groups and provoking harmful wars? I develop a theory where leaders can appease opposing groups by sharing power, but doing so makes the opposition more powerful and more likely to win wars. The theory predicts when leaders include opponents, when they opt for exclusion, and when conflict occurs. Using a novel dataset on the degree of inclusion of ethnic groups into executive power and ethnic conflicts in Africa and Asia, I find strong empirical support for the theory. The estimation of the model gives insight on the most effective policies aimed at mitigating conflict.

Preface

This dissertation is original, unpublished, independent work by the author, Rogerio Santarrosa.

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Chapter 1

Introduction

Civil wars have been the most predominant type of conflict involving the state since World War II, severely undermining development and institutions in the developing world. More precisely, during this period 90% of conflicts fought by central governments were against organizations *within* the country (as opposed to conflicts against another state).[1] Although societies may be divided along many different lines - class, geography, ideology, for example - still the majority of civil conflicts are between groups defined by ethnicity.[2]

One of the most consequential conflicts for political and economic stability are those over the control or composition of the central government. And they are strongly associated with the ethnic composition of the government cabinet: these conflicts are typically launched by ethnic groups underrepresented in the executive power (Denny and Walter [2014], Cederman et al. [2010]). Such ethnopolitical movements, and the resulting violence, are mostly predominant in Africa and Asia, including the Middle East (Krause and Suzuki [2005]). In fact, ethninicity is the fundamental channel through

[1] Own calculation using data from the Uppsala Conflict Data Program (UCDP).

[2] According to Denny and Walter [2014], 64% of civil wars (defined by conflicts with more 1,000 battle deaths) have been divided along ethnic lines. Own calculation using updated data and a lower threshold at 25 battle deaths per year finds that around 54% of intrastate conflicts are ethnic based. Denny and Walter [2014] argue that rebel movements are more likely to organize around ethnicity because ethnic groups are more apt to be aggrieved, better able to mobilize, and more likely to face difficult bargaining challenges compared to other dimensions.

which competition over wealth and power is expressed in the region (Brown [2003], Roessler [2016], Bayart [2009]).[3]

Examples abound historically, and even recently. The Burundian civil war was the result of long standing ethnic divisions in the country. Since colonization Burundi had been historically governed by the minority ethnic Tutsi, largely opposed by majority Hutu political organizations. In the 90's a succession of bi-ethnic governments attempting to mitigate ethnic tensions escalated into a civil war with an estimate of 300,000 casualties (mostly civilians)[4]. Likewise, the Sudanese civil wars have been the result of a struggle for power and an inability on the part of contesting parties to reach agreement on how to share it. The Southern region had fought one of the longest wars since World War II against the northern, Arab-dominated government. Yet, the resulting independence of South Sudan precipitated further tensions between President Kiir and his vice-president, Riek Machar, causing the latter's dismissal and igniting a new ongoing civil war between their respective ethnic groups. Largely similar accounts describe civil conflicts in South Africa, Liberia, Uganda, Rwanda, Iraq, Afghanistan, Syria and many other countries where government and opposition (organized along largely ethnic or religious lines) struggled for power, but were unable to reach a peaceful agreement.

A natural question arising in such settings is why, faced with the possibility of costly rebellion, leaders don't share power instead of excluding or severely under representing opposing groups? In fact, a large literature has suggested that this is a realistic viable option. Since exclusion is the key factor behind ethnic conflicts, power-sharing has been often prescribed as a political solution to overcome deep divisions and mitigate conflict.[5] These recommendations also find some empirical basis. Hartzell and Hoddie [2003]

[3]Using Ethnic Power Relations-2018 Dataset, 30% of African and Asia countries have faced an ethnic conflict over the control of the government in the post World War II period, compared to only 7% in the rest of the world. Figure A1 illustrates the ethnic groups involved in this type of conflict and their concentration in Africa and Asia (particularly, in the Middle East)

[4]http://news.bbc.co.uk/2/hi/africa/7354005.stm

[5]See, for instance, Spears [2000], Lemarchand [2006], Mehler [2009] and Binningsbø and Dupuy [2009] for a discussion on the topic.

shows that power-sharing is a frequent form of conflict resolution. Francois et al. [2015] demonstrate for a sample of African countries that regimes are surprisingly inclusive, and do so to avoid revolutions.

Yet, conflict is widespread. Therefore, the more precise question is why isn't power-sharing always able to prevent conflict? Why do leaders sometimes include opposing groups into the coalition and mitigate conflict, while in other times opt for exclusion and hence invite it? A number of theoretical reasons have been proposed to explain the failure to reach efficient, mutually advantageous agreements, but very limited empirical evidence has been able to pin down the mechanisms (Blattman and Miguel [2010]).

In this thesis, I investigate the role of a unexplored commitment problem, both theoretically and empirically. The theory developed in Chapter 2 considers the perspective of a leader standing alongside contesting groups who have the capacity to attempt to overthrow the leader via entering in to a costly conflict. The leader can appease challengers[6] by giving them some of what they want, i.e., sharing power (which will here be thought of as a division of the rents from office, but which typically involves positions in the cabinet of the country and the military). However, the downside to such sharing is that, should the challenger subsequently decide to repudiate the deal and rebel, the probability of the challenger succeeding will increase with the share of power that the challenger has enjoyed under the power sharing agreement. Horowitz [1985] and Roessler [2016, 2011] have argued that access to the state's coercive apparatus can easily be leveraged by contesting parties into a better position to strike against incumbent leaders, and improving their bargaining power. [7] This effect of sharing power leads

[6]I use "challenger" and "opposition" interchangeably throughout the thesis

[7]Cabinet appointment entails authority and discretion over the distribution of resources in key areas. And there is strong evidence of ethnic favoritism on the distribution of expenditure (e.g., Kramon and Posner [2016]; Ejdemyr et al. [2018]). For example, ethnic groups with co-ethnics in the cabinet can have road building in their districts (Burgess et al. [2015]). In turn, the roads can facilitate the mobilization of militias when attempting to take control of the capital (Rogall [2014]). Alternatively, we may also think of political inclusion as an expansion of state capacity to the ethnic region, including policing, military control, recruitment to the army, public goods, etc. Again, all of these can be used to increase the advantage of the rebels in a potential conflict.

to a commitment problem on the challenger's part: they are unable to commit to not using their partial access to power (which is given as a form of appeasement) as a platform from which to launch aggression against the leader.

This reasoning leads to a clear non-monotonicity in the relationship between group strength (defined as the probability of success in a rebellion), power sharing, and conflict. Weak groups remain peaceful despite receiving no access to the state, as they cannot credibly move against the leader, and therefore do not need to be accommodated. As groups become stronger, they receive access to, and increasingly larger shares of, power but remain peaceful until a threshold level of strength is reached. Beyond this threshold groups are too strong to be appeased without receiving large shares and having their bargaining power substantially increased. Consequently, the leading group chooses to exclude these. However, facing exclusion, and given their high level of innate strength, these groups become the ones likely to launch conflicts.

These predictions are strongly confirmed in Chapter 3. I test the model using a innovative data on politically relevant ethnic groups in Africa and Asia, from 1946 to 2017.[8] The dataset was introduced by Cederman et al. [2010] and motivated by the fact that the majority of ethnic conflicts were the result of competing ethnic groups' claims to the state, which in turn is captured by the representatives of some groups. Therefore, the collection of data informing of the degree of representation of each ethnic group in the executive power was crucial to understand ethnic conflicts. This unique dataset provides information on the access of each ethnic group to executive power. Furthermore, armed organizations in conflict over the government are linked to ethnic groups based on their claims of representation or recruitment of such groups. As a result, I am able to test the model's theoretical mechanisms not only via conflict outcomes, but also by examining the sharing of power with opposition groups under peaceful conditions.

In addition, I proxy the strength of each group by the ethnic group's population size as fraction of the country's total population. In fact, a

[8]Ethnic Power Relations Dataset (EPR-2018)

group's capacity to overthrow the government may be a function of many different determinants. However, probably the most important determinant is numbers. Rebel leaders with a higher number of co-ethnics are able to draw from a larger pool of potential recruiters and resources.

I conduct the empirical analysis using three complementary strategies. First, I use within-country variation, by comparing conflict and inclusion probabilities for groups of different sizes bargaining over control of the same state. The probability of inclusion in a leader's government coalition indeed follows an inverted-U shaped relationship with respect to group size, which is to the best of my knowledge, a new empirical finding to this literature. The probability of conflict, on the other hand, is low and initially non responsive to increases in group size. It increases abruptly beyond a threshold, becoming high for very large groups; again consistent with the pattern predicted by the theory. Results are robust to using leader and country-year fixed effects, and the inclusion of a battery of controls.[9] The empirics also support an indirect prediction of the model: larger groups are more likely to be in conflict if excluded (because the excluded comprise both those who are too weak to threaten the leader, and those who are too strong to be appeased). Nonetheless, again as predicted, there is no effect of group size on conflict for those included. Those included are accommodated via power-sharing arrangements, and do not want to engage in conflict.

Still there is the concern that ethnic groups of different sizes systematically differ in some unobservable ethnic-level characteristics which are instead driving the results.[10] To address this, the second empirical strategy focuses on the sample of split ethnic groups who reside in more than one country. In this specification, the empirical analysis compares the same ethnic group that has different sizes (as measured by the share of their pop-

[9]Controls included are group size ranking, precipitation, distance to capital, distance to the leader's region, terrain, and intra-group fractionalization.

[10]One could also imagine that ethnic groups in conflict were classified more broadly as a politically relevant ethnic group. If this is the case, groups in conflict would be from an ethnicity comprising a larger share of population just because of the arbitrarily classification in EPR. Comparing the same ethnic definition in two different countries rules out any bias caused by this

ulation in their resident country). This identification strategy controls for any unobserved ethnic-level trait. I also restrict the analysis to the African sub-sample, where borders were arbitrarily drawn in the context of the European colonization. Inclusion and conflict probabilities follow the same inverted U pattern predicted by the model.

A third set of reduced form results tests a further prediction of the model relating to the ratio between the opportunity costs of conflict and the value of rents. In the model, when a group decides to enter into conflict, the group considers the rents from office relative to the opportunity costs of conflict. Increases in the benefit to cost ratio affect equilibrium thresholds, making challengers more inclined towards conflict and, therefore, more expensive to buy off. This results in greater inclusion of weaker groups, and simultaneously greater exclusion of stronger groups, as well as a higher likelihood of conflict precipitated by them. To test this comparative static, I combine crop price data with geo-referenced data on cropland maps of each ethnic group, to construct ethnic-year price indicies. I use this variable to create a proxy for changes in the relative economic standing of a given ethnic group compared to the ruling ethnic group. The empirical findings are consistent with the model, where price shocks which alter the relative economic advantage of leaders over challengers have differential effects on inclusion and the incidence of conflict, for weaker compared to stronger groups.

In Chapter 4, I structurally estimate the model. In the econometric structure, I assume that agents observe strength perfectly, but the econometrician only observes a noisy measure of strength: relative group size. I also allow for measurement error in conflict and inclusion. The model is estimated via simulated maximum likelihood, and closely recovers the main empirical patterns in the data. The estimated parameters are then used to evaluate several policy-relevant counterfactuals. Each one of them can be potentially initiated or influenced by international interventions aimed at reducing conflict. I evaluate the effects of democratization, military capacity, financial aid, sanctions and quotas.

The counterfactual exercises provide the following results. Shifting the leadership to the largest ethnic group (an assumed consequence of democratization here) has a substantial impact in reducing conflict. This effect is driven by the fact that the strongest groups depart from the position of challengers. Financial aid has ambiguous effects: it reduces conflict if it is given to challengers, by increasing their opportunity cost, but it may significantly raise the chances of war if it increases rents from office. On the other hand, both sanctions contingent on conflict, and government aid conditional on peace, have a powerful effect in reducing the probability of conflict. Lastly, quotas mandating group representation, though effective in increasing inclusion, have a negligible impact on conflict.

The thesis contributes to a number of literatures. Firstly, it relates to the vast theoretical literature on conflict (e.g Fearon [1995], Powell [2002], Chassang and Padro-i Miquel [2009, 2010], Dal Bó and Powell [2009]). In particular, it is an example of a model of conflict resulting from a commitment problem (see Fearon [1995], Powell [2004], Powell [2006]). However, the nature of the commitment problem here is unique. Previous work has explored the lack of commitment to future transfers, when power shifts dynamically, such as when a leader cannot commit to transfer promised amounts to challengers in the event of their becoming weaker via disarming (Powell [2004], Acemoglu and Robinson [2001]). Conflict in the theory studied in Chapter 2 arises even when a leader can commit to future transfers. Here instead transfers shift the bargaining power between the conflicted parties, and challengers are unable to commit to not utilizing that increased power. Fearon [1996] explores this type of problem; though in a distinct direction to that done here. In a dynamic framework, Fearon [1996] models the bargaining of two states over a territory in successive periods, with the current division determining the state's military odds *in the next period*. In contrast, in my model the success probability of a war is a function of how much power the challenger enjoys *at the moment* of the conflict decision. From this approach, I find novel implications that could not be found in Fearon's, namely the worsening of the commitment problem for the strongest groups. Most importantly, not only do I explain the possibility of conflict, but I also rigorously test the new and unique implications of the key theoretical mechanism against the data.

The empirics exploited in Chapter 3 are related to, and partly informed by, the vast empirical literature on conflict. A number of papers have examined the effect of exogenous economic shocks on the probability of conflict (e.g, Miguel et al. [2004], Bazzi and Blattman [2014], Berman et al. [2017], Berman et al. [2017], Burke et al. [2015]), with no direct evidence of the causal theoretical mechanisms. In contrast, I am able to identify *relative* economic shocks and their effects on conflict. Adhvaryu et al. [2018], Guariso and Rogall [2017], and Mitra and Ray [2014] are limited examples of such approach. Yet, the approach taken here differs due to the particular theoretical results guiding the empirics. One important and unique distinction is the estimation of the impact of economic shocks not only on conflict, but also on power-sharing (which is used to accommodate potential conflicts). Observing how power is shared when conflict does not occur (or at least is off the equilibrium path) can be particularly informative of the theoretical mechanisms.[11]

Mayoral and Ray [2017] also explain and document how conflict over political power is initiated by large groups. The explanation is driven by the assumption that political power generates a public good: given some initial allocation of public goods, large groups have more incentives to fight because the prize will not be split, but enjoyed by the entire group and produce higher total value. In contrast, here, I allow that a leader can freely choose a fully transferable allocation of rents to appease challengers. I also extend the analysis by testing the predicted power-sharing decision empirically.

In addition, the thesis contributes to a growing literature on the political organization and institutions of weak states. In particular, I study how leaders survive in power when facing challengers who they fear may displace them violently (De Mesquita et al. [2005], Gandhi and Przeworski [2006], Egorov and Sonin [2011], Francois et al. [2014], Francois et al. [2015],

[11]Dube and Vargas [2013] also test the implications of a theoretical model predicting violence levels, in the context of Colombia. In this thesis, I find evidence of a commitment problem not studied before in the context of bargaining over rents from political power in Africa and Asia.

Acemoglu et al. [2008], Acemoglu et al. [2010], Arriola [2009]), and even from within their inner circle (Kudamatsu and Besley [2008]). For instance, Boix [2003] and Acemoglu and Robinson [2001] are concerned with how bottom-up forces shape political transition and stability. North et al. [2009] provides a seminal analysis of societies where violence is limited by political and economic manipulation, mostly based on group identities and personal ties (resembling the ethnic dimension featured in this paper).

Notably, I contribute to the still limited empirical research on the allocation of political power in non-democratic regimes. Evidence of entrenchment of political elites is found in Indonesia (Martinez-Bravo [2014], Martinez-Bravo et al. [2017]), Sierra Leone (Acemoglu et al. [2014]), China (Francois et al. [2016]), Russia (Schleiter [2013], Tunisia (Buehler and Ayari [2018]), and Haiti (Naidu et al. [2015]). This study is closely related to Francois et al. [2015] who demonstrate that African ruling coalitions are large and generally proportional to population shares. They show how this may arise as a peace-inducing response by leaders to violent threats perceived against them or their regimes. Conflicts do not occur along the equilibrium path of that model, and their patterns cannot be addressed with it. Here, the theoretical model generates conflict along the equilibrium path and establishes a set of new empirical facts regarding how power is shared in both Africa and Asia. Acemoglu et al. [2010] studies the incentives of a civilian government to create a strong army to defeat a rebellious faction, with the downside of increasing the influence and coup opportunities of its military. According to their model, civilian governments endogenously choose weak armies incapable of ending insurrections provided the rebels are not strong. On the contrary, the model presented here concludes that civil wars tend to be fought between the strongest groups. As we will see, this accords well with observed patterns of civil conflict.

Related to this literature, a line of research emphasizes the risks and limitations of co-opting elites in to power-sharing arrangements due to the added capabilities that may be acquired from within government (Haber [2006], Magaloni [2008], Debs [2007]). Here, I formalize this problem and derive conditions under which power-sharing attempts will fail. Roessler

[2011, 2016] argue that a leader considers the risk of coups and civil wars when deciding between including or excluding an ethnic group. He concludes that the leader will include larger groups because the risk of civil war becomes higher than the risk of coups. In this thesis, the insight is similar but distinct in the following manner: leaders do face a threat from within, but it depends on the share of power enjoyed by the challenger. This key distinction implies a different relationship between group size and inclusion, which (to the best of my knowledge) has not been documented before.[12]

[12] In a contemporary working paper, Chaturvedi and Das [2018] also show an inverted-U relationship between inclusion and population size for Majority Representation systems (MR). Their theoretical approach and empirics is done in the context of a specific democratic institution. In this thesis, I document this relationship for mostly non-democratic countries (and periods) and its resulting effect on civil conflict.

Chapter 2

Bargaining over Power: A Model of Power-sharing and Conflict

2.1 Introduction

Civil conflicts have been a recurring phenomenon across the globe. And they are generally organized along ethnic lines. In particular, these conflicts are launched by ethnic groups excluded from, or underrepresented in, the executive power (Cederman et al. [2010]). Why would a leader ever choose to exclude a group who is likely to respond to exclusion by initiating conflict?

A vast theoretical literature attempts to explain why a costly conflict would occur when there is another, mutually advantageous, efficient allocation. A number of reasons have been proposed by the literature (indivisibilities, information or commitment problems). I investigate theoretically the role of an unexplored commitment problem generated by a reasonable implication of power-sharing agreements. In the model, power-sharing, which typically involves offering positions in the cabinet of a country, may be used to appease a challenger willing to overthrown the government through conflict. However, it also increases the chances the challenger will prevail in the event of a conflict.

Several examples can illustrate this feature. Cabinet appointments entail authority and discretion over the distribution of resources in key areas. And strong evidence of ethnic favoritism on the distribution of expenditure has been found in the literature (e.g., Kramon and Posner [2016]; Ejdemyr et al. [2018]). For instance, Burgess et al. [2015] find that districts occupied by ethnic groups with co-ethnics in the cabinet were more likely to be favored with road building in Kenya during non-democratic periods. In turn, roads may facilitate the mobilization of militias and masses towards an organized violence against the government. In fact, the findings of Rogall [2014] are consistent with this. Alternatively, we may also think of political inclusion as an expansion of state capacity to the ethnic region, including policing, military control, recruitment to the army, public goods, among other benefits. At the same time that these included ethnic groups have a stronger presence of the state, they may also have greater access to weapons and proximity to the security forces. Furthermore, cabinet appointments may directly influence the probability of success of a rebellion just because of better access to inside information. Likewise, inclusion raises the possibility of attacking the regime from within, in which case the chances of success would likely increase with the share of posts occupied by the group (Roessler [2016]).

This effect of power-sharing has been often mentioned in the theoretical literature but have not been analyzed before (e.g., Haber [2006], Magaloni [2008], Debs [2007]).[1] Others have pointed out how access to the state's coercive apparatus may be leveraged by ethnic groups in several contexts (Horowitz [1985]; Roessler [2016]).

There is no information asymmetry in the model. Indeed, information problems, like uncertainty about the value of resources or military capacity of conflict actors seem implausible explanations for long intra-state wars (Fearon [1995]). The theory fits the class of models of conflict resulting from

[1] Fearon [1996] investigates a similar problem, but with a different perspective. See discussion on the literature in the Introduction.

commitment problems. Most of this literature has focused on the commitment problem on the side of the leaders - for instance, when leaders cannot commit to make future transfers(e.g., Acemoglu and Robinson [2001],Fearon [2004]). I depart from the literature by focusing on a commitment on challenger's side, motivated by the examples above. The model generates very unique and distinctive implications that can be tested against the data (an exercise that is pursued in the following chapters).

2.2 A Simple Model

2.2.1 Overview

I start with a brief overview of the model. A leader of a country enjoys the prestige and the rents of holding power. Nevertheless, the leader faces a challenger that can potentially overthrow the regime by violent means. Conflict is costly; that is, if leader and challenger fight over control of the government, both parties will face losses. Losses here can be thought of as the destruction of infrastructure, disruption of economic activities, opportunity costs of resources diverted to fighting, etc. Because of the potential costs incurred by both parties, there is the potential for welfare-improving sharing. For example, the leader could offer the challenger a share of power roughly calibrated to the leader's probability of losing the war. This would make both parties better off compared to a conflict situation, since the expected payoffs would approximate the probabilities of victory but the pie would include the associated costs that are lost when a conflict occurs.

However, if the leader were to attempt such a power-sharing deal with the challenger he would also be granting access to resources that could be used to overthrow the leader. A commitment problem thus emerges. The challenger cannot commit to not use these extra capabilities against the leader. So the leader must decide between offering a share of power in order to compensate a challenger at the risk of strengthening them, or opt for strategic exclusion and face a higher likelihood of war. Next, I present the model in details.

2.2.2 Model Set-up

There is a static bargaining problem between a leader (l) and a challenger (c) over political power. This rules out the possibility of a leader including a subgroup of challengers and excluding the remainder, for example. It is motivated by the strong ethnic ties that shape group identity, and that we conceive of as primordial and hence take as primitives for the rest of this study. For a complementary approach that allows groups to be endogenously connected in the midst of conflict see König et al. [2017].

The total value of political power is π, capturing both economic spoils and personal rents of being in a prestigious position[2]. The challenger is only able to seize power by violent means. If conflict occurs, both the leader and challenger face losses c_l and c_c, respectively. The challenger has strength θ_c, which denotes the challenger's probability of success from a conflict when it starts from a position of complete exclusion from power. The leader observes the challenger's strength perfectly.

Assume that π is fully divisible so that the leader may offer a share of rents $\tau \in [0, 1]$ to appease the challenger.[3] Power-sharing, however, increases the potency of a challenging group's threat, if it subsequently decides to rebel and move against the leader. Specifically, the subsequent probability of challenger's success in conflict with the leader is now given by $\theta_c + \alpha\tau$, when the challenger receives share τ. The parameter $\alpha > 0$ captures the extent to which the likelihood of success in conflict increases as a response to an extra unit of power shared. This is the key novel assumption introduced into the model and captures a number of important features of reality. Power-sharing involves the allocation of cabinet and military positions to a potentially contesting group. Holders of such positions are empowered in many ways: they may control key positions in the administration, have some control over

[2] Anedoctal evidence linking office-holding to benefits abounds. Benefits may include wealth, resources, patronage, corruption opportunities, prestige and the prerogatives of office. See Arriola [2009] for discussion.

[3] Divisibility is reasonable in this context. Arriola [2009] and Francois et al. [2015] show the allocation of cabinet posts as means of power-sharing. Powell [2006] and Bidner et al. [2014] show that a lottery can also be used as a way of sharing power in case of indivisibilities.

resource management within it, have access to (and inside information on) the leader, and/or knowledge about vulnerabilities within the regime, or the military. All of these factors, and more, may offer an advantage to the group were it to attempt a rebellion. We bound parameters so that $\theta_c + \alpha < 1 \ \forall \ c$, so that the probability of success is bound below one.

The timing of the game is as follows. The leader chooses an offer τ. After observing τ, the challenger decides to rebel or not. If not, the leader and challenger obtain the proposed allocation $(1-\tau)\pi$ and $\tau\pi$, respectively. If conflict is chosen, the winner of the conflict obtains π minus the cost occurred; the loser just suffers the cost. In expectation, under allocation τ for challenger c, the value of rebelling to the challenger is $(\theta_c + \alpha\tau)\pi - c_c$, whereas the leader's expected payoff under a challenge is $(1 - \theta_c - \alpha\tau)\pi - c_l$. Figure 1 illustrates the game.

2.2.3 Analysis

We are looking for a Subgame Perfect Nash Equilibrium. Using backward induction, we first look at the challenger's optimal strategy given an offer τ by the leader. The challenger's payoff of peace is higher than conflict if:

$$\tau\pi \geq (\theta_c + \alpha\tau)\pi - c_c \Rightarrow \tau \geq \frac{\theta_c - c_c/\pi}{1-\alpha}$$

We then define τ_c^{min} as the minimum transfer needed to be offered by the leader to appease the challenger:

$$\tau_c^{min} \equiv \frac{\theta_c - c_c/\pi}{1-\alpha} \tag{2.1}$$

Note here the nature of the commitment problem. If power-sharing did not shift the challenger's capabilities, the leader could appease the potential rebel by just offering the latter's probability of success minus a discount associated with the incurred cost of conflict. However, that is not enough for appeasement since the offer also increases the chances of victory for the rebels. The appeasing offer must be high enough to at least make the challenger indifferent to going to war, given that the probability of success also depends on the transfer ($\theta_c + \alpha\tau$). Therefore, the leader must find the transfer that solves this fixed-point problem. This results in a multiplying effect. The minimum appeasing offer is $\theta_c - c_c/\pi$ (the optimal transfer in the absence of any commitment problem) multiplied by $\frac{1}{1-\alpha}$, which is increasing in α.

It is straightforward to see that, conditional on the challenger's decision, τ always decreases the leader's payoff. A positive offer is made only if it induces the challenger to peace. Therefore, regarding the leader's optimal strategy, it is sufficient to evaluate $\tau_c = 0$ and $\tau_c = \tau_c^{min}$.

If $\theta_c \leq c_c/\pi$, the leader can sustain peace even if offer is zero. The probability of a rebel's victory is so small that the expected gains does not exceed the cost of conflict. If $\theta_c > c_c/\pi$, then the leader must decide to offer zero and face war, or to give just enough to buy peace. The value of exclusion will be larger than a peaceful power-sharing if:

$$(1-\theta_c)\pi - c_l > (1-\tau_c^{min})\pi \Rightarrow (1-\theta_c)\pi - c_l > (1 - \frac{\theta_c - c_c/\pi}{1-\alpha})\pi \Rightarrow$$
$$\theta_c > \frac{(1-\alpha)c_l + c_c}{\alpha\pi}$$

2.2.4 Results

This results in a unique equilibrium[4] described by Proposition 1.

Proposition 1. *There exist a unique Subgame Perfect Nash Equilibrium. It comprises the following strategies:*
i) The challenger rebels if and only if $\tau_c < \frac{\theta_c - c_c/\pi}{1-\alpha}$*; playing peace when* $\tau_c \geq \frac{\theta_c - c_c/\pi}{1-\alpha}$*;*

ii) The leader offers: $\begin{cases} \tau_c = 0, \quad if \quad \theta_c \leq \theta_c^* \equiv c_c/\pi \\ \tau_c = \frac{\theta_c - c_c/\pi}{1-\alpha}, \quad if \quad \theta_c^* < \theta_c \leq \theta_c^{**} \equiv \frac{(1-\alpha)c_l + c_c}{\alpha\pi} \\ \tau_c = 0, \quad if \quad \theta_c > \theta_c^{**}. \end{cases}$

[4]Technically, there exist multiple equilibria in a measure zero set of parameter values where this applies. Specifically, there exist multiple equilibria only if θ_c is exactly equal to $\frac{(1-\alpha)c_l + c_c}{\alpha/\pi}$. This is a knife edge case.

Because conflict is costly, a weak challenger is not a credible threat. The leader can exclude such a group from power and sustain peace. Challenging groups are able to commit to rebellion as they become stronger, and anticipating this, the threat of costly wars makes the leader willing to share power to obtain peace. The offer, however, must be high enough to deal with the commitment problem (on the side of the challenger) generated by the increased chances of success from access to political resources. The minimum transfer required to appeasement increases substantially with the initial strength of the group (due to the multiplier $\frac{1}{1-\alpha}$). Beyond a threshold (θ_c^{**}), the challenger is so expensive to buy off that a costly war is preferable for the leader. The reason is that stronger groups require progressively larger transfers, causing greater shifts of power with their inclusion. Figure 2 provides a visual illustration of the equilibrium path.

One consequence of this result is the heterogeneity of excluded groups. Both the weakest and strongest groups are left out of coalitions, but for different reasons. The weakest are excluded due to the lack of credible threat they pose, while the strongest are excluded because the transfer needed to subdue them is so large and would empower them so much, that it is better to keep them cut-off altogether.

The results also shed some light on the importance of *relative* economic shocks. An *aggregate* shock that changes the costs of conflict (c_c and c_l) and rents from holding power (π) simultaneously, and in the same direction, has no effect on final outcomes (if the ratios are kept constant). In contrast, *relative* shocks do affect the thresholds, and change the distribution of groups included and in conflict.

Though the mechanism proposed here is simple, it yields quite strong empirical predictions. In summary: (1) there is an inverted-U relationship between strength and inclusion, and an increasing convex relationship between strength and conflict. (2) there is heterogeneity in excluded groups – both very weak and very strong are excluded. And the strong excluded groups are likely to be observed in conflict. There should be no such relationship between strength and conflict probabilities for included groups. (3) relative shocks that decrease the c_c/π ratio move both thresholds to the left. This implies higher probability of inclusion for relatively weak groups, and higher probability of exclusion, and hence conflict, for strong ones. In the next section I elaborate on the empirical setting in which to test these results of this model.

2.3 Model Extension: Dynamic Framework

2.3.1 Overview

I extend the model to a dynamic setting. Differently from the static model analyzed above, the game does not end after conflict or acceptance of the leader's offer. Instead, groups move to a next period when the will be played again. The leader in the next period is determined by the results obtained in the previous period. If peace was played, the previous leader keeps power and starts next period as a leader. On the contrary, if conflict was played, the winner of conflict starts as a leader.

The main implication of this feature is the following. When deciding to play conflict or peace, a challenger now considers the payoff of being a future leader. In turn, the payoff of being a future leader will depend on the strength of the current leader who will in the position of challenger in case he is overthrown. Winning a war against a strong leader implies higher costs of accommodation or a more powerful rebel in the future. Therefore, the strength of the leader will affect the chances of peace. In particular, strong leaders will make the value of conflict lower and groups more likely to appeased.

In the empirical part of the thesis (Chapter 3), I use relative group size (share of country's total population) as a main proxy for group strength. The dynamic model implies the same empirical patterns suggested by the static one: groups of a larger population share face a greater commitment problem, and are more likely to be in conflict. The distinction is that the dynamics adds another cause for the relationship. Groups of larger relative size also face (by construction) challengers of smaller size, which imposes a lower disciplinary effect, a higher value of seizing power, and consequently leads to more conflict. Next, I present the details of this extension.

2.3.2 Model Set-up

Consider an infinite horizon, discrete time economy, with per period discount rate δ. There are two groups, denoted by A and B, with strength θ_A and θ_B, respectively. At time 0, I assume group A is the leader and group B is the challenger, without loss of generality. Similar to the static model, groups bargain over the rents π. The leader (group A) starts by choosing a share τ_B of rents to be offered to group B. Group B, in the position of a challenger, observes τ_B, and decides to start a conflict, or accept the offer and stay in peace.

If peace is played, groups A and B consume the proposed allocation: $(1-\tau_B)\pi$ and $\tau_B\pi$, respectively. The period ends, the leader keeps power, and the game is played again next period with A as the leader. If conflict occurs, the probability of rebel's success is given by $\theta_B + \alpha\tau_B$, $\alpha < 1$. The leader and the challenger face costs c_l and c_c (costs are indexed by status, and not by group identity). The loser realizes the cost of war, and dies (continuation value is zero). The winner consumes π minus the associated cost, and starts next period as the leader. The deceased is replaced by a new player from the same group, who starts as a challenger.

The motivation for this last assumption is the following. First, death, imprisonment and exile are the post tenure fate of 80% of leaders replaced irregularly (e.g., by conflict).[5] It is reasonable to assume similar outcomes for challengers. On the other hand, the ethnic demographic composition (one of the most important dimensions along which conflict is organized) does not disappear or even change too much. A new leader will certainly need to deal with the demands of rival ethnic groups, and their replaced leadership.

[5] Own calculation using Archigos dataset

2.3.3 Analysis

We are looking for a stationary Markov Perfect Equilibrium, where players decide on the offer (when in the "leader" state) conditional on the strength of the of the challenging group, and on conflict or peace conditional on the present offer (when they are in the "challenger" state).

The value of being leader for player $i \in [A, B]$ is given by:

$$V^l_{i,t} = \max_{\{\tau_{j,t}\}_{t=t}^{\infty}} \{((1-\tau_{j,t})\pi + \delta V^l_{i,t+1})(1 - C_{j,t}(\tau_{j,t}))+$$
$$((1-\theta_j - \alpha\tau_{j,t})(\pi + \delta V^l_{j,t+1}) - c_l)(C_{j,t}(\tau_{j,t}))\},$$

where $C_{j,t}(\tau_{j,t}) \in (0,1)$ is the probability of conflict decided by player $j \neq i$ conditional on observing an offer $\tau_{j,t}$, in period t. The leader i chooses $\tau_{j,t}$ to maximize his payoff, taking into account player j's response.

The value of being a challenger for player j is given by:

$$V^C_{j,t} = \max_{\{C_{j,t}(\tau_{j,t})\}_{t=t}^{\infty}} \{V^{CC}_{j,t}(\tau_{j,t}), V^{CP}_{j,t}(\tau_{j,t})\},$$

where $V^{CC}_{j,t}(\tau_{j,t})$ and $V^{CP}_{j,t}(\tau_{j,t})$ are the payoffs of playing conflict and peace, respectively.

The values of peace and conflict are given by:

$$V^{cp}_{j,t} = \tau_{j,t}\pi + \delta V^c_{j,t+1}$$

$$V^{cc}_{j,t} = (\alpha\tau_{j,t} + \theta_j)(\pi + \delta V^l_{j,t+1}) - c_j$$

Note that in the static model the conflict decision was solely based on the challenger's strength and the offer made. The key distinction here from the static model is that the incentives for conflict for, say, group A now also depend on its continuation value of being a leader. This, in turn, depends on the strength of group B (since, as a new leader, group A will face the threat of the deposed group B). In turn, the incentives of conflict for group B will also depend on the strength of group A, and so on.

The conflict decisions impose discontinuities on the value function. The value of being leader assumes distinct functions of the parameters depending on the strategies played in the subgame. Therefore, we must solve the model by finding conditions for each possible equilibrium scenario. In the Appendix C, I find the solution for every possible equilibrium.

2.3.4 Results

The results are summarized by Proposition 2.

Proposition 2. *There exist a unique stationary Markov Perfect Equilibrium. It generates the following outcomes on the equilibrium path for a leader A and challenger B:*
i) If $\theta_B \leq \theta_B^*$*: Leader A offers* $\tau_B^* = 0$*, and challenger B plays peace (*$C^*(\tau_B^*) = 0$*);*
ii) If $\theta_B^* < \theta_B \leq \theta_B^{**}$*: Leader A offers* $\tau_B^* > 0$*, and challenger B plays peace (*$C^*(\tau_B^*) = 0$*);*
iii) If $\theta_B \geq \theta_B^{**}$*: Leader A offers* $\tau_B^* = 0$*, and challenger B plays conflict (*$C^*(\tau_B^*) = 1$*),*
where θ_B^* *and* θ_B^{**} *are functions of the model parameters (*δ*,* α*,* c_c/π*,* c_l/π*), and the other group strength (*θ_A*).*

In summary, a weak challenger is not included and keeps peace. As it becomes stronger, power-sharing is required so the group can be appeased. The leader is willing to do that since conflict destroys some surplus. As the challenging group becomes too strong crossing a second threshold, the leader will prefer to exclude the group altogether and face conflict. Again, similar to the main force of the static model, power-sharing increases the conflict capabilities of the opposition, and creates a commitment problem. This commitment worsens for the strongest groups, since they are the ones who demand the highest offers.

The reader can follow the derivation of conditions for each equilibrium for the specific values of θ_B^*, θ_B^{**} and τ_B^* (Appendix C). The functions present discontinuities and can be very long and intractable expressions (that's why they are not presented here). Under some parameter space, the first threshold (θ_B^*) may depend only on the cost of conflict (if, for instance, the challenger B does not share power or face conflict in the leader state). If group A is strong enough to be appeased with some share in equilibrium when group B is in power, then θ_B^* will also depend (negatively) on α and θ_A. This is because they are determinants of how much group B will have to share if he becomes leader through conflict. Finally, consider that θ_A is so high that the equilibrium path for a leader B would be the exclusion and the consequential conflict from group A. Then θ_B^* will also depend on, but will be a different function of, θ_A. In the former case, θ_A affects the sharing that the group would give away in the state of leader; in the latter, it would affect the payoffs of being a future leader through the costs of war that occurs in that state.

The main novel result from the dynamic model is the elucidation of the importance of the leader's strength. Formally, it can be shown that $\frac{\partial \theta_B^*}{\partial \theta_A} \geq 0$, $\frac{\partial \theta_B^{**}}{\partial \theta_A} \geq 0$, and $\frac{\partial \tau_B^*}{\partial \theta_A} \leq 0$. That is, the strength of the leader imposes a disciplinary effect on the challenger's behavior. A group who wants to depose a strong leader anticipates the high costs of accommodation or conflict in the future. This decreases the incentives for conflict, makes the group cheaper to be appeased, and raises the likelihood of peace.

In the empirical analysis, I compare ethnic groups of different sizes as a source of variation for group strength. The main idea is that a bigger group B is in expectation stronger than a smaller group A. In the light of the dynamic model, there is another difference. Group B is not only stronger, but also faces a weaker challenger (namely group A). Similarly, group A is not only weaker, but also faces a stronger challenger (namely, group B). In any case, the key predictions of the dynamic framework supports the ones of the static model. There is just one additional channel in play besides the own group strength: as the *other* group becomes weaker, the incentive for conflict grows, initially increasing the likelihood of inclusion, but eventually leading to exclusion and conflict.

2.4 Discussion

I briefly discuss some modelling assumptions here, and some possible directions for future research.

Functional form I assume the probability of success in conflict is a linear function of the leader's offer. If this function were convex, higher offers would change rebel victory probability even more abruptly. This would magnify the commitment problem. On the other hand, if the function were concave, the marginal effect of the offer would be decreasing. Therefore, as groups become stronger, the marginal effect of increasing the offer is lower. However, strong groups still receive larger shares and have their strength increased more. The concavity operates just in the margin. In this scenario, strongest group are not necessarily the ones excluded and in conflict. There will be two forces: one given by nature of the model, and the other by the function form. And they operate in opposite directions in generating the exclusion and conflict from the part of the strongest groups.

That being said, the same results are still derived if the functional form are $\theta_c + \alpha\tau^{1/2}$ or $\theta_c + \alpha\tau^{1/3}$, for example. In addition to that, strong concavities seem unreasonable in this setting. It would imply, for instance, that group strength would increase substantially with the first cabinet seats offered, but less if the group already had other seats.

In chapter 4, the model is structurally estimated assuming the linear specification. It would be possible estimate a more flexible function. Nevertheless, the linear specification provides a good and parsimonious fit. Figure A7 shows how the allocation of cabinet appointments has a closely linear relationship with population share (the key proxy for group strength). Figure 10 shows how the structural model closely recovers the empirical patterns of the data (Figure 3).

Secessionist wars The model is explicitly elaborated to explain conflict over the control of the government. In particular, the empirical analysis in the next chapter relies on the availability of data on the divisions of power, and a good proxy for the capabilities to overthrow the government (population share of the ethnic group).

The mechanism proposed in this chapter could also be present in conflicts over territory. In this case, a government could expand regional autonomy to an ethnic group, but such concession would possibly empower the group even more in its attempt of secession. Nevertheless, I do not test for this case empirically in this thesis. The main reason is that population share - the key proxy for strength in governmental conflict - is not a good proxy for secessionist wars. In this type of conflict, groups do not need to mobilize towards the capital and overthrow the regime. Instead, they simply need to keep control of a piece of the territory (generally, the ethnic homeland).

Yet, there is a way to think about conflict over territory in the context of bargaining over the executive power. Whatever game leaders and ethnic groups are playing when dealing with the autonomy of their region, this will become an outside option for ethnic groups. Leaders could potentially offer some sharing of power to accommodate groups for that reason. However, the same implication of the model is kept. *Ceteris paribus*, groups stronger in their capabilities to overthrow the government require higher sharing (and consequently, enhance commitment problems).

From a similar perspective, weak groups (in their capabilities of overthrowing the government) expect very little from the bargaining over the rents of the executive power. For these groups, the outside option of fighting for regional autonomy is higher. Indeed, empirically secessionist conflicts are commonly led by small groups.

Multilateral bargaining Most countries have multiple ethnic groups. The application of this model to a setting with multiple groups assumes that leaders bargain with each group individually. There are a few reasons why this is an acceptable assumption in this context.

First, the key motivation for this thesis is that conflicts are generally organized along ethnic lines. Groups tend to be concentrated over different parts of the territory, and organize politically along this dimension. As a consequence, even the structure of the data (to be presented in Chapter 3) is dyadic in nature, and identify conflicts fought by particular groups (and not by a collusion of groups). In fact, 71% of episodes of ethnic governmental conflicts in Africa and Asia are launched by a single group. When more than

1 group is involved, it is never the case that the conflict was launched by all groups at the same time. For this reason, a natural theoretical direction here is to understand the difference between the outcomes of each bilateral bargaining separately.

Second, the model presented here posits a specific relationship between group strength (which, again, is proxied by group size in Chapter 3) and final outcomes. It can be shown that conditional on group's own size, the size of other groups has no explanatory power for conflict and inclusion outcomes, confirming that I am probably focusing on the most important elements of the question in hand.

Given these facts, focusing on the commitment problem in a bilateral bargaining environment seems to be a plausible first approach to understand the exclusion and conflict of ethnic groups. Indeed, this exercise yields novel interesting and strong results to be tested. However, exploiting this game in a multilateral setting can be a very fruitful avenue for future research.

2.5 Conclusion

In this chapter, I have built a model based on a commitment problem that has been often mentioned and recognized anecdotally, but had not been modelled before. The key feature of the model is that power-sharing (though it is meant to appease) increases the strength of the opposition. Strong implications are derived: leaders obtain peace from weaker groups, but the commitment problem worsens for the strongest groups.

The theory predicts a U-inverted relationship between group strength and its probability of inclusion in the coalition. Moreover, conflict probabilities do not react immediately to increases in strength since groups of intermediate strength are accommodated in power-sharing agreements. Nevertheless, when they are too strong, they are the ones likely to be excluded and in conflict. Additional implications with respect to relative economic shocks are also derived. Relative economic shocks against a group leads to more inclusion if the group is weak, but to more exclusion and conflict if it is strong.

In the next chapter, I elaborate on the ideal setting to test the key predictions of the model.

Chapter 3

Power-sharing and Conflict: Empirical Evidence from Africa and Asia

3.1 Introduction

I test the predictions of the model developed in Chapter 2 in the context of ethnic conflict over control of government using the EPR-2018 dataset (described in detail below). There are two reasons to focus on ethnic groups as the unit of the analysis. The first is data availability. As described below, we are able to observe for each ethnic group: their degree of representation in the executive (inclusion), their representation by rebel organizations in conflict with the state, and a good proxy for group strength (population share). The presence of all these elements provides an ideal setting to study empirically the importance of the proposed theoretical mechanism.

Second, ethnicity plays a key role in politics in Africa and Asia (Brown [2003], Roessler [2016]). This does not mean that ethnicity is the only or necessarily the most important social identity in all contexts, neither does it necessarily imply that ethnicity is the unique dimension political mobilization. Yet, ethnicity is frequently the channel through which competition over wealth and power is expressed (Bayart [2009]). Shared ethnicity (based on religious, language, or ancestry commonality) facilitates cooperation and determines the extent of influence of political elite actors. Ethnicity often became even more salient as a result of colonial institutions which often granted to tribal leaders control of important state resources. Moreover, upon independence, may of the new post-colonial states combined an absence of strong coercion capacity with strong ethnicity based political institutions. This resulted in an political environments where power could was naturally contested by elites based on ethnicity identification that leveraged the strength of their ethnic networks.

Given the predominance of this historical pattern in African and Asian countries, and the unique preponderence of ethnic conflicts in these countries since World War II, I restrict the analysis to Africa and Asia in what follows.

3.2 Data: EPR-2018

The Ethnic Power Relations (EPR-2018) datasetwas originally introduced by Cederman et al. [2010] and provides annual data from 1946 to 2017 on politically relevant ethnic groups, their relative sizes (as share of the country's population), and their access to executive state power in all countries of the world with population of at least 250,000 (Vogt et al. [2015]).

Previous literature had analyzed ethnic conflict largely ignoring the role of the state, focusing, for instance, on the effects of ethnic fractionalization or polarization (Easterly and Levine [1997], Montalvo and Reynal-Querol [2005]). In contrast, Cederman et al. [2010] argue that the state is not a neutral actor, but in fact the central object of, and participant, in ethnic conflicts. In this context, the state is analyzed as an institution captured by the representatives of particular ethnic groups, and ethnic wars are conceived as the result of their competing claims over it. This understanding exactly motivated the collection of this very novel dataset with the goal of measuring the ethnic configuration of the state.

The data collection involved nearly one hundred country and regional experts who were asked to identify the ethnic categories most salient for national politics in each country. For the purpose of this data, ethnicity is broadly defined by any sense of commonality based on a belief in common ancestry and/or shared culture. This may include common languages, phenotypical features, and religion. A group is considered politically relevant, and thus observable in the dataset, if at least one active political organization (for example, but not necessarily, a political party) claims to represent the group's interests in national politics, or if its members are subjected to intentional state-led discrimination in the domain of public politics. Indirect discrimination, in the form of disadvantages in the education or economic spheres for example, are not included in this definition. A2 shows a map of politically relevant groups in Kenya, as an example.

All politically relevant ethnic groups were categorized according to the degree of access to executive power obtained by those who claimed to represent them[1]. Depending on where political power is effectively exercised, this can be the presidency, the cabinet, and senior posts in the administration of ostensibly democratic regimes; the army command in military dictatorships; or the ruling party leadership in one-party states. Importantly, data is coded based on groups' absolute access to power, rather than on their under- or over-representation relative to demographic size.

The EPR dataset records the political status of each group categorically as either: "*monopoly*", "*dominant*", "*senior partner*", "*junior partner*", "*powerless*", "*discriminated*" or "*self-exclusion*". The first two categories describe groups that control executive power alone largely on their own. In contrast to monopoly, dominant indicates that there is inclusion of "token" members from other groups who do not, however, have any real influence on decision making. Senior and junior partners are indicators of power-sharing arrangements that are delineated according to their level of influence. This is measured by the number, and importance, of the positions controlled by group members (again, irrespective of group size). The remainder are excluded groups. The powerless delineate the groups that are simply not

[1] Access to legislative and judicial institutions are disregarded. In the African literature, it is well established that the executive is where main power, both political and economic, resides (Francois et al. [2015], Posner [2005])

represented, discriminated indicates groups subject to active, intentional, and targeted discrimination by the state in the domain of public politics. An example of which is the prohibition against holding or contesting for political offices. The final category of self-exclusion applies to groups who have excluded themselves from central state power, in the sense that they control a particular territory of the state which they have declared independent from the central government.

3.2.1 Key variables

Inclusion For the empirical analysis, it is necessary to identify the leader, the challengers, and whether each challenger is included or not in the coalition. Given the structure of political status described above, I assign a group as "*leader*" if it is coded as "*monopoly*", "*dominant*", or "*Senior Partner*". I assign a challenger as included in the coalition if its coded as "*junior partner*". Lastly, "*powerless*", "*discriminated*", and "*self-excluded*" are assigned as excluded.[2] Figure A3 shows a map of politically relevant ethnic group in Africa and Asia, according to the power status assigned by the EPR dataset. Figure A4 presents the same map highlighting their classification into leaders, and included or excluded challengers.

Conflict The dataset also links groups to rebel organizations in the UCDP/PRIO actor database (ACD2EPR)[3]. Conflict is attributed to an ethnic group if the actor of violence recruits from, and claims to, represent that group. The UCDP/PRIO dataset identifies conflict as a *contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in a calendar year*[4]. There are two important clarifications here. First, I use only *ethnic* conflict. In this chapter, the unit of observation is the ethnic group and, therefore, conflict is not coded as having occurred if the rebel organization does not recruit

[2]Self-excluded groups comprise a very small fraction of the dataset (1.51%). Results are similar if these groups are dropped.

[3]See Wucherpfennig et al. [2012] for a reference.

[4]UCDP/PRIO Armed Conflict Dataset Codebook. http://ucdp.uu.se/downloads/ucdpprio/ucdp-prio-acd-171.pdf

or claim to represent any ethnic group. Second, I restrict attention to *civil* conflict over the *government*, where the contest between actors concerns either replacement of the central government or a change in its composition. The measures of transfers (power conceded) and strength (group size) are not appropriate to study conflict when incompatibility concerns territory such as that over inter-state wars, or where a group demands secession or autonomy. The key conflict incidence variable is then coded as 1 for all observations in which there is an ongoing conflict (0, otherwise).[5]

Strength In the model, the innate strength is the probability of success if a group starts a conflict against the leader's group (absent of any power-sharing). Note also that the final potential probability of success in a conflict is a function of this pre-determinant innate strength and the share of rents offered by the leader. The ideal measure of innate strength would capture the former, and should be insensitive to the later.

Generally speaking, we could conjecture that the probability of a rebel's victory is a function of two main inputs: manpower and resources. The first provides for the necessary numbers and popular support, while the second grants firepower.

I then use group size, measured by the ethnic share of the country's total population, as a proxy for group strength. Population share is by no means a perfect measure of group strength. Yet, it is a key determinant of the bargaining power of ethnic elites contesting the spoils of the state. As stated by Roessler, in natural states, elites are only as powerful as their supporter networks[6]. A larger group means a larger pool of potential recruits and support, a larger share of territorial occupation, greater access to natural resources, and ultimately a greater capacity of mobilization. In addition, the political claims of larger ethnic groups can enjoy more legitimacy and attract more support (Cederman et al. [2010]). Ultimately, group size is the most realistic proxy for manpower.

[5]Irredentism may be categorized as either intra-state secessionist conflict or inter-state conflict depending on the main actor initiating the conflict. These conflicts are not used in the analysis.

[6]Roessler [2016]

Other measures reflecting the resources available for each group suffer from significant caveats. For example, income or access to roads could also be determinants of success in a conflict. However, they are endogenous in nature. They may be the result of the access of their co-ethnics to power (a key outcome of the model), and also reflect opportunity costs (another input of the model). In contrast, population share is not subject to political decisions, and had been largely determined by historical processes that anticipated the formation of these states. Furthermore, my identification strategy is extended to an ethnic-fixed effect specification, where I exploit the quasi-natural size variation in groups split across national borders.[7]

Population share also has some convenient properties that aid in empirical investigation. First, it is a continuous measure, which is important because of the non-linear effects that we wish to test. Second, it is variable defined over a broad range, including both very weak and very strong groups (the dataset exhibits groups with population share as low as 0.01%, and as high as 98%). Third, the population share measure is available for every group in the data, and is consistently calculated and not greatly subject to measurement error. Other measures that could proxy for group power, such as pre-colonial centralization, access to natural resources, presence of coethnics in neighboring countries, are dominated in at least one of the aspects above, and are definitely weaker determinants of manpower.

GeoEPR The GeoEPR (Wucherpfennig et al. [2011]) provides geospatial information on the settlement patterns of groups. This map of ethnic groups is used to construct several geo-referenced pieces of information at the ethnic-level. In particular, I use the map to identify crops that each group grows, which is used in the identification strategy of relative economic shocks.

Additional variables I include a battery of controls in several robustness checks throughout the analysis: leader's ethnic group size, within-

[7]Another threat would be a case where population share varies as a result of conflict. As argued later in the empirical strategy, such case is unlikely in this setting though. Although, there is a reasonable amount of deaths in civil conflicts, it is very small to cause any real change in the ethnic composition of the population, let alone change the size order of the groups.

country size ranking of groups, distance between the ethnic homeland and the national capital, distance between the group's and the leader's homeland, different measures of precipitation and drought, measures of elevation and mountainous terrain, within group fractionalization and light density. These variables are all constructed in the ethnic level. They are obtained (directly, or indirectly by using own calculations) from the GROWup project. The project uses geo-referenced information from several sources and construct ethnic-specific variables based on the settlement patterns of ethnic groups (Girardin et al. [2015]).[8] In the Appendix, I provide more details on each variable and the estimation results using them.

3.2.2 Descriptive overview of the data

Table A1 presents a general picture of the EPR dataset, indicating the number of politically relevant groups per country, the distribution of groups by political power, and the incidence of conflict. Countries have 4.7 relevant groups on average. For the analysis, at least two groups are needed as we need to identify a leader and at least one challenger, and then estimate the probability of inclusion of the challenger conditional on its strength. Conditional on having at least two politically relevant groups, we obtain 5.5 ethnic groups per country: 2.5 groups comprise the leader and included on average, while 3 are excluded. Ethnic conflict over the control of the government (the conflicts we are uniquely focused on) occur in 5.7% of country-year observations, and 38.1% of African and Asian countries had at least one episode historically, suggesting that this is a prevailing and critical issue in many settings. Leaders who do not share power (monopoly and dominant) are around 9% of groups; 10.9% of groups are leaders in power-sharing arrangements; included groups comprise 25.4%; the remaining 54.6% are excluded, from which a substantial amount are discriminated against (36.6% are powerless and 16.5% discriminated).

[8] Data can be accessed at https://growup.ethz.ch/

3.2.3 Discussion

There are some caveats worth mentioning here. The first is selection. Non-politically relevant groups are not observed in the dataset. This implies that we observe relatively stronger groups that have managed to exert at least some political influence. The counterpart of this is that there are a great number of small groups with limited or no representation in power (and who we would predict to never be in conflict) in the dataset. This yields enough variation to test the implications of being a weak group. Twenty-five percent (25%) of ethnic groups in the data have population shares of 1% or less; 8.7% of groups have a size less than or equal to 0.1% of the total population.

Next, the definition of ethnic groups is broader than usually used in other datasets (e.g. GREG; Francois, Rainer and Trebbi, 2015). The reason for this is that even though there is a multitude of ethnic groups, they tend to align in to more general categories when bargaining at the level of national politics. The same is true for militias organized along ethnic lines with the goal of taking control of the state.

Furthermore, we do not know how and why these ethnic groups became politically relevant. Here, I take the ethnic group unit as given. The key assumption for the identification strategy of the next sections to make sense is that differences in population share between two politically relevant ethnic groups affects inclusion and conflict (only) through their underlying strength, and not through any unobserved factors that may have resulted in those groups becoming different sizes. This assumption seems to be particularly justifiable for the countries of our sample. In most cases, ethnic identities were predetermined well before colonization and the formation of the independent national states.

Despite these minor caveats, the dataset provides an ideal setting to study empirically the causes of conflict. The reason is the availability of measures for all key elements of the theory: conflict, transfers, and group strength. Consequently, we are able to test not only implications over actual conflict, but also over power-sharing (when conflict occurs off the equilibrium path) - which is a significant contribution to the conflict literature.

3.2.4 Summary Statistics

Table 1 presents the summary statistics of the sample used in the estimations. The sample include non-leading groups only (see discussion on the Empirical Strategy below). Out of the sample of these challengers, 31.7% are included in the government coalition. The other key outcome is conflict, and around 2.07% of the group-year observations are in rebellion aiming to overthrow the government.

The key proxy variable for group strength, and the main regressor, is group size. The average size of a non-leading ethnic group is around 9.6%, varying from as low as 0.01% to as high as 98% .

3.3 Empirical Evidence

3.3.1 Within-Country Variation

Empirical Strategy

The model posits a unique relationship between the strength of challengers, the transfers received, and the incidence of conflict in equilibrium. To test such a relationship, the ethnicity of the leader and of the challengers must be defined. As described in the data section, I assume the ruling ethnicity is the most powerful group in the country-year (i.e *monopoly*, *dominant* or *senior partner*, necessarily). Given the EPR coding procedure (see above), the most powerful group in the country is the one holding the most influential and decisive positions, and very likely will be the leader's ethnicity.[9]

[9]There is a strong correlation between the most powerful group in the country in EPR and the ethnicity of the leaders in Francois, Rainer and Trebbi (2015). The few exceptions of discrepancies are mostly ambiguous, for example: i) leader's ethnicity (FRT) is not politically relevant, but targets support from other politically relevant groups (EPR); ii) In Democratic Republic of Congo, Laurent-Désiré Kabila (Luba ethnic group, and coded as so in FRT) led ethnic Tutsis (EPR) in overthrowing Mobutu; iii) In Nigeria's history,

For the remainder of the (non-leader) groups, I estimate the probabilities of being included in the government coalition (as Junior Partners), and of conflict, conditional on population size:

$$Y_{cet} = \beta_1 size_{cet} + \beta_2 size_{cet}^2 + \gamma_c + \gamma_t + \epsilon_{cet}, \tag{3.1}$$

where Y_{cet} is conflict or inclusion, dummy variables of ethnicity e, in country c, at period t; γ_c and γ_t are country and year fixed effects; and $size_{cet}$ is the group size measured by the ethnic share of the country's total population.

The identification strategy relies on comparing groups of different sizes in the same country. The key assumption is that differences resulting in inclusion and conflict are caused by the strength of the group. So, for example, if group size is correlated with natural resources, or the portion of territory occupied historically, there will be no threat to identification as long those correlates affect conflict and inclusion through group strength. The insight of the identification is to compare how contenders for power in the same country (same rents from office), under the same institutional setting, differ in the likelihood of being appeased as a function of the size of their ethnic network and capabilities.

Note there is a selection here. By excluding the leader from the regression, we are comparing groups that may not be strong enough to hold power in the first place. The identification is still valid if under this condition bigger groups are stronger. As it will be shown, the findings are inconsistent with a different a story where bigger groups would be weaker conditional on not being leaders. Certainly, the relationship between strength and population share conditional on not being leader is different than the unconditional one (and so the estimated coefficients). However, it is the former relationship that matters for us, given that leaders do not launch conflicts.

A final observation is that most of the within-country variation comes from comparing group of different sizes, and not from within-group variation over time. Group size is rarely updated in the dataset and generally only

Presidents of different ethnicities (FRT) were arguably chosen or kept in check but the military dominated by the Hausa-Fulani.

marginally so. One possible concern is that conflict episodes may themselves cause variation in group size. But this is not the case. First, group size is rarely updated during conflict periods (because it requires population surveys/census updates). Second, the number of deaths related to conflict are not high enough to cause significant changes in the population share of an ethnic group. Estimates of battle-related deaths in civil conflicts between 1989 and 2017 (from UCDP) point to an average of 1,163 causalities per conflict-year.

Main Results

Before presenting the results with country fixed-effects, I show the pure unadjusted relationship between population share and the likelihood of inclusion and conflict. Figure 3 fits a nonparametric (kernel-weighted local polynomial) regression of inclusion and conflict on group size. [10] It depicts what is, to the best of my knowledge, a novel empirical pattern. The pattern closely resembles the established theoretical results (see Figure 2). The probability of inclusion (positive transfers) increases, while the probability of conflict is virtually unchanged as a group becomes stronger. This proceeds until a threshold, beyond which the probability of inclusion declines, and the incidence of conflict spikes.

The same relationship holds comparing groups within the same country. Table 2 reports results from estimations that include country fixed-effects and a second-order polynomial of group size. The likelihood of being included in the governing coalition has a hump-shaped relationship with group size, implying that leaders concentrate more power when faced with an opposition supported by a very large fraction of the population (column 1). The peak of inclusion is reached when group size is around 40% of the population. Similar to the nonparametric regression, the marginal effects of group size on conflict are initially small but spike for the largest groups. The effects of group size and group size squared are jointly significant (column 2). Column 3 shows the result of regressing conflict incidence on group size

[10] Figure A5 includes binned scatterplot

squared only (without group size). The estimated coefficient is large and significant.[11] [12]

Robustness checks

Minorities in power Another alternative explanation for the results is the presence of minorities in power. The identification strategy compares groups of different size within the same country. However, by construction, the sum of population share of all groups must be less than 100%. Therefore, the outcomes of a larger group may be driven by the fact the remaining groups are smaller. In particular, a non-leader of large size necessarily implies a minority ethnic group in control of the state. One could argue that conflict may be the result of something special about minorities in power (for instance, if minorities adopt more discriminatory policies and exclude more groups). Nevertheless, I can control for the size of leader. Since minorities can be in power and face challengers of different sizes, we can still have variation in both the size of the challengers and the leader size. Table 5 shows that the main relationship between group size, and inclusion and conflict, is robust to controlling for leader size.

Leader and Country-year fixed-effects Part of the variation from the estimation with country fixed-effects comes from shifts in leadership. For example, assume one country with two groups: A and B. The specification with country-fixed effects compares the outcomes for A when A is the challenger and B is the leader, with the outcomes for B in a different period, when A is the leader and B is the challenger. It is clear that, by doing so, the leadership is not constant and the outcomes are not necessarily compared in the same period. In Table 6, I show the results are robust to including leader and country-year fixed effects. In practice, we are removing from the analysis countries with only 2 groups (because they have only one challenger per period). Although these cases provide an important source

[11] Table 3 reports the results of a regression which includes a 3rd order polynomial of group size. The implied pattern remains the same.

[12] Figure 4 plots the predicted value of inclusion on group size, assuming value 0 for the fixed-effects.

of variation, since they are the ones likely to have the large groups, we are still able to find significant effects without them.

Controls The results are also robust to the inclusion of a battery of controls.[13] Assume for a moment that our findings are picking up the effect of some other(s) determinant(s) of inclusion or conflict. For this to be true, this other determinant should either have the established non-linear relationships with inclusion and conflict, or a non-monotonic association with group size. I estimate the main specification including several possible determinants of inclusion and conflict.

One confounding factor would be if leaders make inclusion decisions based on the size ranking of groups, and not necessarily on their pure strength (Table A3). Leaders might also include groups based on their distance to the capital, or the leader's own homeland (Table A4), and possibly choose to fight against big groups that are far away (e.g., Buhaug et al. [2009]).

I also control for precipitation and frequency of droughts (Table A5), which has a long established relationship with conflict in the literature. Terrain ruggedness is another important correlate of conflict, state capacity and ethnic diversity (Jimenez-Ayora and Ulubaşoğlu [2015], Michalopoulos [2012], Fearon and Laitin [2003]). In Table A6, results are shown including elevation's standard deviation, and the proportion of mountains. Further, regressions in Table A7 include measures of intra-group religious and language fractionalization.

A last concern addressed here is the underlying relationship between strength and income. Groups might be included, or in conflict, as a result of their income. Adding income in the specification raises two major issues. The first is data availability. This can be overcome by using night light density in ethnic homelands. But this is available only from 1992 onward, which reduces the power of our estimation. Second, and more important, income is a classically problematic control to include in this case since conflict incidence may have a meaningful impact on income. With this caution in

[13]Summary Statistics for all controls are reported in Table 1

mind, results are reported in Table A8. The results persist with coefficients largely preserved when these additional controls are added.

Alternative Explanations

Strength concave in group size One threat to the results is that actual group strength may be concavely related to a group's population share. For example, very large groups may face more coordination problems. Alternatively, they may comprise a larger share of the population as a symptom of their inability to organize politically to a finer more coherent level. Similarly, large challenging groups may be particularly week, since they were not able to become leaders despite their size. Against this possible concern, if the reason for exclusion of big groups is indeed their lower strength, we should observe conflict responses similar to the small groups. But we observe something entirely different. While the likelihood of inclusion decreases for the biggest groups, the probability of conflict *increases*. This suggests that the effect is not driven by the fact that they are weaker, but that groups are excluded *despite being stronger*. In fact, the model provides a mechanism rationalizing why the leader would exclude such groups - that is, *because* they are stronger. Furthermore, even if the largest groups are politically weak in the sense that they were unable be leaders, their big numbers can still affect the success of a rebellion directly.

Large groups included as Senior Partners Another concern that can be raised is that strong groups are included as senior partners, and that is why we observe a decline in the probability of their being junior partners. This is unlikely for three reasons. First, Senior Partner and Junior Partners are coded taking into account not only the number of positions, but also their importance. Therefore, it is the Senior Partners who are most likely to be the actual leaders taking decisions on the allocation of cabinet posts. In fact, there are very few cases in which more than one Senior Partner is present per country-year (around 3%). Taking these, even if I assign the largest senior partner as an included group, the results persist - I still find a high probability of exclusion for large groups in general.

Second, if large groups were being appeased by the offer of senior partnership, we should not observe an increase in conflict. This last piece suggests that, in fact, those groups are not being fully accommodated.

Third, this alternative explanation cannot account for the fact that we do not observe excluded groups moving from exclusion to inclusion positions.[14] To reinforce this point, Table 4 presents results for the estimated probability of discrimination conditional on group size. Consistent with the previous results, the probability of discrimination is high for small and big groups, and lower for groups of intermediate size. Thus, bigger groups who are not leaders not only have their chances of inclusion reduced, but their chances of state-based political discriminated are also increased.

Cold War

Civil conflicts across Africa and Asia are known to have received significant international interventions, and may be a result of the struggle between foreign powers and their attempt of political influence. This was the case mainly during the Cold War period, when the United States and Soviet Union could potentially instigate rebel movements in order to replace incumbent governments with aligned regimes. Definitely, the proposed model is not the only explanation for civil conflicts, which can also be the result of such geopolitical factors. However, we still must conjecture whether those factors may explain the patterns in the data that I claim to be the result of the key mechanism of the model.

First, foreign interventions are not a concern to the empirical test of the model if they are occurring based on country characteristics aside of the ethnic distribution (since we use country fixed effects and use within country variation in the ethnic population share). Second, it is also not a concern if the additional strength leveraged by the group with the support of foreign allies could be accommodated in the power-sharing agreements. In this case, we could think of foreign alliances as one of the many factors

[14] Figure A6 shows the composition of power status by group size. It can be seen that as groups become larger they are more likely to be leaders. However, we do not see the same pattern in terms of mobility from exclusion to included groups.

influencing group strength for which we observe only a proxy (population share). Nevertheless, it would be a threat if conflicts are initiated by foreign powers, and those foreign powers only pick the largest ethnic groups - with probabilities increasing in the population share in a convex form.

In Table A9, I report the results splitting the sample between the period of 1946-1991 and 1992-2017. The key empirical patterns are the same for both periods, ruling out the hypothesis of the Cold War being the main driver of the results.

Further Predictions

Effects of group size conditional on status Here, I test one additional model prediction. As explained above, the leader's decision implies heterogeneity in excluded groups. They are composed of those who are too weak to have any credible threat, and those who are too strong to commit to peace if included. We should thus expect a positive relationship between our measure of strength (group size) and conflict for excluded groups. But we should not expect this for included groups whose additional strength is accommodated by larger transfers in the power-sharing arrangement.[15]

Table 7 presents the results of the empirical test of this prediction. Column 1 shows the impact of group size on conflict probability conditional on the group being excluded from the coalition. As always, specifications include country and year fixed-effects. Consistent with the model, the effect of group size is positive and statistically significant. In columns 2 and 3, results are reported for only included groups. In column 2, leaders are included in the sample, while in column 3 I restrict the sample to only non-leaders included as junior partners. For these groups, the impact of group size is much smaller and not distinguishable from 0.

[15] Francois et al. [2015] collect detailed information on the ethnicity of ministers for a sample of African countries. I combine the EPR data with theirs to obtain the share of cabinet appointments for each included group. Indeed, I find a strong positive relationship between group size and the share of appointments for included groups, which is also consistent with the model's prediction. The results are reported by Figure A7

3.3.2 Split groups

A series of robustness checks ruled out alternatives explanations. Still we might conjecture that ethnic groups of different sizes differ in ethnic-level characteristics that are unobservable to the econometrician, which might be the true underlying causes of conflict. For instance, a possible threat for my previous identification strategy is the following. Imagine that the experts responsible to identify the politically relevant groups classified the ethnic groups more broadly when they observed a conflict. If this is the case, groups in conflict may be from an ethnicity comprising a larger share of population just because of the arbitrary classification in EPR.

In order to deal with this possibility, in this section I use the existence of ethnic groups split across different countries. Then, I exploit the differences in the sizes of the same group across those countries to identify the effect of group strength.

Empirical Strategy

For this empirical strategy, I use the Trans-border Ethnic Kin (EPR-TEK) dataset. This is a companion to the main EPR-2018 which records all politically relevant ethnic groups living in at least two countries (i.e. ethnic groups with transnational ethnic connections) and whose settlement area is split by an international border.[16] I restrict the sample only to ethnic groups living in at least two countries, and I estimate the following flexible specification that includes ethnic fixed effects:

$$Y_{cet} = \beta_1 size_{ce} + \beta_2 size_{ce}^2 + \beta_3 size_{ce}^3 + \gamma_e + \epsilon_{ce}, \tag{3.2}$$

where Y_{cet} is our outcome of interest (conflict incidence or inclusion), in country c, ethnic group e, and year t.[17]

[16] See Vogt et al. [2015] for details on the data. See Cederman et al. [2013] for a reference of application.

[17] I include the cubic term in the estimation of the effect of group size on inclusion. This is necessary because the peak of inclusion probability occurs for groups around 20% of less (see Figure 7).

Under this specification, we are comparing the same ethnic group that is present in different countries, and as a consequence, has different sizes measured as the share of country's total population.[18] This specification, therefore, controls for any determinant of conflict and inclusion that is inherently constant to the ethnicity. For example, groups from a particular non observed type of ancestry, history, religion or social norms may be more or less likely to be in conflict or included. If these characteristics are correlated with group size, they can be a source of bias in the country fixed-effect specification. By using within-ethnicity variation, we assure the comparison of groups of similar culture, history and geographical region. Perhaps, most importantly, this strategy is robust to selection bias in the definition of the politically relevant groups by the data coders.

Figure 6 depicts the empirical strategy for the example of Shia Arabs; who do not fit the model exactly but serve as a clear illustration. The figure shows the presence of Shia Arabs in 4 different countries. Our data is annual, but in the figure I make it explicit whether the group is generally excluded or included when they are not leaders, and whether the group has been in conflict against the government. They are only 3% of the Iranian population. In Iran, the Shia Arabs are mostly excluded and always in peace. The same is true in Saudi Arabia, where they are 15% of the population. In Kuwait, on the other hand, they are 11% of the population and are often represented in executive power. A very different scenario occurs in Iraq, where although the Shia Arabs are the vast majority of the country's population (63%), they

[18] It is possible to conceive that ethnic groups might have support from their co-ethnics from the other side of the border in ways that the control (smaller) group would be contaminated by the treatment (larger co-ethnic group). In fact, the predicted pattern of group size and inclusion is shifted to the left (Figure 4 versus Figure 7, suggesting that this sample of groups is on average stronger. Suppose we have a group split in two countries. In country A, the group has 10% of population share, while it has 40% in country B. The key assumption is that the group will be stronger in country B, where it has a larger share of population in the territory (40%) with the little help of its co-ethnics on the other side of the border, than in country A, where it has only 10% of population despite having a better support across the border. More generally, by including ethnic fixed effects we compare the same ethnic group, having by construction the same number of co-ethnics across the world, and use only the variation of the population inside the borders of each country.

have been often excluded and are in a constant attempt to seize power. This example is not cherry-picked; the model predicts less likelihood of inclusion in the case of Kuwait as opposed to Saudi Arabia. But the true efficacy of the model is whether it explains conflict and exclusion patterns for the data as a whole.

Results

Table 8 confirms the evidence found using within-country variation for Africa and Asia. In column 1, I estimate our main specification for the inclusion outcome. All coefficients of the flexible specification of group size are significant. The estimated values imply a positive effect of increasing group size on inclusion probability up to around a 20% population share. After this, increasing group size decreases the probability of inclusion. Columns 2 and 3 report an increasing and convex relationship between group size and armed rebellion.

In columns 4 and 5, I test once more the additional model implication of model that strength is predictive of conflict only if the challenger is excluded from power. The results using ethnic fixed-effects confirm this prediction. Conditional on being excluded, a group comprising 10% more of its country's population is 1.96 p.p. more likely to be in conflict, compared to its other co-ethnics (column 4). The effect is very large given the average incidence of 1.5 % in the dataset (2.1% if considering challengers only). The effect of group size on rebellion is much smaller and only significant at the 10% level if the group is included in the coalition.

Africa as natural experiment Africa provides a unique opportunity for a further robustness check. The reason is that national borders were historically arbitrarily drawn, and therefore it provides exogenous variation in ethnic sizes within each country – often referred to as the "The Scramble for Africa". This term denotes the partitioning of the continent by European powers during the period of New Imperialism, between 1881 and 1914. The most significant event was the Berlin Conference of 1884 that laid down the principles that would be used subsequently to divide the rest of the continent. Asiwaju [1985] argues that the Berlim conference had no African representation or concern for local conditions, resulting in accidental marking of African borders. For instance, Alesina et al. [2011] document that eighty percent of African borders follow latitudinal and longitudinal lines. The artificial borders caused ethnic groups to be split between different countries. At the time of independence, new rulers in Africa decided to keep the borders drawn by former colonizers to avoid conflict with other countries, making the artificial divisions persist over time. Thus, the randomness of African borders split groups in bigger and smaller sizes that are uncorrelated with national characteristics.

Table 9 presents the results for Africa only. The first panel includes all politically relevant ethnic groups in African countries. As a robustness check, I remove non-native ethnic groups (e.g White Europeans) and "umbrella groups" in the the second panel. Umbrella groups refer to cases where one ethnic group in a country is related to two or more sub-groups in another. For example, "Blacks" in Mali are coded as the same ethnicity of both Mandingue and Pulaar in Senegal. In both panels, the findings attest to the previous results and model predictions.

3.3.3 Comparative Statics: Evidence from relative economic shocks

Now I test a further prediction of model given by the comparative statics implied by Proposition 1. The model postulates that the ratio between cost of conflict and the value of rents matters. Income variations changing costs and rents simultaneously in the same direction have an ambiguous effect; only changes in their ratio matters. Increasing the opportunity cost may make groups less willing to rebel and cheaper to buy off, but it can be offset by increasing the value of the prize (rapacity effect).

Variations in the opportunity cost, and value of rents ratio provide a useful way to test the model. According to the model, $\frac{d\theta^*}{\pi/c_c} < 0$ and $\frac{d\theta^{**}}{\pi/c_c} < 0$. In words, an economic shock that makes the challenger *relatively* poorer (i.e. the value of rents increases relative to the opportunity cost), lowers both thresholds. Intuitively, this makes conflict more attractive for the contesting groups, but causes (testable) nonlinear effects on conflict and inclusion probabilities. Specifically, conflict should increase, but more so for bigger groups (θ^{**} moves to the left increasing the support of groups in conflict). The effect on inclusion is ambiguous. The distribution of groups changes with more inclusion of weaker groups and exclusion of stronger ones. Figure 8 illustrates the effect of such economic shocks. These somewhat arcane implications of distributional shocks don't seem to naturally follow from some other cause, and allow for a further test of the model.

Data: Commodity price shocks and crop maps

As I explain in detail below, I identify relative economic shocks from relative price variation of crops grown by different ethnic groups. I construct commodity price indexes using data from Bazzi and Blattman [2014]. They collect data on prices of 65 commodities, the share of each commodity in total exports, and the value of exports to GDP for the period of 1957 to 2008. The primary source of commodity trade was extracted from the United Nations Commodity Trade Statistics Database (UN Comtrade) assembled by the United Nations Statistics Division (UNSD 2010). The dataset provides trade values by country, year and commodity. Additional data were collected from regional and individual country statistical yearbooks. Prices are taken primarily from IMF International Financial Statistics (IFS), followed by US Bureau of Labor Statistics (BLS) and Global Financial Data (GFD).

I then utilize individual maps of 32 crops that can be combined with the international price index. I collect geo-referenced information for all crop commodities listed in Bazzi and Blattman [2014]. Each crop map was produced by Monfreda et al. [2008]. It compiles land use information from national and sub-national census statistics in an updated global dataset of croplands on a 5 minute by 5 minute (roughly 10 km by 10 km) latitude/longitude grid during 1997-2003. From these maps, I obtain average production per land-area in an ethnic homeland. Finally, I use GeoEPR shapefile (ethnic homeland maps) in combination with the map of each individual crop to construct the weight of each crop at the ethnic group level.

Empirical Strategy

There are two main challenges to estimating distributional economic shocks. First, there is no consistent annual income variable available at the ethnic level for the whole sample.[19] Second, even if a good proxy was available, there would be endogeneity concerns. In order to overcome these challenges, I use exogenous variation in international prices of the crops grown by each ethnic group to identify differential (ethnic-specific) economic shocks. An ethnic-year price index is calculated as follows:

$$P_{eit} = \sum_c \frac{P_{ct} w_{cei} x_{ci}}{w_{ci}},$$

where P_{ct} is a real price index (corrected by CPI) of commodity (crop) c, at time t, and x_{ci} is a time-invariant share of commodity c in total exports of country i. This weight is calculated by the average of the annual share of that particular commodity in total exports for the period over which we have data available (1957-2008).

The ratio $\frac{w_{cei}}{w_{ci}}$ is a measure of ethnic advantage, where w_{cei} is the average production by area of crop c, at the homeland of the ethnic group e, in country i. The same is done at the country-level to calculate w_{ci}. The variables w_{cei} and w_{ci} are constructed combining maps for each crop c (Monfreda et al. [2008]), and the country and ethnic homeland maps (GeoEPR). I then define an ethnic-specific economic shock variable:

$$\widetilde{S}_{eit} = \Delta(logP_{eit}) * (X_i/GDP_i),$$

where X_i/GDP_i is a constant export per GDP ratio (we also take the average over the sample period). Intuitively, the economic shock reflects the variation in international prices weighted by the importance of each commodity in the export basket. This is weighted by the relative importance of the ethnicity production of that commodity. In addition, we expect that shocks may be more important the higher is the magnitude of exports in the country's GDP. The commodity price index is always included in the

[19] Night-time light density is only available after 1992.

regression analysis using first differences (because commodity prices follow approximately a random walk process).

I proxy increases in π/c_c with price variation that makes the ethnic group relatively poorer with respect to the leader. In order to calculate relative shocks, I take the difference between the ruling ethnic group (l) and each group e in the country:

$$S_{eit} = \Delta log(P_{lit}/P_{eit}) * (X_i/GDP_i), \tag{3.3}$$

Finally, I estimate the following specification:

$$\Delta Y_{eit} = \phi_{ei} + \gamma_t + \beta_0 S_{eit} + \beta_1 S_{eit-1} + \beta_2 S_{eit-2} + \epsilon_{eit}, \tag{3.4}$$

where Y_{eit} is the outcomes of interest: conflict over the government, or inclusion. The parameters ϕ_{ei} and γ_t are ethnic and time fixed-effects. As always, robust standard errors are clustered at the country-level.

Figure 9 illustrates the identification strategy. Togo is an African country with two politically relevant groups: Ewe living mostly in the south, and Kabre that are more predominant in the northern-central areas. The Ewe's homeland is relatively more productive in coffee, while the Kabre's homeland is relatively more productive in cotton. When the price of coffee increases more than the price of cotton, I assume that the ratio of opportunity cost to rents decreases for the Kabre (who are more abundant in cotton), increasing their value of fighting. The opposite effect would occur for the Ewe's group.

Results

Table 10 presents results for regressions testing the implications of the model illustrated in Figure 8. Exogenous economic shocks inducing leaders to become *relatively* richer have marginally small positive effects on the probability of conflict (Column 1). This weak causal effect hides strong heterogeneity. The effect of distributional shocks in favor of the leader on conflict onset are larger for bigger groups (Column 2). A 10% increase in the leader's prices relative to a challenger with a population share of

50% increases the probability of conflict by around 2.5 p.p. (compared to a sample average of 2.1%). Consistent with the model's predictions, commitment worsens for strong groups. Increasing rebellion incentives for such groups leads to bargaining failures, while weaker groups are more likely to be accommodated in power-sharing agreements.

The effect of distributional shocks on inclusion is not significant (Column 3). In column 4, there is some evidence (although the coefficients are significant only at 10% level) that the effect is heterogeneous. Specifically, a relative shock favoring the leader will have a maximum positive effect for groups that are around 19.4% of the country's population. For groups bigger than this, positive effects diminish and eventually become strongly negative, implying a lower probability of appeasing an opposition more disposed to conflict.

One potential concern with the relative shocks variable constructed is the possibility of variation due to leader transition, and not international prices only. To address this concern, Table 11 reports the same analysis excluding periods of leader transition. The results are preserved.

3.4 Conclusion

In this chapter, I have presented strong empirical support to the theory developed in Chapter 2. I use a novel dataset combining information on access to executive power by ethnic groups, conflict over the control of the government launched them, and a reasonable proxy for group strength. The key predictions of the model are tested using a multitude of empirical strategies. First, I compare groups of different sizes within the same country to show evidence for the strong non-linearities between group strength, and conflict and inclusion outcomes, predicted by the model. The results are robust to the inclusion of a series of fixed-effects and a battery of controls. Second, the results persist using a quasi-natural variation induced by groups split across borders. Third, I test a comparative statics implication of model, identifying conflict-inducing relative economic shocks in the ethnic level.

The analysis has provided novel empirical patterns of the distribution of power among ethnic groups in weak states - particularly, the evidence of exclusion of strong groups. Also, the new documented facts are tightly linked to the model. This moves forward the needed effort of testing theories in the conflict literature (Blattman and Miguel [2010]).

Chapter 4

Power-sharing and Conflict: Structural Estimation and Policy Counterfactuals

4.1 Introduction

The model has successfully accounted for key patterns in the data, and survived several empirical tests. Now we can take one step forward. Under the assumed structure of the theory, the model parameters can be estimated. This allows me to quantify the effects of policies that can be influenced and executed by the international community aimed at mitigating conflicts. Most of them are fruit of heated debate, and generally lack any scientific diagnosis about their potential impact.

The policy-relevant counterfactuals I evaluate are democratization, military capacity, financial aid, sanctions and quotas. The relationship between democratization and conflict has been a topic of long debate and little empirical consensus (e.g., Mansfield and Snyder [2007], Bernhard et al. [2017]). Most findings suffer from endogeneity issues, and also by the fact that democratization itself may be a leader's decision of power-sharing. Without taking any normative stand, here I simply estimate the effect of democratization in a key outcome of interest - intrastate conflict. Alternatively, I investigate the effects of enhancing the state capacity of governments, potentially increasing the military superiority of incumbents.

Financial aid, another relevant policy, has been widely used by the international community to provide assistance to developing countries. States with conflict history have been target of substantial amount of resources given the size of their economies. For example, official development assistance to historically conflict-prone countries, like Afghanistan, Liberia, Burundi, and Rwanda, are 13%-21% of their gross national income.[1] Nevertheless, the effects of such interventions on conflict have also been a topic of contradictory results in the literature. The model estimated here will be able to illuminate how financial aid can have positive or negative results depending on its design (depending particularly on the recipient group).

I also investigate the role of sanctions and conditional aid in disciplining leaders and rebel groups. This is of first order importance. A common view of why violent leader transitions occur so frequently in weak states is that new leaders are promptly recognized by other national leaders once they assume office (Roessler [2016]). What would be the effect of sanctions - a trade restriction, for instance - on countries in conflict? How would leaders and challengers adapt their power-sharing and conflict decisions? Would this be quantitatively important?

Furthermore, quotas - numerical requirements of representatives of particular groups in political positions - have been increasingly implemented worldwide in order to achieve higher inclusion and equality. Could we achieve peace by enforcing some minimum inclusion of opposing groups? I evaluate the effects of such policy in mitigating conflicts.

4.2 Additional data

For the purpose of estimating the model, I make use of additional data beyond the standard EPR data presented in Chapter 3. The reason for collecting additional data is the following. The model has implications beyond

[1] Data obtained from the World Bank database.

conflict and inclusion probabilities. The parameters of the model define a threshold (θ^{**}) that determines who is in conflict and who is appeased in a power-sharing agreement. The distribution of strength not only generates the probability of conflict but also the probabilities of rebel victory conditional on fighting. Furthermore, power-sharing transfers also depend on the distribution of strength conditional on being between the two thresholds that determine inclusion. Thus, having information on the shares of power transfered to challengers (not available in the EPR) and the outcomes of civil conflict can provide additional variation to help in identifying structural parameters.

Information on shares of power obtained by included groups comes from the dataset collected and used by Rainer and Trebbi [2012] and Francois et al. [2015]. They employ a complete dataset on the ethnic affiliation of each national minister for 15 African countries since independence until 2004. The ethnicity categories in their dataset are not the same as in EPR. Thus, I first match the ethnicities in the two datasets and then calculate the proportion of cabinet seats occupied by each included group in EPR. I will use this variable as a noisy measure (more on this below) of the transfer conceded by the leader. Note that I only have this information for a sub-sample of the whole dataset. In the econometric specification (below), I derive the likelihood of observing a particular value of transfer for an included group if it is observed, and also the likelihood of being included (independent of how much is shared) for groups that are not part of this sub-sample.

Next, I construct a binary variable indicating if an insurgent challenger won or lost the war. Data on the outcomes of conflict are coded manually, case by case, for every group identified as in conflict against the government. The main source of information is the UCDP Conflict Termination Dataset (Kreutz, 2010). As explained above, ethnic groups in conflict are matched with rebel actors that claim to represent them, and then with the outcome of the conflicts that those actors are launching.

There are 6 possible outcomes in the UCDP Termination Dataset (*rebel victory, government victory, low activity, actor ceases to exist, peace agree-*

ments and ceasefire. I follow the dataset ruling if the outcome is defined as rebel victory or government victory. In most of the cases the outcome is coded as low activity (because UCDP codes conflict only for episodes with more 25 battle deaths per year). Then, I search in the same dataset for the final result if the conflict eventually resumed. Otherwise, the final outcome is obtained from other online sources. If the actor ceases to exist, I identify the new actor name that represents the ethnic group (which is generally the case) and the resulting outcome of that conflict event. The final outcome is coded as missing for Peace agreements and Ceasefire agreements, unless the conflict eventually resumes and a rebel victory or defeat can be clearly established. Finally, outcomes of ongoing conflicts are also missing. Here again, I define the likelihood of conflict (for those with a missing outcome) and the likelihood of victory (or defeat) for groups from whom I could identify the final outcome of conflict.

In sum, the data we have consists of every non-leader group, whether it is included in the coalition, and whether it is in conflict against the government. For a subsample, we will also have the shares allocated to included groups, and the final outcome (victory/defeat) of conflict.

4.3 Econometric specification

4.3.1 Overview

I give a brief overview of the structural specification before showing the details. In general, I assume players are playing consistently according to the model. Information is complete: Challengers know their own strength. Leaders know it as well. The game is static and played repeatedly every period. The econometrician does not observe group strength perfectly, but strength depends on the group's population share. Strength varies between groups, but does not vary over time. Group inclusion (and power-sharing transfers) and conflict can vary over time. This temporal variation comprises deviations from outcomes predicted by the model which are due either to measurement error or arise due to reasons outside the model. Next, I elaborate on the econometric specification.

4.3.2 Strength

Each ethnic group i has a time-invariant[2] innate strength θ_i. We cannot observe θ_i perfectly, but observe the population share (s_i) of each group as a proxy. Specifically, θ_i is drawn from a cumulative distribution $F(\theta|s_i)$, and density function $f(\theta|s_i)$, with support $[0, 1-\alpha]$. As clarified above, θ_i is the probability of victory if the group launches a conflict and is only defined (in the context of the theoretical model) over this support.[3]

I assume $F(.)$ and $f(.)$ are functions with beta distribution, such that $\theta_i \sim Beta(\gamma, \gamma(1-s_i)/s_i, 0, 1-\alpha)$, where $\gamma > 1$. The shape parameters γ and $\gamma(1-s_i)/s_i$ depend on the population share of the group, and 0 and $1-\alpha$ are the minimum and maximum values in the support of the distribution.[4][5] These parameters are defined to generate $E[\theta_i|s_i] = (1-\alpha)s_i$. This captures the hypothesis of group size being a proxy for strength. Every group may draw any innate strength from 0 to $1-\alpha$; however, in expectation, arbitrarily small groups have negligible chances of winning, while groups comprising almost the whole population have probability of success close to the maximum. Beta is a suitable distribution in this case for being defined

[2]The time-invariant innate strength of the group captures the strong persistence of conflict and power-sharing in the dataset.

[3]θ_i must be not greater than $1-\alpha$ to guarantee that the probability of success of conflict does not surpass 1 for any power-sharing transfer

[4]This distribution will be estimated for the sample of non-leaders. Again, note there is a selection since we might expect that leaders are stronger in expectation even conditional on population share. Nevertheless, the distribution of strength *conditional* on not being leader is exactly what we are interested in (and, it is the one estimated here). The expected strength unconditional on being leader and challenger is not relevant since leaders don not go to war, and their strength is not determinant of the equilibrium. We want to know what population share reveal about the group strength for those who are challengers.

[5]I don't impose any country heterogeneity because reduced-form estimates of the effects of population share with and without country fixed-effects are very similar. Technically, maximum likelihood estimates of country-specific distributions of θ could result in implausible corner solutions. Groups in countries with only exclusion and peace would be estimated as weak as possible. Meanwhile, groups in countries where the challenger is a victorious rebel would have their strength estimated as high as possible.

in a limited interval.[6] The assumption $\gamma > 1$ guarantees a bell shape for the distribution.[7]

4.3.3 Conflict

Conflict initiated by group i, at period t, is observed through a binary variable $C_{it} \in \{0, 1\}$. According to the model, a group with strength $\theta_i > \theta^{**}$ is in conflict in equilibrium. In the data, such groups will be observed in conflict, in a particular period t, with probability ϕ_c. There are a few reasons why there may be time variation in measured conflict even if the underlying data generating process is constant. For instance, conflict episodes are only coded as such in the dataset if they resulted in at least 25 battle deaths in the year. Similarly, active insurgent groups may occasionally stop fighting to regroup (while the underlying contest with the government still exists unabated), or the events of conflict may have not been observed by data coders.

If $\theta_i < \theta^{**}$ group i is not in conflict in equilibrium, according to the model. In the data, such groups are assumed to be in conflict with probability ϕ_0. These episodes are pure errors not explained by the model. We can think of them as uninsurable conflicts (i.e., ones that cannot be appeased by power-sharing)[8]. It will be shown that the estimated value of ϕ_c is substantially greater than ϕ_0, which turns out to be fairly small. Practically, in the context of the likelihood estimation, this positive probability of conflict deals with conflict outliers (e.g. included groups in short conflicts). Formally:

$$P(C_{it} = 1) = \begin{cases} \phi_0 & if \quad \theta_i \leq \theta^{**} = \frac{(1-\alpha)c_l/\pi + c_c/\pi}{\alpha} \\ \phi_c & if \quad \theta_i > \theta^{**} = \frac{(1-\alpha)c_l/\pi + c_c/\pi}{\alpha} \end{cases} \tag{4.1}$$

[6] For examples and discussion of the use of the beta distribution in this literature, see Merlo (1997), Diermeier, Eraslan, and Merlo (2003), Adachi and Watanabe (2007), Francois, Rainer and Trebbi (2015)

[7] A higher γ indicates lower variance. In practice, variance of groups in the extreme (with population share close to 0 or 1) is substantially low for any γ. This is because the expectation of $theta_i$ is already close to one of the support limits.

[8] For example, there may be short-term instability due to disagreements in the allocation of power-sharing agreements.

Let W_{it} be a binary variable determining the outcome of a conflict. It takes value 1 in case of a rebel's victory (with probability θ_i) and value 0 in case of a leader's victory (with probability $1 - \theta_i$).

Conflict

4.3.4 Power-sharing

Finally, every player in the game receives (and perfectly observes) τ_i as a function of the group's innate strength θ_i, according to Proposition 1 ($\tau_i = 0$ if $\theta_i \in [0, c_c/\pi] \cup [\frac{(1-\alpha)c_l/\pi + c_c/\pi}{\alpha}, 1-\alpha]$, or $\tau_i = \frac{\theta_i - c_c/\pi}{\alpha}$ if $\theta_i \in [c_c/\pi, \frac{\theta_i - c_c/\pi}{\alpha}]$). We imperfectly observe τ_i for included groups, where the observation includes time-varying group-specific errors, v_{it}. I define the following latent variable:

$$X_{it}^* = \tau_i + v_{it},$$

where v_{it} is identically distributed across time and ethnic groups, and has symmetric distribution around zero, with density function $g(.)$ and cumulative function $G(.)$. The empirical ministerial allocation observed in the data is $X_{it} = X_{it}^*$ if $X_{it}^* \geq 0$ and $X_{it} = 0$ if $X_{it}^* < 0$. In what follows, I set $v_{it} \sim N(0, \eta)$.

Therefore, an included group ($\tau_i > 0$) is erroneously observed out of the coalition in the data with probability $P(X_{it} = 0 | \tau_i > 0) = G(-\tau_i)$. This probability goes to zero as τ_i increases. Meanwhile, the probability of observing such groups as excluded approaches 50% as τ_i approaches zero.

I finally allow for the possibility of error in assigning excluded groups (they could be empirically assigned as included in some periods). For example, ethnic groups may have unobservably different factions or subgroups - one of whom may be included, and the other excluded; or a group's strength may eventually move away from its innate condition. The probability of such errors will also be governed by the parameter η, and will depend on the distance to inclusion thresholds. For simplicity of notation in the derivation of the likelihood, we define the probability of empirical inclusion of excluded groups as $\tilde{\eta}$:

$$\tilde{\eta} = P(X_{it} > 0|\tau_i = 0) = \eta(1 - \Phi(d/\eta)), \text{ where } d = min(|\theta_i - \theta^*|, |\theta_i - \theta^{**}|) \tag{4.2}$$

The component $(1-\Phi(d/\eta))$ follows the same structure as the measurement error for included groups. It is the probability that a normally distributed random variable, with standard deviation equal to η, is greater than d. If the group strength is far from what is needed to be included, the empirical probability of inclusion is lower. To put it another way, as the group strength becomes closer to the inclusion threshold it is more likely to be observed as included. In the limit, as d approaches zero, $(1 - \Phi(d/\eta))$ converges to 0.5. For this reason, the term is multiplied by η, making it dependent on the variance of the measurement error.

Note how the measurement error is governed by η. As η goes to zero, there is no measurement error. We would observe power-sharing allocations perfectly, and excluded groups would never be mistakenly observed as included in the data. As η increases both error types are more likely (seeing inclusion of an actually excluded group, or empirically assigning exclusion to a group included - in the model - in the coalition).

The probability density function of observing a specific ministerial allocation for an excluded group is given by:

$$\begin{aligned} P(X_{it} = x > 0|\tau_i = 0) &= \tilde{\eta}P(\tau_i + v_{it} = x|\tau_i = 0, x > 0) \\ &= \tilde{\eta}P(v_{it} = x|v_{it} > 0) \\ &= 2\tilde{\eta}g(x) \end{aligned} \tag{4.3}$$

This group-specific idiosyncratic component has two purposes in our estimation. First, it captures temporal deviations from a long-run constant transfer (explained by the model). This is consistent with the data that shows that power-sharing allocations are very persistent with small fluctuations over a historical average. Second, it captures the unusual cases where we observe transitory inclusion of groups, some of them in conflict (which is not predicted by the model for any group type). In this econometric specification, I allow for cases where $\theta_i > \theta^{**}$, and even though a group is in conflict and excluded according to the model, transitory transfers may be observed due to idiosyncratic shocks.[9] This is also consistent with the data: 79% of included groups in conflict are found to be excluded in other periods; whereas only 38% of peaceful included groups are eventually excluded.

4.3.5 Likelihood

For the structural estimation I assume all groups face the same cost of conflict c_c. For identification purposes, I also set $c_c = c_l = c$ (both α and c_l determine the value of the second threshold, so they cannot be separately identified). It is also clear from the solution of the model that all outcomes depend only on c_c/π and c_l/π, and not on c_c, c_l and π separately; thus, only the ratios are identified.

Given the set of model parameters $\Theta = [\alpha, c/\pi, \gamma, \eta, \phi_0, \phi_c]$, the joint likelihood of observing a power-sharing allocation X_{it}, conflict decision C_{it}, and conflict outcome W_{it} conditional on θ_i is defined as:

$l_{it}(X_{it}, C_{it}, W_{it}|\theta_i; \Theta) =$

$$\begin{cases} (C_{it}\phi_0 + (1-C_{it})(1-\phi_0))[(1-\tilde{\eta})\mathbf{1}(X_{it}=0) + 2\tilde{\eta}g(x)\mathbf{1}(X_{it}=x>0)+ \\ \quad \tilde{\eta}\mathbf{1}(X_{it}>0, x=.)], \quad if \quad \theta_i < c_c/\pi \\ \\ (C_{it}\phi_0 + (1-C_{it})(1-\phi_0))[G(-\frac{\theta_i - c_c/\pi}{1-\alpha})\mathbf{1}(X_{it}=0) + g(x-\frac{\theta_i - c_c/\pi}{1-\alpha})\mathbf{1}(X_{it}=x>0)+ \\ \quad (1-G(-\frac{\theta_i - c_c/\pi}{1-\alpha}))\mathbf{1}(X_{it}>0, x=.)], \quad if \quad c_c/\pi \le \theta_i \le \frac{(1-\alpha)c_l/\pi + c_c/\pi}{\alpha} \\ \\ [(1-C_{it})(1-\phi_c) + C_{it}\phi_c\mathbf{1}(W_{it}=.) + C_{it}\phi_c\mathbf{1}(W_{it}\in\{0,1\})(W_{it}\theta_i + (1-W_{it})(1-\theta_i))]* \\ \quad [(1-\tilde{\eta})\mathbf{1}(X_{it}=0) + 2\tilde{\eta}g(x)\mathbf{1}(X_{it}=x>0) + \tilde{\eta}\mathbf{1}(X_{it}>0, x=.)], \\ \qquad if \quad \theta_i > \frac{(1-\alpha)c_l/\pi + c_c/\pi}{\alpha} \end{cases} \tag{4.4}$$

The first case gives the likelihood conditional on group strength being lower than the first threshold ($\tau_i = 0$). In this case, the probability of conflict

[9] An examination of the cases of included groups in conflict points to several reasons (not inconsistent with the key elements of the model, but due to the limitations of the data): i) ethnic group has two factions, one included and the other excluded and in conflict; ii) conflict in anticipation of a future exclusion; iii) short-term instability due to disagreements in the allocation of power-sharing agreements.

is ϕ_0 (Equation (4.1)). The probability of observing this group excluded is $1-\tilde{\eta}$ (analogously, the inclusion probability is $\tilde{\eta}$), as given by equation (4.2). We observe cabinet allocations for a subsample of included groups. In this case, the probability density function of observing a particular allocation x is given by $2\tilde{\eta}g(x)$, as shown in equation (4.3).

In the second case it is shown the likelihood conditional on group strength being between the two thresholds. In this interval, the group is predicted to be in peaceful inclusion. Again, the conflict probability is ϕ_0. The probability of exclusion depends on the distribution of measurement errors for included groups. As explained above, it is given by $G(-\tau_i)$, where $\tau_i = \frac{\theta_i - c_c/\pi}{1-\alpha}$. If we observe the cabinet allocation of an included group, we use the density function $g(v_{it} = X_{it} - \tau_i)$.

Lastly, the third case has the likelihood for groups above the second threshold, and therefore predicted to be in conflict and exclusion. The probability of observing conflict empirically for this group is ϕ_c. For a subsample of rebel groups, we have conflict outcomes ($W_{it} \in \{0, 1\}$). If this is the case, the probability of conflict is also multiplied by the probability of victory (θ_i) or defeat ($1-\theta_i$), depending on the realization (W_{it}). Inclusion probabilities follow the same structure as the groups in the first block. Note that $\tilde{\eta}$, $G(.)$, and $g(.)$ depend fundamentally on the parameter η to be estimated.

The likelihood of the time series of observations for each ethnic group i conditional on θ_i is:

$$l_i(X_i, C_i, W_i|\theta_i; \Theta) = \prod^{T} l_{it}(X_{it}, C_{it}, W_{it}|\theta_i; \Theta). \tag{4.5}$$

Integrating over the distribution of unobserved strengths, we obtain the likelihood of each group conditional on population share:

$$l_i(X_i, C_i, W_i|s_i; \Theta) = \int_0^{1-\alpha} l_i(X_i, C_i, W_i|\theta_i; \Theta) f(\theta|s_i) d\theta \tag{4.6}$$

Finally, the log-likelihood is given by:

$$\ln L(\Theta) = \sum_i \ln l_i(X_i, C_i, W_i | s_i; \Theta) \tag{4.7}$$

4.4 Estimation

I estimate the parameters Θ of the model using Maximum Simulated Likelihood (MSL). Note that the conditional probability $l_i(X_i, C_i, W_i; \Theta)$ involves an intractable integral. In the absence of a closed-form solution, the likelihood of each observation is estimated as:

$$\hat{l}_i(X_i, C_i, W_i; \Theta) = \frac{1}{R} \sum_{r=1}^{R} l_i(X_i, C_i, W_i | \theta_i^r; \Theta), \tag{4.8}$$

where θ_i^r, $r = 1, = 1, ..., R$, are R draws with marginal distribution $f(\theta | s_i)$.

The estimator $\hat{\Theta}_{MSL}$ minimizes the negative simulated log-likelihood:

$$\ln \hat{L}(\Theta) = -\sum_i \ln \hat{l}_i(X_i, C_i, W_i | s_i; \Theta) \tag{4.9}$$

The MSL estimator is consistent with usual Maximum Likelihood (ML) asymptotic distribution if $N \to \infty$, $R \to \infty$, and $\sqrt{N}/R \to 0$, where N is the number of observations.

4.5 Identification

I aim to identify the following parameters $[\alpha, c/\pi, \gamma, \eta, \phi_0, \phi_c]$. Every group draws a unique and persistent strength θ_i. This generates a time invariant τ_i. Therefore, η can be identified from within group time variation in the allocation of cabinet seats, as well as group shifts in inclusion/exclusion. Conditional on the value of the second threshold (c/π and α) and strength distribution, we can compute the probability of falling within each range (before or above the threshold) for each group conditional on population share. The resulting conflict probability will depend on ϕ_0 and ϕ_c. More precisely, the probability of conflict for a group of size s_i is equal to

$F(\theta^{**}|s_i)\phi_0 + (1 - F(\theta^{**}|s_i))\phi_c$. Variation in group sizes and their respective empirical likelihood of conflict identify ϕ_0 and ϕ_c.

Given the conditional distribution of strength, c/π is identified to match the probabilities of exclusion and low conflict. The second threshold is a function of both c/π and α. Having the value of the first as given, α is identified to match the empirical probabilities of inclusion/low conflict and exclusion/high conflict. A bigger α implies a higher threshold, and higher likelihood of inclusion/peace compared to exclusion/conflict. Furthermore, the second threshold determines the distribution of the strength of groups in conflict - because it defines the minimum strength to have conflict in equilibrium. Consequently, the empirical probabilities of success also provide variation for the identification of α.

Lastly, γ is identified from the variance in equilibrium outcomes; that is, how likely groups of the same size are distributed in different equilibrium zones. A higher γ implies lower variability and more precision in the prediction of inclusion and conflict probabilities.

4.6 Results

Table 12 presents the maximum simulated likelihood estimates of the structural model parameters $[\alpha, c/\pi, \gamma, \eta, \phi_0, \phi_c]$. The cost of conflict is estimated to be 3.6% of the value of the rents of capturing the government. This implies a relatively low cost, and explains the steep response to the inclusion probability from increments in the population share for small groups. This small value is consistent with the low levels of income of the average citizen, and the fact that opportunities of economic success are concentrated in holding political positions. This is a common view in many African countries. For example, salaries of ministers in Zaire at the end of Mobutu's rule are estimated to be 40 to 60 fold greater than those received by doctors and judges (Francois et al. [2015];Gebrewold [2009]).

The marginal shift in success probability of conflict due to power-sharing transfers (α) is estimated at 0.17. Combined with the estimated value of the cost, it implies $\theta^{**} = 39\%$ - the maximum strength of groups that leaders are willing to accommodate in the coalition. If the threat is higher, groups cannot be included without significantly increasing their power and making the cost of inclusion larger than the expected losses from conflict. In fact, 69% of conflict episodes, for which we observe the final outcome, end with the rebel's victory, suggesting high likelihood of success for insurgents.

The estimate of γ is 1.0004. Because the structure of the strength distribution imposes expectation of strength equal to population share (adjusted by $1 - \alpha$), the variance of distribution is always low for groups close to the boundary of the distribution (group size close to 0 or 1). However, an estimate estimate of γ close to 1 suggests a high variance for groups with population share in the middle range, and the importance of other non-observed explanatory factors for group strength.

The parameter η governing the distribution of inclusion and exclusion measurement error is relatively low (0.08). This captures the temporal standard deviation of cabinet appointments within group. It also governs the probability of empirical inclusion for groups expected to be excluded. The estimate implies a probability of 2% of inclusion for a group whose strength is far from the inclusion threshold by 0.05. For groups that are further than 0.1 from the inclusion threshold, the inclusion likelihood is less than 1%.

Finally, the estimates of ϕ_0 and ϕ_c highlight the explanatory power of the model. The probability of conflict for groups below θ^{**}, and therefore, unaccounted by the model is 0.9%. On the other hand, groups who are estimated to be above the threshold, and subsequently, strategically excluded by the leader, are in conflict 32.8% of the time. This is also suggestive that the model explains longer and more persistent conflicts.

Figure 10 shows the simulated probability of inclusion and conflict by group size generated by the estimated parameters. The non-linear relationships observed in the pure data (as shown in Figure 3) are closely recovered by the structural model.

4.7 Counterfactuals

I use the model to study several policy relevant counterfactuals. I first explain how the model parameters, or the structure of the game, may be heavily influenced by international interventions or institutional policies (democratization, military capacity, financial aid, sanctions and quotas). Then, I examine how these changes affect conflict probabilities and other outcomes, by simulating the model in the dataset under the new parameters or structure. Results are shown in Figure 11 and Table 13.

All counterfactuals are compared to the results of the baseline model. The probability of conflict and inclusion are 2.52% and 29%, respectively. Using the inclusion probability and the size of the the leaders, I compute that the coalition has ethnic representation comprising 66% of the population (in expectation). Back-of-the-envelope calculations find the probability of an eventual leader's removal through conflict to be 13.5%. This is calculated as the sum of probabilities of challengers being strong enough to be excluded and in conflict, multiplied by their expected strength conditional on the first case.

Democratization Several politically unstable regimes in Africa and Asia are associated with autocracies headed by ethnic minorities. In many cases, these ethnic minorities have held power by excluding large segments of society. This is the case of Liberia that was ruled by a small minority of freed American slaves repatriated there until 1980. Other examples include white minority rule in Zimbabwe and South Africa, the Tutsi-controlled government in Burundi, and Saddam Hussein's Sunni-dominated regime in Iraq.

In this counterfactual experiment, I arbitrarily move the leadership of the government to the largest group. This is not necessarily the strongest group but is likely to be so. Subsequently, the composition of challengers is replaced by one with challengers of smaller size, who are more likely to be appeased. I call this experiment "democratization" since it approximates the largest group advantage that arises in democratic elections.

Democratization generates a large drop in conflict of 35% (from 2.52% to 1.63%). The probability of inclusion only slightly moves from 28.9% to 29.6.1%. The effect is largely driven by having a leader who would be a potentially excluded rebel otherwise. This increases the size of the coalition (from 66% to 73.7%). Under democratization the regime is considerably more stable. The probability of an eventual leader's removal by violent means falls from 13.5% to 5.3%. Higher stability is driven by both a smaller likelihood of conflict and the fact that rebel groups are now weaker.

Military Capacity The second counterfactual experiment examines the effect of increasing military capacity. State capacity, conceptualized as the coercive control and the monopoly of violence, is clearly associated with civil conflict. Conflict-prone countries are those where armed groups mount credible threats against weak regimes. The implied policy here is one where the international community would provide military and organizational assistance to governments. Increasing the military capacity of a country would enhance the control of the government forces over the territory and weaken anti-government militias. In particular, I examine the effect of decreasing the probability of rebel victory by 20% ($\Delta\theta/\theta = -20\%$). I find that conflict would be reduced by 20%. The inclusion probability also decreases. A lower strength induces the inclusion of groups who would have previously been excluded and in conflict. On the other hand, this effect is overcompensated by the exclusion of groups who lose their credible threat. As a result, stability increases with a lower probability of the leader's removal (8.4%).

Financial aid to groups Governments and international organizations have extensively used development assistance to reduce violence and improve lives in conflict-prone regions. Development assistance has the main goal of improving welfare by expanding heath care, schooling, job opportunities, and income. Increasing the economic opportunities and future prospects of citizens makes them less vulnerable to be recruited by rebel groups. In the context of the model, I assume this would increase the opportunity costs for rebel groups due both to higher salaries required for recruitment and the larger losses of infrastructure, and interruption of investments and economic activities. Here I evaluate the effect of financial aid that increases the opportunity cost of engaging in conflict (c_c) by 20%. The probability of conflict is reduced by only 10%; notably less than the changes associated with most of the other counterfactual policies. The small response is due to the fact that the opportunity cost parameter has been estimated to be relatively small compared with the estimated prize of capturing the government. Consequently, increasing costs by 20% does not have a substantial effect on c_c/π. The inclusion probability decreases are driven by the lower number of groups with incentives to fight.

Unconditional Government Aid (or Reduced Arming) Financial assistance may have a very different effect if instead of increasing the opportunity cost, it in fact raises the rents from office. The implied policy here is one that provides financial resources directly to the state, where political elites have discretion on their allocation, and can use them for their own benefit. Here I evaluate the effect of a 25% increase in the rents from office ($\Delta\pi/\pi = 25\%$) due to the higher revenues received by the country. Because the results depend only on the ratios c_c/π and c_l/π, this is equivalent to reducing the costs of conflict c_c and c_l by 20%. This can be interpreted as a "Reduced Arming" scenario. This would be a scenario with higher restrictions to the production and trade of weapons. In this case, the destructive potential of conflict, proliferated by weapons, troops, training, and resources from foreign allies, would be reduced. Consequently, the costs of conflict would be also diminished.

Results show an estimated increase in conflict of 23%. There are a couple of reasons for this large effect. First, it entails an effective decrease in both the leader's and challengers' relative costs, diminishing the scope for a peaceful bargain. Second, a decrease in cost can raise conflict more than an increase in the cost diminishes violence because there are more groups immediately to the left of θ^{**} than to the right. The probability of inclusion increases to 30.1%, while the coalition size declines to 64.8%. This is due to the inclusion of smaller groups and exclusion of bigger groups.

These results help reconcile the apparently contradictory results of the impact of financial aid on conflict in the literature. Some studies have shown financial aid increases conflict (e.g Crost et al. [2014], Weintraub [2016], and

Nunn and Qian [2014]). Others have found zero or negative effects on recruitment and insurgent support when benefits were designed to be less subjected to rebel targeting by directly giving them to community individuals (Crost et al. [2016], Blattman and Annan [2016], Lyall et al. [2018]). These results are consistent with ours that point to positive effects on conflict of larger rents, and modest negative effects of greater opportunity costs.

Government Aid Conditional on Peace What if, instead of giving unconditional financial aid, the international community gives financial assistance that is conditional on peace? I estimate the effect of increasing the rents from office π via such a peace premium of 5%. It is assumed that the international community can credibly commit that the increment is removed if a conflict breaks out. The change in the structure of the game has interesting implications. First, because insurgents lose these additional rents if they start a conflict and win, groups can be appeased with a lower share of total power (which includes the extra rents). Second, leaders now have a higher opportunity cost of excluding groups and facing war (i.e., the loss of aid). As a result, conflict is reduced to 1.72% (32% drop). The inclusion probability and coalition size increase (31.4% and 69.8%, respectively), at the same time that the probability of an eventual leader's removal drops to 8.4%.

Sanctions against regimes in conflict The next policy experiment explores the effect of an international sanction against a regime in conflict. I assume this intervention to be a drop of 5% in the rents of governments in war. It implies $\Delta c_l/\pi = 5\%$. Raising the costs of conflict for leaders enlarges the scope for peaceful bargaining and induces inclusion. This intervention has sizable effects. Conflict is reduced by 39%, the inclusion probability increases to 32%, coalition size reaches 70.9% of population, and leaders are removed with probability as low as 6.9%.

It is worth noting why this intervention has a larger effect in reducing conflict than conditional aid. In fact, leaders also face an implied opportunity cost if they refuse the aid and go to war. However, as long as power must be shared to appease the challenger, the leader does not enjoy the increments of rents to their full extent. For this reason, the effective opportunity cost is higher under sanctions than under conditional (on peace) aid.

Sanctions against government established through conflict Another type of sanction is to punish not the leader in conflict, but the new regime established irregularly (through conflict). I assume this as a 5% drop in the value of the rents for successful rebels. This counterfactual experiment has an effect similar to conditional aid. Because challengers would receive a lower value of rents in the case of a successful rebellion, they require lower transfers to be appeased. The lower value of transfers causes a downward shift in group capabilities, diminishing the commitment problem. Additionally, this type of sanction increases the ratio of opportunity cost to the actual prize of overthrowing the government. The result is a decline of 35% in conflict. The inclusion probability goes to 30.7% (lower than inclusion under conditional aid).

Quotas Quotas have been a widely advocated policy in order to ensure greater and fairer representation of groups in society. How effectively does a system of quotas reduce conflict? I explore the effects of a quotas with the following rules: (i) every group that comprises more than 20% of population must be included; and (ii) the minimum share of rents to be allocated to any included group is 25% of group's population share. For example, a group that is 40% of the population should be included in the coalition and have at least 10% of the seats.

Quotas have a direct and indirect effect on conflict. First, the minimum share required by the system may be more than enough to appease a challenger who would be in conflict otherwise (direct effect). Second, if the minimum required is not enough for appeasement, the leader must decide between giving the minimum required by law and facing conflict, or complementing the transfer of power to buy peace. Note that the leader now faces a lower utility value in facing conflict. If there is no appeasement, the leader will face a war where he is more likely to lose because of the minimum share he is required to give to the opposition. This, in turn, may induce full appeasement (an indirect effect on conflict).

The simulation for the specified quota system results in 2.17% probability of conflict (14% drop), 35.2% probability of inclusion, and 78.1% of the population represented in the coalition. Quotas increase inclusion and coalition size much more than any of the other policies. However, the effect on conflict is fairly modest. The probability of an eventual leader's removal marginally drops to 11.8%. On the one hand, stability is increased because there are fewer wars; but on the other , leaders are more likely to be removed by persisting conflicts.

4.8 Conclusion

In this chapter, the model was structurally estimated. The major benefit of the exercise is to quantify the effects of relevant policies commonly considered as potential peace-keeping interventions. The results have shed some light into the discussion. Democracy is found to be effective in reducing conflict. Financial aid, consistent with previous literature, has ambiguous effects. It essentially depends on which way it goes. However, conflict incidence reacts more to growth in the rents from office (when conflict incidence is increased) than to growth in financial aid to groups directly (when conflict incidence is decreased). In fact, the effect of latter is very limited given the small estimated opportunity costs of war in our context. Altogether, financial assistance is looks like a high risk policy for a potential marginal impact. Sanctions over countries in conflict is very effective in disciplining actor that may be potentially involved in war. Lastly, quotas is kind of irrelevant for conflict (but obviously good for inclusion).

Structural estimation of conflict models are still rare in the literature.[10] Other attempts to do so in light of other models will provide very fruitful insights to policy. This is paramount given the obvious difficulties of doing experimental interventions to identify best practices in these contexts.

[10] König et al. [2017] is one of the very few examples.

Chapter 5

Conclusion

Why does conflict occur? Why does bargaining fail leading to violent rebellion? In this thesis, I have investigated the role of a simple feature, arguably very present and salient in the context of ethnic politics in weak states. Sharing power (by allocating cabinet and military positions) with contesting groups grants them access, privileges, information, and administrative capabilities. This, in turn, increases their likelihood of success should they choose to move against the leader. I show in a simple model how this leads to a inverted-U shape distribution of included groups in the government coalition based on their strength. In particular, I show that leaders choose to exclude and ultimately face conflict with the most powerful groups.

Based on the theoretical predictions, I have documented a novel empirical pattern showing that the largest ethnic groups have a declining probability of inclusion, despite their more credible threats against the regime. This newly uncovered stylized fact, rationalized by the model, is found comparing groups in the same country, as well as groups of the same ethnicity quasi-randomly split across countries. In addition, I identify exogenous distributional shocks within countries that provide further evidence in favor of the model.

Identifying the underlying theoretical mechanisms causing conflict is of first order importance for policies. After providing reduced-form evidence supporting the model, I structurally estimate the model parameters. Several policy relevant counterfactuals are examined. Results show the limits of financial aid and quotas. Democratization, conditional assistance (on peace), and sanctions contingent on conflict both yield promising prospects in reducing the chances of rebellion.

There are numerous additional questions, not fully addressed here, that are important avenues for future research. First, all of the analysis is performed using ethnic conflict over the government. This followed from the possibility of observing (with noise) offers, and conflict outcomes simultaneously, and the importance of ethnicity as a determinant of political identity in the context of Africa and Asia. Nevertheless, nothing in the theoretical or empirical framework indicates that the results should be expected only in this particular setting. The same mechanism may play a role in non-ethnic or secessionist wars too, but we cannot provide such evidence here. Second, the analysis was restricted to only politically relevant groups and assumed their existence in an exogenous way. The formation and configuration of such groups is still an open question for future research. Finally, the problem here was ultimately studied as a game between elites: in particular, political entrepreneurs who can bargain over political spoils under the spectre of violent threats. The analysis has nothing to say about other important consequences of these power allocations. For example, a fruitful research avenue might be to understand their effects on governance, accountability to ethnic supporters, delivery of public goods and other development outcomes. Yet, the theory and empirical findings do explain the incidence of conflict, which clearly has an important relationship with underdevelopment.

Tables

Table 1: Summary Statistics (non-leading groups)

Variables	Mean	Std. Dev	Min	Max	Obs
Included	0.317	0.465	0	1	20,597
Conflict	0.0207	0.142	0	1	20,597
Group size	0.0955	0.143	0.0001	0.980	20,597
Rank (field)	5.867	5.635	1	32	20,597
Rank (track)	5.098	5.879	1	36	20,597
Distance to the capital	734.6	626.1	23.25	3,361	16,527
Leader distance	612.8	504.5	0	2,335	16,801
Precipitation	1,145	761.4	4.900	4,342	10,765
Drought (SPEI CRU)	0.0495	0.0616	0	0.600	15,832
Drought (SPEI GDM)	0.0556	0.0712	0	0.913	16,077
Drought (SPI)	0.0445	0.0651	0	0.606	10,648
Elevation (std)	302.0	259.0	6.424	1,739	17,922
Mountains (proportion)	0.354	0.323	0	1	17,452
Night light (calibrated)	0.0624	0.0634	0	0.659	6,553
Night light	1.656	3.620	0	32.69	6,875
Fractionalization (religion)	0.312	0.271	0	0.749	19,788
Fractionalization (language)	0.196	0.271	0	0.750	19,842
Log (Night light)	0.585	0.740	0	3.517	6,875
P_{eit}	165.2	4,960	0	245,536	12,898
$S_{eit} = \Delta log(P_{lit}/P_{eit}) * (X_i/GDP_i)$	0.000986	0.0556	-1.386	0.807	11,955

Notes: The table shows summary statistics of the non-leading groups used in the estimation. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of countryâs total population.

Variable rank (field) ranks group sizes within country and assumes value equal to 1 + the number of groups with higher population. Rank (track) is 1 + the number of groups with lower population.

Leader distance is the distance in kilometers from the centroid of the ethnic group homeland to the centroid of the leaderâs ethnic homeland.

Drought (SPI) gives the proportion of months in the growing season that are part of the longest streak of consecutive months in that growing season with SPI1 values below -1.5. The growing season is the growing season for the cellâs main crop, defined in the MIRCA2000 dataset v.1.1. SPI1 index measures deviation from long-term normal rainfall for that month. The values are standardized where deviation estimates less than 1 standard deviation indicate near normal rainfall. Drought (SPEI CRU) uses the Standardized Precipitation and Evapotranspiration Index SPEI-1 from the SPEIbase v.2.3. SPEIbase is based on precipitation and potential evapotranspiration from the Climatic Research Unit of University of East Anglia CRU v.3.22. Drought (SPEI GDM) uses the Standardized Precipitation and Evapotranspiration Index SPEI1 from the SPEI Global Drought Monitor. SPEI GDM uses the GPCC âfirst guessâ product and GHCN/CAMS, while using the Thornthwaite potential evapotranspiration (PET) estimation. Precipitation gives the yearly total amount of precipitation (in millimeter) in the cell, based on monthly meteorological statistics from the Global Precipitation Climatology Centre. All values are weighted (by area) mean of all grid values in the ethnic homaland. Values at grid value are from the PRIO-GRID dataset.

Elevation (std) is the standard deviation of gridded elevation measurements (0.008330 decimal degree resolution) intersecting with group polygon. Mountains (proportion) is the group-level area-weighted mean of the gridded proportion of mountainous terrain within the cell based on elevation, slope and local elevation range, taken from a high-resolution mountain raster developed for UNEPâs Mountain Watch Report.

EPR-2018 provides information on the 3 largest religions within group and the fraction of group associated with each. Fractionalization is measured as $1 - religion_1^2 - religion_2^2 - religion_3^2 - (1 - \sum_i^3 religion_i)^2$. The same is done for language.

Night light measures average nighttime light emission from the DMSP-OLS Nighttime Lights Time Series Version 4. The calibrated variable accounts for intersatellite differences and interannual sensor decay using calibration values from Elvidge et al (2014).

Table 2: Probability of Inclusion and Conflict

	(1) Included	(2) Conflict	(3) Conflict
groupsize	2.3176***	-0.0349	
	(0.417)	(0.093)	
$groupsize^2$	-3.1275***	0.2390	0.1937***
	(0.544)	(0.164)	(0.064)
Country FE	Y	Y	Y
Year FE	Y	Y	Y
F test (p-value)	0.000	0.0062	-
N	20,597	20,597	20,597
R^2	0.481	0.141	0.141

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Inclusion and group size (3rd order polynomial)

	(1) Included
groupsize	3.5484***
	(0.830)
$groupsize^2$	-8.1579***
	(2.571)
$groupsize^3$	4.3896**
	(1.945)
Country FE	Y
Year FE	Y
N	20,597
R^2	0.486

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Groupsize is measured as the fraction of country's total population. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Discrimination and group size

	(1) Discriminated
groupsize	-1.0062***
	(0.308)
groupsize^2	1.3895***
	(0.400)
Country FE	Y
Year FE	Y
N	20,597
R^2	0.390

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Discriminated is a dummy variable assuming value 1 if a non-leader faces state discrimination (0 if group is coded as junior partner, powerless, or self-exclusion). Groupsize is measured as the fraction of country's total population. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Probability of Inclusion and Conflict, by group size

	(1) Included	(2) Conflict	(3) Conflict
groupsize	2.3068***	-0.0379	
	(0.418)	(0.092)	
$groupsize^2$	-3.0877***	0.2502	0.2002***
	(0.545)	(0.161)	(0.065)
leader size	0.0766	0.0216	0.0191
	(0.211)	(0.077)	(0.079)
Country FE	Y	Y	Y
Year FE	Y	Y	Y
N	20,597	20,597	20,597
R^2	0.481	0.142	0.141

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. Leader size is the groupsize of leading group (most powerful group) in the country-year. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Probability of Inclusion and Conflict, by group size (Leader & Country-year FEs)

	(1) Included	(2) Conflict	(3) Conflict	(4) Included	(5) Conflict	(6) Conflict
groupsize	2.3648***	0.0502		2.3649***	0.0368	
	(0.438)	(0.073)		(0.598)	(0.090)	
$groupsize^2$	-3.1689***	0.0546	0.1267**	-3.2246***	0.1004	0.1602**
	(0.589)	(0.092)	(0.049)	(0.951)	(0.137)	(0.076)
Leader FE	Y	Y	Y	N	N	N
Country-Year FE	N	N	N	Y	Y	Y
N	20,597	20,597	20,597	20,597	20,597	20,597
R^2	0.542	0.182	0.182	0.617	0.454	0.454

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. Leader fixed-effects is dummy for the ethnic identity of the leading group. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Conflict and group size, by power status

	(1)	(2)	(3)
	Conflict	Conflict	Conflict
	Excluded groups	*Leaders + Included*	*Included (non-leaders)*
groupsize	0.1495***	0.0294	0.0130
	(0.054)	(0.019)	(0.061)
Country FE	Y	Y	Y
Year FE	Y	Y	Y
Mean Dep.Var	0.0267	0.0081	0.0078
N	14,062	11,670	6,535
R^2	0.160	0.112	0.198

Notes: Regression of conflict incidence on group size conditional on political status. Group size measured as fraction of country's total population. Estimation is done for excluded groups only (powerless, discriminated, self-exclusion) in column (1), for leaders and included groups (monopoly, dominant, senior and junior partners) in column (2), and for included groups only (junior partners) in column (3). Robust standard errors clustered at the country level in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 8: Inclusion and Conflict by group size (Split groups) - Africa and Asia

	(1) Included	(2) Conflict	(3) Conflict	(4) Conflict *if excluded*	(5) Conflict *if included*
groupsize	2.7138***	0.0121		0.1960***	0.0696*
	(0.826)	(0.094)		(0.066)	(0.036)
groupsize^2	-7.6834***	0.1897	0.2031***		
	(2.722)	(0.154)	(0.069)		
groupsize^3	4.7720**				
	(2.118)				
Ethnic FE	Y	Y	Y	Y	Y
N	15,204	15,204	15,204	10,182	5,022
R^2	0.370	0.159	0.159	0.191	0.152

Notes: Estimation with sample of ethnic groups present in at least two countries, using ethnic fixed-effects. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. A cubic term is included in the estimation of the effect of group size on inclusion. This is necessary because the peak of inclusion probability occurs for groups around 20% of less (see Figure 7). In column (4), estimation for the sample of excluded groups. In column (5), estimation for junior partners only. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Inclusion and Conflict by group size (Split groups) - Africa

	All					Selected groups				
	(1) Included	(2) Conflict	(3) Conflict	(4) Conflict *if excluded*	(5) Conflict *if included*	(6) Included	(7) Conflict	(8) Conflict	(9) Conflict *if excluded*	(10) Conflict *if included*
groupsize	2.0493*	-0.0548		0.2479**	0.0263	2.5109*	-0.0042		0.2626**	-0.0178
	(1.171)	(0.127)		(0.100)	(0.045)	(1.319)	(0.136)		(0.104)	(0.021)
$groupsize^2$	-8.2142**	0.2805	0.2243**			-9.4630**	0.2248	0.2206**		
	(3.475)	(0.200)	(0.087)			(3.843)	(0.206)	(0.094)		
$groupsize^3$	5.8070**					6.6638**				
	(2.533)					(2.811)				
Ethnic FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	5,789	5,789	5,789	3,576	2,213	4,815	4,815	4,815	3,079	1,736
R^2	0.421	0.199	0.198	0.220	0.237	0.457	0.202	0.202	0.227	0.254

Notes: Estimation with sample of ethnic groups present in at least two countries, using ethnic fixed-effects. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. In columns (4) and (9), estimation for the sample of excluded groups. In column (5) and (10), estimation for junior partners only. Columns 1-5 report estimation for all African groups. In Columns 6-10, a selected sample of groups is used, where non-native and umbrella groups are removed. An ethnic group in one country is called umbrella if it is related to two or more subgroups in another country. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Effects of Relative Shocks on Conflict and Inclusion

	(1) Onset	(2) Onset	(3) Included	(4) Included
$S_t(P_{leader}/P_{group})$	0.0564*	0.0058	-0.0754	-0.4094*
	(0.029)	(0.035)	(0.085)	(0.245)
$S_t(P_{leader}/P_{group}) * size$		0.4958**		6.0691*
		(0.220)		(3.303)
$S_t(P_{leader}/P_{group}) * size^2$				-15.6417*
				(8.832)
Ethnic FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
N	14,708	14,687	6,761	6,761
R^2	0.058	0.064	0.072	0.078

Notes: Estimation of the effects of relative economic shocks on conflict and inclusion. Estimations use first difference. Onset is 1 if an ethnic conflict started in that year. Included is measured by change in inclusion status (1 if group moved from excluded to junior partner; -1 if group moved from junior partner to excluded; and 0 otherwise). Relative economic shocks are first-difference of the ratio between leader-specific and ethnic group-specific prices. Relative economic shocks are interacted with group size and group size square when indicated. Regressions include first and second lags (not shown) of price shocks. Group size measured as fraction of country's total population. All regressions include ethnic fixed-effects. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Effects of Relative Shocks on Conflict and Inclusion (No leader change)

	(1) Onset	(2) Onset	(3) Included	(4) Included
$S_t(P_{leader}/P_{group})$	0.0434*	-0.0062	-0.0386	-0.6142*
	(0.025)	(0.015)	(0.164)	(0.343)
$S_t(P_{leader}/P_{group}) * size$		0.4575***		10.0974*
		(0.164)		(5.258)
$S_t(P_{leader}/P_{group}) * size^2$				-26.7154*
				(13.820)
Ethnic FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
N	14,212	14,191	6,431	6,431
R^2	0.054	0.059	0.107	0.111

Notes: Same estimation as Table 10, but excluding years of changes in the leading group. Estimation of the effects of relative economic shocks on conflict and inclusion. Estimations use first difference. Onset is 1 if an ethnic conflict started in that year. Included is measured by change in inclusion status (1 if group moved from excluded to junior partner; -1 if group moved from junior partner to excluded; and 0 otherwise). Relative economic shocks are first-difference of the ratio between leader-specific and ethnic group-specific prices. Relative economic shocks are interacted with group size and group size square when indicated. Regressions include first and second lags (not shown) of price shocks. Group size is measured as the fraction of country's total population. All regressions include ethnic fixed-effects. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Structural Estimates

	Results	Std. Dev.
α	0.1678	(0.0014)
c/π	0.0358	(0.0002)
γ	1.0004	(0.0192)
η	0.0760	(0.0002)
ϕ_0	0.0088	(0.0002)
ϕ_c	0.3282	(0.0074)
Obs	20,597	
Log-Likelihood	-5,062	

Notes: The table presents the results of structural estimation. Parameters are estimated by Maximum Simulated Likelihood (MSE). 50,000 draws were used in the simulation. Standard errors computed by Outer-Product Gradient Approximation.

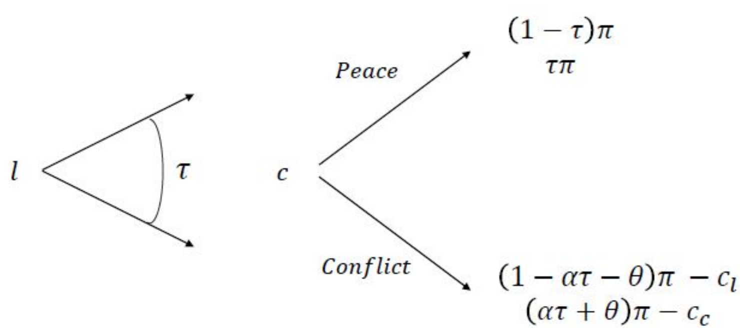
Table 13: Counterfactuals

	Prob of Conflict	Prob of Inclusion	Coalition size	Prob of leader's removal
Model	**2.52%**	**28.9%**	**66.0%**	**13.5%**
Democratization (largest group = leader)	1.63%	29.6%	73.7%	5.3%
Military capacity ($\Delta\theta/\theta = -20\%$)	2.02%	26.7%	66.6%	8.4%
Aid to groups (increased opportunity cost) ($\Delta c_c/c_c = +20\%$)	2.27%	27.2%	66.1%	12.2%
Unconditional Gov Aid/Reduced Arming ($\Delta\pi/\pi = +25\%$ or $\Delta c_l/c_l = \Delta c_c/c_c = -20\%$)	3.10%	30.1%	64.8%	16.3%
Gov Aid Conditional on Peace ($\Delta\pi/\pi = +5\%$)	1.72%	31.4%	69.8%	8.4%
Sanction against regimes in conflict ($\Delta c_l/\pi = +5\%$)	1.54%	32.0%	70.9%	6.9%
Sanction against gov established through conflict ($\Delta\pi/\pi = -5\%$)	1.63%	30.7%	69.9%	7.7%
Quotas (min 25% of pop share for groups > 20%)	2.17%	35.2%	78.1%	11.8%

Notes: The table shows the predictions given by the estimated model parameters and for each counterfactual experiment. Coalition size is calculated by multiplying the probability of inclusion and group size (measured as the share of country's population). Probability of leader's removal is calculated by the sum of probabilities of challengers being strong enough to be excluded and in conflict, multiplied by their expected strength conditional on the first case. ***Democratization*** changes the composition of challengers by making the largest ethnic group always the leader. ***Military capacity*** decreases the strength of every group by 20% ($\Delta\theta/\theta = -20\%$). ***Aid to groups*** decreases the opportunity cost of conflict for challengers by 20% ($\Delta c_c/c_c = +20\%$). ***Unconditional Gov Aid*** increases the value of rents from office by 25% ($\Delta\pi/\pi = +25\%$), which is equivalent to reduce costs for leader and challengers by 20% ($\Delta c_c/c_c = -20\%$ and $\Delta c_l/c_l = -20\%$). ***Gov Aid Conditional on Peace*** increases the rents (π) by 5% conditional if there is no conflict. If there is conflict, leader and challenger fight over the non-incremented value of π. ***Sanctions against regimes in conflict*** increases the relative cost of conflict for the leader by 5% ($\Delta c_l/\pi = +5\%$). ***Sanctions against gov established through conflict*** decreases the value of rents by 5% for successful rebels. ***Quotas*** changes the structure of the game imposing a minimum enforced allocation of power: every group comprising more than 20% of the country's population must be given at least 25% of the group size

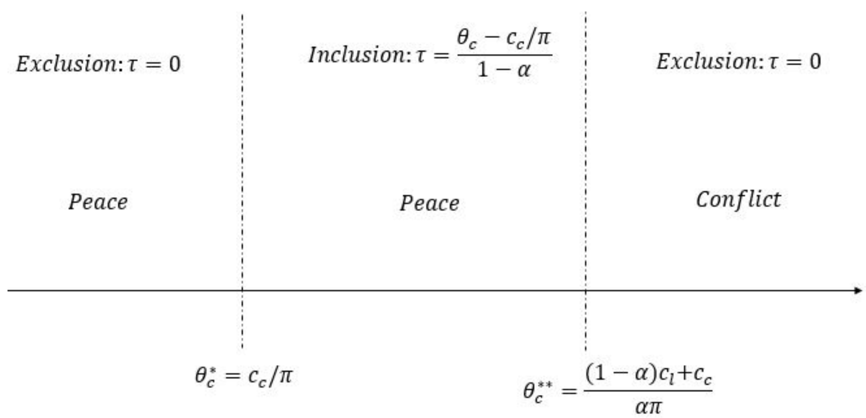
Figures

Figure 1: Model



Notes: Extensive-form representation of the model.

Figure 2: Results (Equilibrium path)



Notes:Illustration of the model results on the equilibrium path. θ is the innate strength of the challenger, defined as the winning probability of a conflict; τ is the endogenous equilibrium power-sharing transfer made by the leader to the challenger; c_c and c_l are the costs of conflict for challengers and leader, respectively; π is the value of the bargaining object; α is the marginal change in the winning probability in response to τ. "Peace" or "Conflict" is the endogenous decision taken by the challenger.

Figure 3: Probability of Inclusion and Conflict

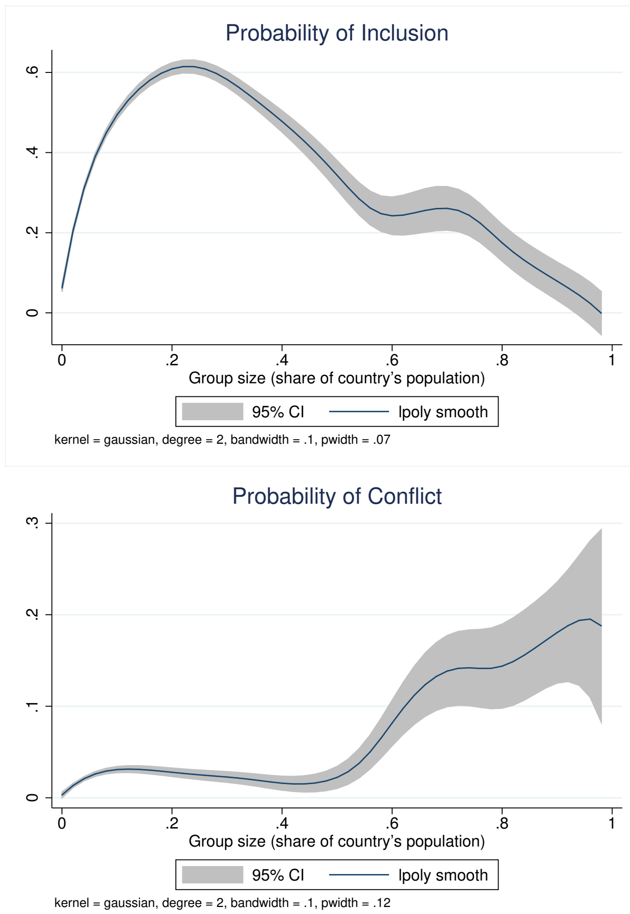
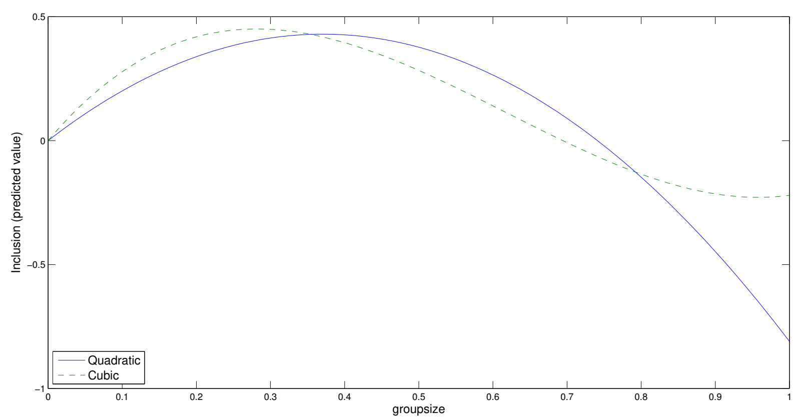
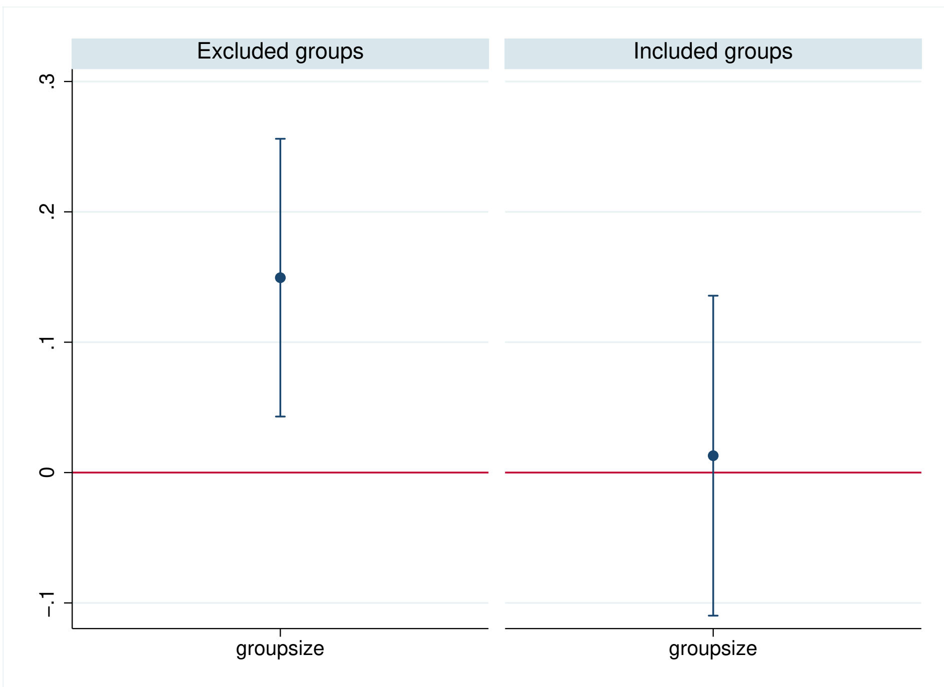


Figure 4: Inclusion - Predicted values (Country FE regression)



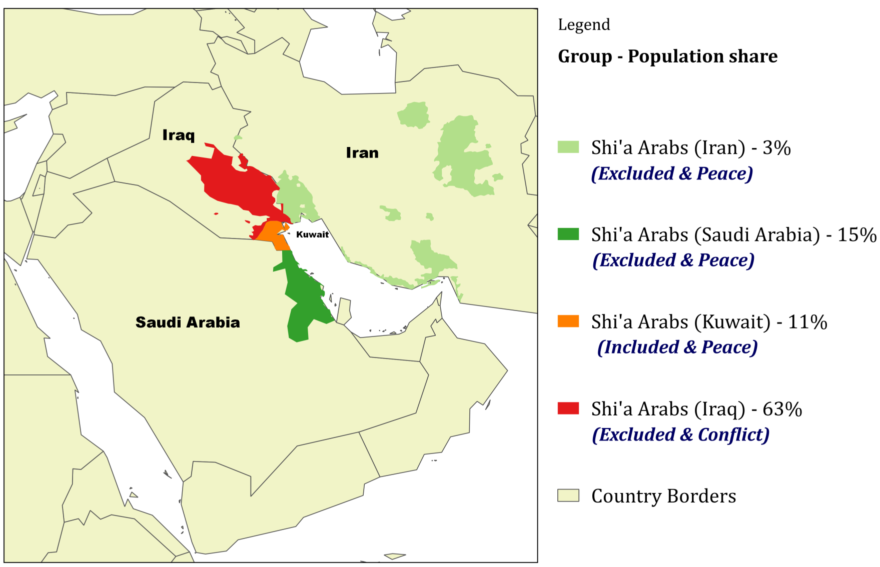
Notes: This figure reports the predicted values of inclusion probability from estimations from Tables 2 and 3. It shows how predicted values of inclusion probability vary with group size. Values for country and year fixed-effects are set as zero. Therefore, the plotted predicted values must be interpreted as the expected increase in probability of inclusion compared to a group of size zero (or marginally above zero) in the same country and year.

Figure 5: Effect of group size on conflict, by Power status



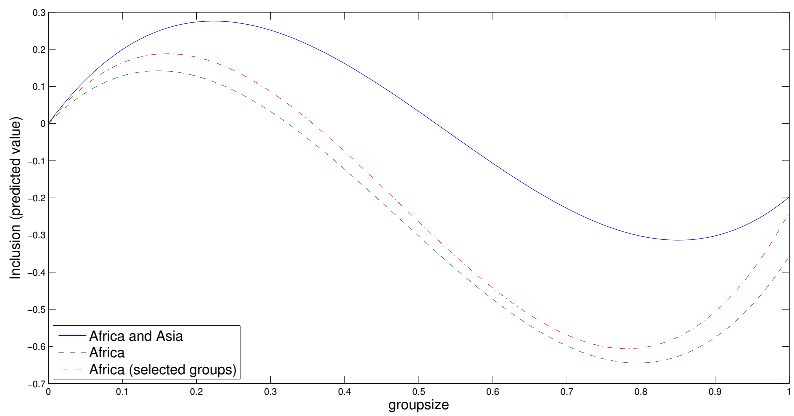
Notes: This figure shows the results of the estimation reported in columns 1 and 3 of Table 7. Regression of conflict incidence on group size conditional on political status. Group size measured as fraction of country's total population. Estimation is done for excluded groups only (powerless, discriminated, self-exclusion) in the panel on the left, and for included groups only (junior partners) in the panel on right. A 95% confidence interval is shown based on robust standard errors clustered at the country level.

Figure 6: Illustration: split groups



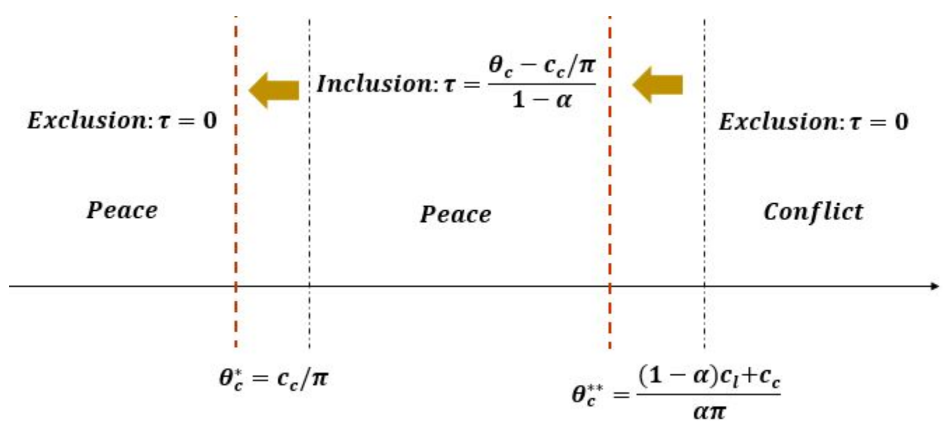
Notes: Illustration of the identification strategy of the estimations with ethnic fixed-effects. The Shia Arabs are present in different countries with varying size, measured by the share of each country's total population. For each case, it is reported the most frequent power-status outcome when the group was not the leader (included or excluded), and whether the group was ever in conflict.

Figure 7: Inclusion - Predicted values (Ethnic FE regression)



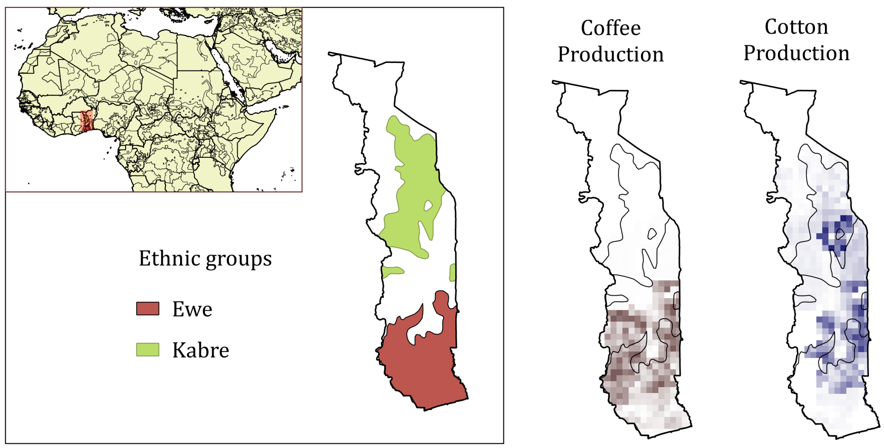
Notes: This figure reports the predicted values of inclusion probability from estimations from Tables 8 and 9. It shows how predicted values of inclusion probability vary with group size. Values for ethnic fixed-effects are set as zero. Therefore, the plotted predicted values must be interpreted as the expected increase in probability of inclusion compared to a co-ethnic group of size zero (or marginally above zero).

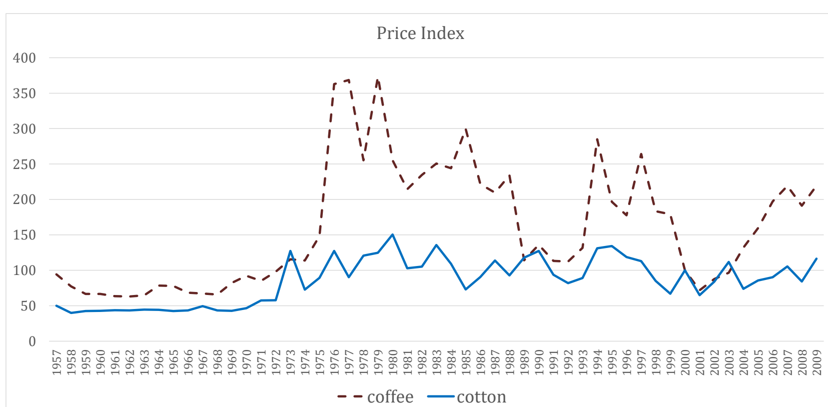
Figure 8: Effects of $c_c/\pi \downarrow$ $(\pi/c_c \uparrow)$



Notes: Illustration of the model's comparative statics for relative economic shocks. In this example, the shock is an increase in the ratio between rents and opportunity cost of conflict for the challenger (π/c_c).

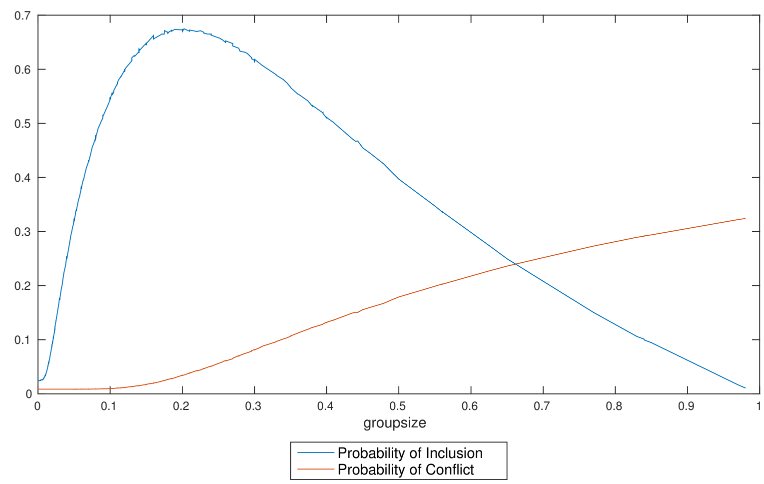
Figure 9: Distributional shocks - Illustration (Togo)





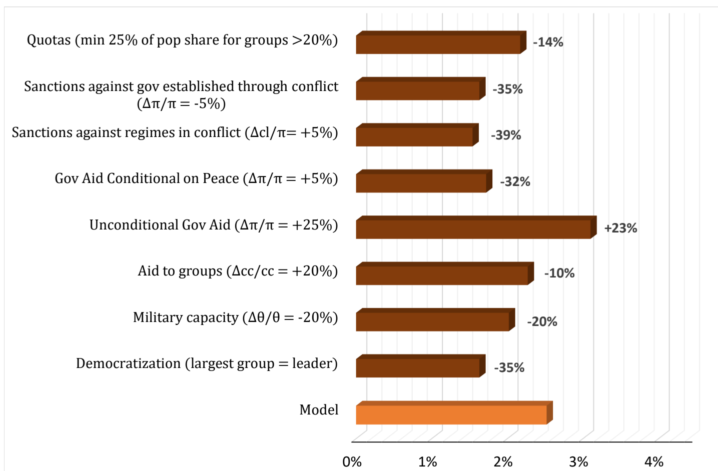
Notes: Illustration of the variation behind the relative economic shocks. Ewe's homeland grows relatively more coffee, while Kabre grows relatively more cotton. Coffee and cotton prices vary in different rates.

Figure 10: Model fit - Probability of Inclusion and Conflict, by group size



Notes: The figure shows the simulated probability of inclusion and conflict conditional on population share using the estimated parameters (as reported in Table 12).

Figure 11: Counterfactuals - Effects on Conflict Probability



Notes: The figure shows a bar chart with the probability of conflict predicted by the model parameters and for each counterfactual experiment. Percentage variation with respect to the model is shown on the right side of each bar. ***Democratization*** changes the composition of challengers by making the largest ethnic group always the leader. ***Military capacity*** decreases the strength of every group by 20% ($\Delta\theta/\theta = -20\%$). ***Aid to groups*** decreases the opportunity cost of conflict for challengers by 20% ($\Delta c_c/c_c = +20\%$). ***Uncondtional Gov Aid*** increases the value of rents from office by 25% ($\Delta\pi/\pi = +25\%$), which is equivalent to reduce costs for leader and challengers by 20% ($\Delta c_c/c_c = -20\%$ and $\Delta c_l/c_l = -20\%$). ***Gov Aid Conditional on Peace*** increases the rents (π) by 5% conditional if there is no conflict. If there is conflict, leader and challenger fight over the non-incremented value of π. ***Sanctions against regimes in conflict*** increases the relative cost of conflict for the leader by 5% ($\Delta c_l/\pi = +5\%$). ***Sanctions against gov established through conflict*** decreases the value of rents by 5% for successful rebels. ***Quotas*** changes the structure of the game imposing a minimum enforced allocation of power: every group comprising more than 20% of the country's population must be given at least 25% of the group size

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Appendix A

Additional Tables

Table A1: EPR-2018: Descriptive Statistics (Africa and Asia)

Variables	Mean	Std. Dev	Min	Max	Obs
Country-year level:					
Number of relevant groups	4.692	4.717	0	37	5,484
Number of relevant groups (if more than 1)	5.454	4.659	2	37	4,718
Number of included groups	2.474	2.332	1	15	4,718
Number of excluded groups	2.981	4.265	0	36	4,718
Governmental Ethnic conflict incidence (ongoing)	0.0566	0.231	0	1	4,718
Governmental Ethnic conflict history	0.381	0.486	0	1	4,718
Group-year level:					
Population share	0.162	0.224	0.0001	0.981	25,732
Monopoly (leader)	0.0339	0.181	0	1	25,732
Dominant (leader)	0.0566	0.231	0	1	25,732
Senior partner (leader)	0.109	0.312	0	1	25,732
Junior partner (included)	0.254	0.435	0	1	25,732
Self-exclusion (not included)	0.0158	0.125	0	1	25,732
Powerless (not included)	0.366	0.482	0	1	25,732
Discriminated (not included)	0.165	0.371	0	1	25,732
Governmental conflict incidence (ongoing)	0.0183	0.134	0	1	25,732
Governmental conflict history	0.129	0.336	0	1	25,732

Notes: The table shows summary statistics of the main dataset (Ethnic Power Relations 2018). The dataset is organized at the ethnic group level. The first panel shows statistics collapsed at the country-year level. The second panel presents statistics at the ethnic group-year level. Included groups are the number of groups coded as *"monopoly", "dominant", "senior partner"*, and *"junior partner"*. Excluded groups are *"powerless", "self-exclusion" and "discriminated"*. Conflict incidence is coded 1 for every period of an ongoing ethnic conflict over the control of the government (and 0, otherwise). Each power category is a dummy indicating if the group has that level of power in that year.

Throughout the analysis, I use ethnicity as the unit at which I observe conflict and inclusion decisions. Because ethnicity is not a perfect measure of political identity, it is possible that we may observe inclusion of some members of a group while at the same time a distinct sub-set of the group may be excluded and perhaps even in conflict with the included members of the same group. For example, a rebel organization that claims to fight for a particular group may have no effective relationship with their co-ethnics who are in power. Despite this possibility, Table A2 validates the power and salience of ethnic identity in this context. There is a strong relationship between exclusion and conflict.[1] The correlation holds comparing both different groups in the same country and the same group at different points of time (ethnic fixed-effects).

Clearly, this result does not imply causality. Included and excluded groups may differ in several aspects, and, in fact, the proposed theory implies included groups and excluded ones will differ in their threat capabilities. The data though shows that there is a correlation between the endogenous choice of exclusion on the part of the leader, and the decision to start a conflict on the part of a challenger.

[1]Similar results were also obtained by Cederman et al. [2010]

Table A2: Conflict and Power status

	Including leaders				*Excluding leaders*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Incidence	Incidence	Onset	Onset	Incidence	Incidence	Onset	Onset
Excluded	0.0157**	0.0431***	0.0028*	0.0096**	0.0137*	0.0277***	0.0020	0.0069*
	(0.006)	(0.013)	(0.002)	(0.004)	(0.008)	(0.010)	(0.002)	(0.004)
Ethnic FE	N	Y	N	Y	N	Y	N	Y
Country FE	Y	N	Y	N	Y	N	Y	N
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Mean Dep.Var	0.0182	0.0182	0.0034	0.0034	0.0207	0.0207	0.0037	0.0037
N	25,732	25,732	25,172	25,172	20,597	20,597	20,101	20,101
R^2	0.112	0.271	0.019	0.078	0.132	0.321	0.026	0.113

Notes: Regressions of Conflict (Incidence or Onset) on exclusion category. Group is considered excluded if it is not included in the coalition either as a leader (monopoly, dominant, senior partner) or included in a power-sharing arrangement (junior partner). Thus, excluded groups are the ones classified as either powerless, self-exclusion or discriminated. Columns 1-4 include all groups in the regression. Estimations in Columns 5-8 do not include the leaders in the sample, thus it compares junior partners and the excluded categories. All regressions include year-fixed effects, and Country fixed-effect or Ethnic fixed-effects as indicated. Robust standard errors clustered at the country level in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table A3: Probability of Inclusion and Conflict, by group size (controlling for ranking of group size)

	(1) Included	(2) Conflict	(3) Conflict	(4) Included	(5) Conflict	(6) Conflict
groupsize	2.0952***	-0.0470		2.0370***	-0.0296	
	(0.385)	(0.099)		(0.412)	(0.098)	
$groupsize^2$	-2.8849***	0.2522	0.1927***	-2.8097***	0.2330	0.1953***
	(0.489)	(0.170)	(0.065)	(0.506)	(0.169)	(0.065)
rank (field)	-0.0069	-0.0004	-0.0002			
	(0.009)	(0.000)	(0.000)			
rank (track)				0.0079	-0.0001	-0.0003
				(0.009)	(0.000)	(0.000)
Country FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	20,597	20,597	20,597	20,597	20,597	20,597
R^2	0.483	0.142	0.141	0.485	0.141	0.141

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. Variable rank (field) ranks group sizes within country and assumes value equal to 1 + the number of groups with higher population. Rank (track) is 1 + the number of groups with lower population. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A4: Probability of Inclusion and Conflict, by group size (controlling for distance to capital and leader's homeland)

	(1) Included	(2) Conflict	(3) Conflict	(4) Included	(5) Conflict	(6) Conflict
groupsize	2.3994***	-0.1260		2.4321***	-0.0049	
	(0.509)	(0.127)		(0.501)	(0.110)	
$groupsize^2$	-3.3913***	0.3719*	0.1987**	-3.4118***	0.1725	0.1661***
	(0.736)	(0.220)	(0.077)	(0.673)	(0.156)	(0.056)
distance to capital	-0.0001	-0.0000	-0.0000			
	(0.000)	(0.000)	(0.000)			
leader distance				-0.0001	-0.0000	-0.0000
				(0.000)	(0.000)	(0.000)
Country FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	16,527	16,527	16,527	16,801	16,801	16,801
R^2	0.494	0.145	0.144	0.504	0.150	0.150

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. Leader distance is the distance in kilometers from the centroid of the ethnic group homeland to the centroid of the leader's ethnic homeland. Robust standard errors clustered at the country level in parentheses.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A5: Probability of Inclusion and Conflict, by group size (controlling for rainfall)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Included	Conflict	Conflict	Included	Conflict	Conflict	Included	Conflict	Conflict	Included	Conflict	Conflict
groupsize	2.7198***	-0.0671		2.5757***	-0.1267		2.5741***	-0.1195		2.8459***	-0.0553	
	(0.580)	(0.154)		(0.549)	(0.122)		(0.545)	(0.123)		(0.608)	(0.160)	
$groupsize^2$	-3.8850***	0.3781	0.2778**	-3.5777***	0.3715*	0.1991**	-3.5794***	0.3714*	0.2085**	-4.0036***	0.3672	0.2858**
	(0.929)	(0.258)	(0.117)	(0.783)	(0.215)	(0.078)	(0.783)	(0.217)	(0.080)	(0.949)	(0.260)	(0.121)
precipitation	-0.0000	-0.0000	-0.0000									
	(0.000)	(0.000)	(0.000)									
Drought (SPEI CRU)				-0.1180	-0.0017	-0.0023						
				(0.120)	(0.031)	(0.031)						
Drought (SPEI GDM)							-0.1010	0.0159	0.0170			
							(0.070)	(0.033)	(0.033)			
Drought (SPI)										-0.0476	-0.0231	-0.0233
										(0.076)	(0.026)	(0.027)
Country FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	10,765	10,765	10,765	15,832	15,832	15,832	16,077	16,077	16,077	10,648	10,648	10,648
R^2	0.532	0.210	0.210	0.488	0.146	0.145	0.494	0.146	0.145	0.533	0.210	0.209

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. Robust standard errors clustered at the country level in parentheses. Drought (SPI) gives the proportion of months in the growing season that are part of the longest streak of consecutive months in that growing season with SPI1 values below -1.5. The growing season is the growing season for the cell's main crop, defined in the MIRCA2000 dataset v.1.1. SPI1 index measures deviation from long-term normal rainfall for that month. The values are standardized where deviation estimates less than 1 standard deviation indicate near normal rainfall. Drought (SPEI CRU) uses the Standardized Precipitation and Evapotranspiration Index SPEI-1 from the SPEIbase v.2.3. SPEIbase is based on precipitation and potential evapotranspiration from the Climatic Research Unit of University of East Anglia CRU v.3.22. Drought (SPEI GDM) uses the Standardized Precipitation and Evapotranspiration Index SPEI1 from the SPEI Global Drought Monitor. SPEI GDM uses the GPCC 'first guess' product and GHCN/CAMS, while using the Thornthwaite potential evapotranspiration (PET) estimation. Precipitation gives the yearly total amount of precipitation (in millimeter) in the cell, based on monthly meteorological statistics from the Global Precipitation Climatology Centre. All values are weighted (by area) mean of all grid values in the ethnic homaland. Values at grid value are from the PRIO-GRID dataset. Robust standard errors clustered at the country level in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table A6: Probability of Inclusion and Conflict, by group size (controlling for geography)

	(1) Included	(2) Conflict	(3) Conflict	(4) Included	(5) Conflict	(6) Conflict
groupsize	2.3964***	-0.0624		2.5374***	-0.1019	
	(0.500)	(0.103)		(0.502)	(0.119)	
$groupsize^2$	-3.2275***	0.2799	0.2013***	-3.5737***	0.3461	0.2056***
	(0.642)	(0.174)	(0.066)	(0.738)	(0.211)	(0.078)
Elevation (std)	-0.0001	0.0000	0.0000			
	(0.000)	(0.000)	(0.000)			
Mountains (proportion)				-0.1493	-0.0038	-0.0026
				(0.169)	(0.016)	(0.015)
Country FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	17,922	17,922	17,922	17,452	17,452	17,452
R^2	0.491	0.149	0.148	0.494	0.140	0.139

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. Elevation (std) is the standard deviation of gridded elevation measurements (0.008330 decimal degree resolution) intersecting with group polygon. Mountains (proportion) is group-level area-weighted mean of the gridded proportion of mountainous terrain within the cell based on elevation, slope and local elevation range, taken from a high-resolution mountain raster developed for UNEP's Mountain Watch Report. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A7: Probability of Inclusion and Conflict, by group size (controlling for intra-group fractionalization)

	(1) Included	(2) Conflict	(3) Conflict	(4) Included	(5) Conflict	(6) Conflict
groupsize	2.2584***	-0.0568		2.2648***	-0.0585	
	(0.426)	(0.092)		(0.425)	(0.094)	
$groupsize^2$	-3.0400***	0.2577	0.1848***	-3.0197***	0.2540	0.1789***
	(0.549)	(0.163)	(0.066)	(0.544)	(0.165)	(0.066)
Fractionalization (religion)	-0.0043	-0.0010	-0.0018			
	(0.054)	(0.008)	(0.008)			
Fractionalization (language)				-0.1099**	0.0213	0.0212
				(0.051)	(0.015)	(0.015)
Country FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	19,788	19,788	19,788	19,842	19,842	19,842
R^2	0.468	0.145	0.145	0.471	0.146	0.146

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. EPR-2018 provides information on the 3 largest religions within group and the fraction of group associated with each. Fractionalization is measured as $1 - religion_1^2 - religion_2^2 - religion_3^2 - (1 - \sum_i^3 religion_i)^2$. The same is done for language. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A8: Probability of Inclusion and Conflict, by group size (controlling for light density)

	(1) Included	(2) Conflict	(3) Conflict	(4) Included	(5) Conflict	(6) Conflict	(7) Included	(8) Conflict	(9) Conflict
groupsize	2.9161***	0.1213		2.7571***	0.1250		2.8984***	0.1291	
	(0.686)	(0.207)		(0.661)	(0.209)		(0.680)	(0.208)	
$groupsize^2$	-4.0236***	-0.0725	0.1289	-3.7547***	-0.0785	0.1288	-4.0116***	-0.1009	0.1124
	(1.221)	(0.277)	(0.105)	(1.202)	(0.279)	(0.105)	(1.192)	(0.268)	(0.099)
Night light	0.0244	-0.0004	-0.0003						
	(0.018)	(0.001)	(0.001)						
Log (1+Night light)				0.1393	-0.0032	-0.0019			
				(0.085)	(0.004)	(0.004)			
Night light (calibrated)							1.4933	-0.0651	-0.0668
							(1.157)	(0.048)	(0.044)
Country FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	6,875	6,875	6,875	6,875	6,875	6,875	6,553	6,553	6,553
R^2	0.565	0.245	0.244	0.569	0.245	0.244	0.563	0.254	0.254

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. Night light measures average nighttime light emission from the DMSP-OLS Nighttime Lights Time Series Version 4. The calibrated variable accounts for intersatellite differences and interannual sensor decay using calibration values from Elvidge et al (2014). Robust standard errors clustered at the country level in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A9: Probability of Inclusion and Conflict, by group size (Cold War vs Post-Cold War)

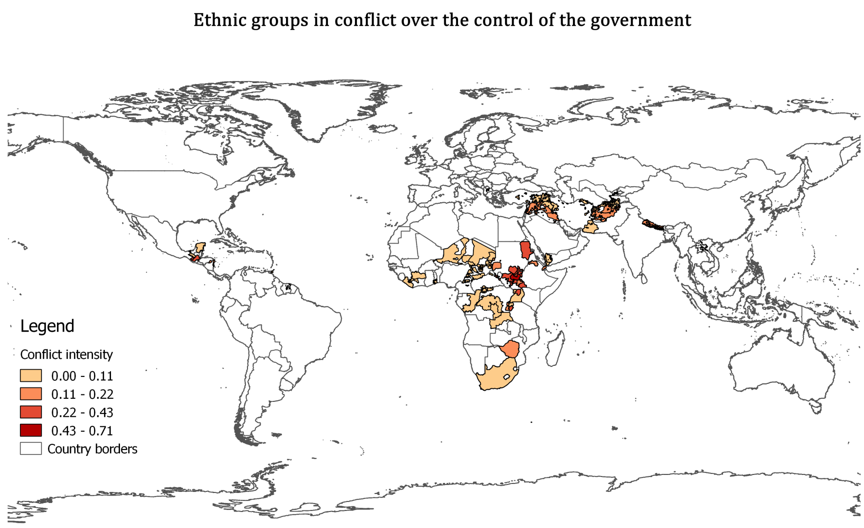
	1946-1991			1992-2017		
	(1)	(2)	(3)	(4)	(5)	(6)
	Included	Conflict	Conflict	Included	Conflict	Conflict
groupsize	1.8432***	-0.1104		2.7810***	0.0790	
	(0.503)	(0.104)		(0.525)	(0.202)	
$groupsize^2$	-2.2500***	0.3072	0.1613*	-3.8741***	0.1610	0.2882*
	(0.666)	(0.220)	(0.087)	(0.872)	(0.405)	(0.165)
Country FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	11,005	11,005	11,005	9,592	9,592	9,592
R^2	0.515	0.114	0.113	0.548	0.236	0.236

Notes: Data is at the group-year level. Estimation for the sample of non-leaders. Included is a dummy variable assuming value 1 if a non-leader is included as junior partner in the coalition (0 if group is powerless, discriminated or self-exclusion). Conflict incidence is coded as 1 for every year where there is ongoing conflict from a rebel organization claiming to represent the ethnic group. Groupsize is measured as the fraction of country's total population. Robust standard errors clustered at the country level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Appendix B

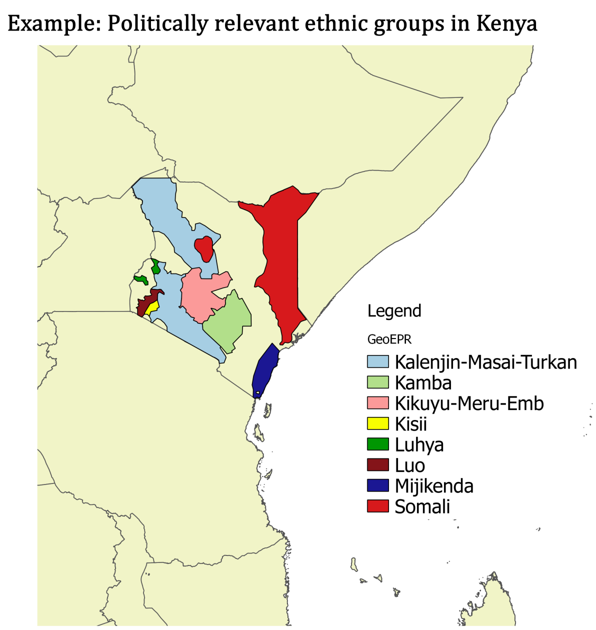
Additional Figures

Figure A1: Ethnic groups in Conflict over the control of the government (1945-2017)



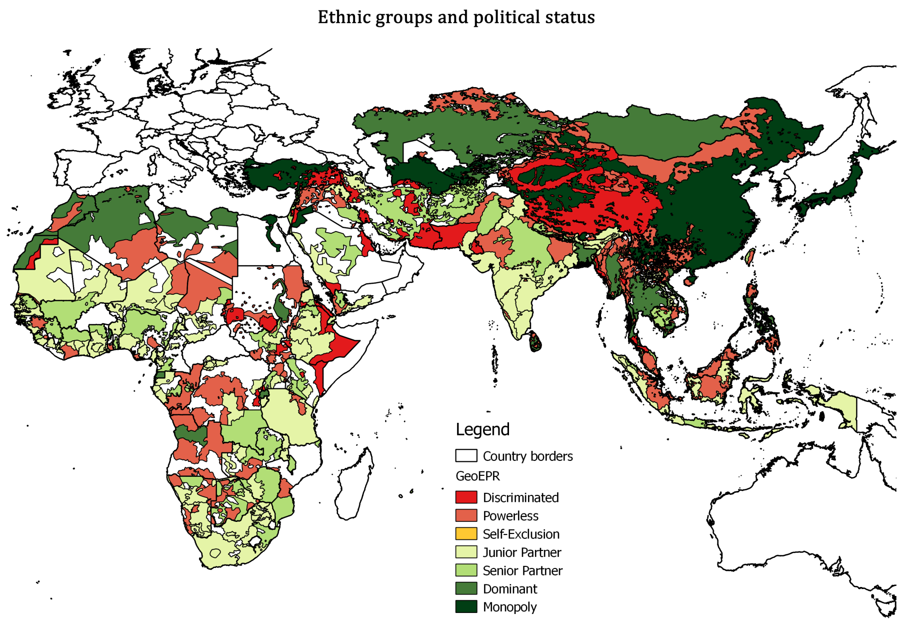
Notes: The figure highlights the ethnic homeland of groups supporting or been represented by rebel organizations in conflict against the government during 1946-2017. Only conflict over the control or composition of the government is highlighted (it does not include secessionist movements). Different shades reflect the frequency of conflict episodes.

Figure A2: EPR-2018: Kenya



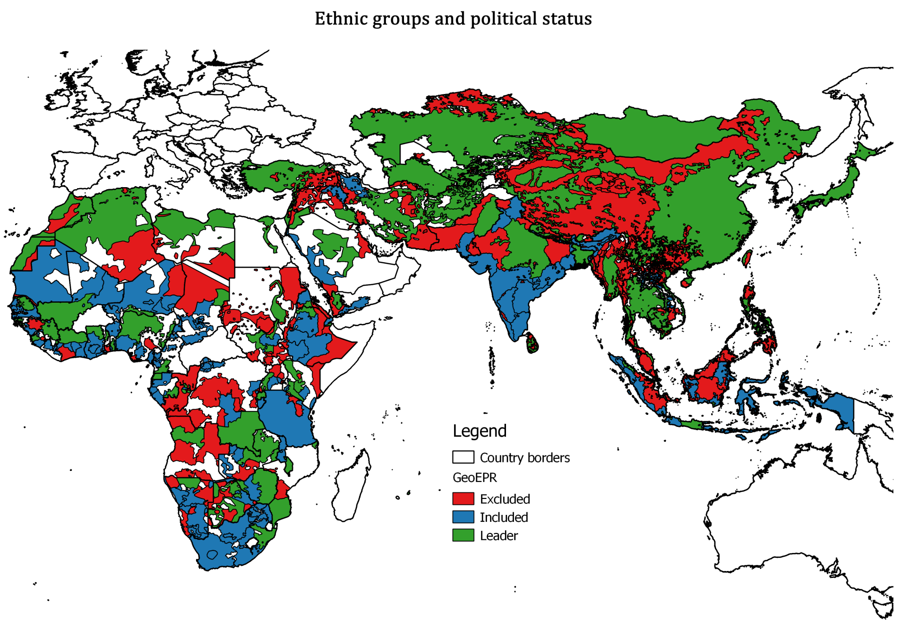
Notes: The figure shows the geographical distribution of politically relevant ethnic groups in Kenya. The highlighted areas show where groups are concentrated. Blank areas may be either uninhabited regions or areas inhabited by several groups with no concentration of a particular ethnicity.

Figure A3: EPR: Politically relevant groups in Africa and Asia (2017)



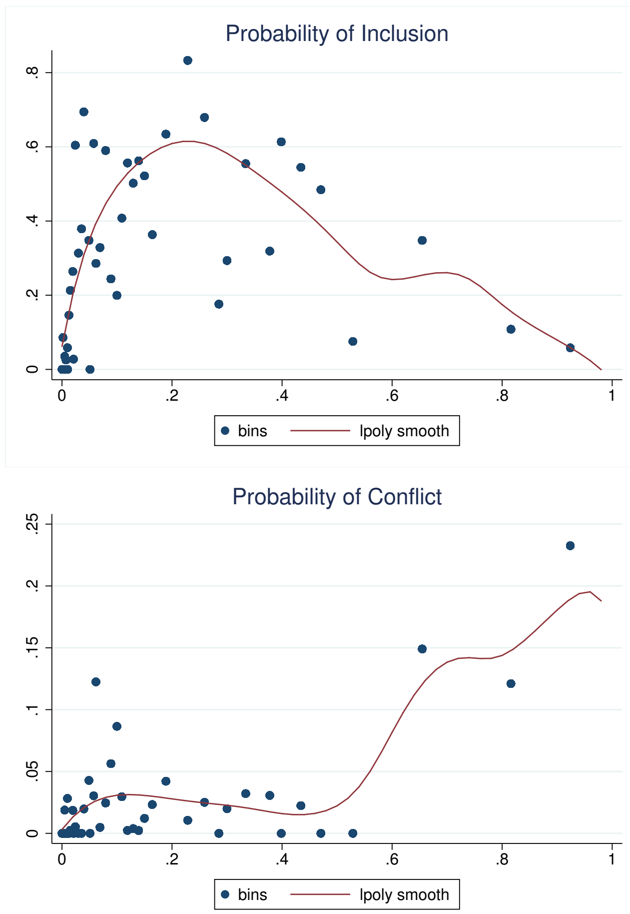
Notes: The figure shows the geographical distribution of politically relevant ethnic groups in Africa and Asia. Political status reflects the degree of representation in the executive power, as defined by EPR-2018.

Figure A4: EPR: Politically relevant groups in Africa and Asia (2017)



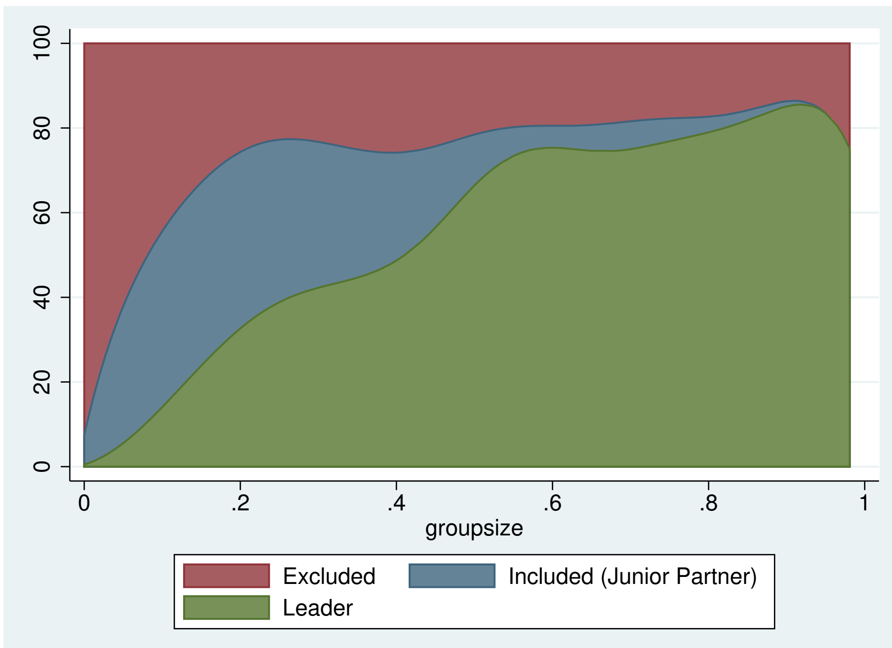
Notes: The figure shows the geographical distribution of politically relevant ethnic groups in Africa and Asia. Political status is defined as used in the estimations. Leaders are the most powerful group in the country (dominant, monopoly, or senior partner). Included groups are junior partners. Excluded groups are those categorized as Powerless, Discriminated or Self-Exclusion.

Figure A5: Probability of Inclusion and Conflict, by group size



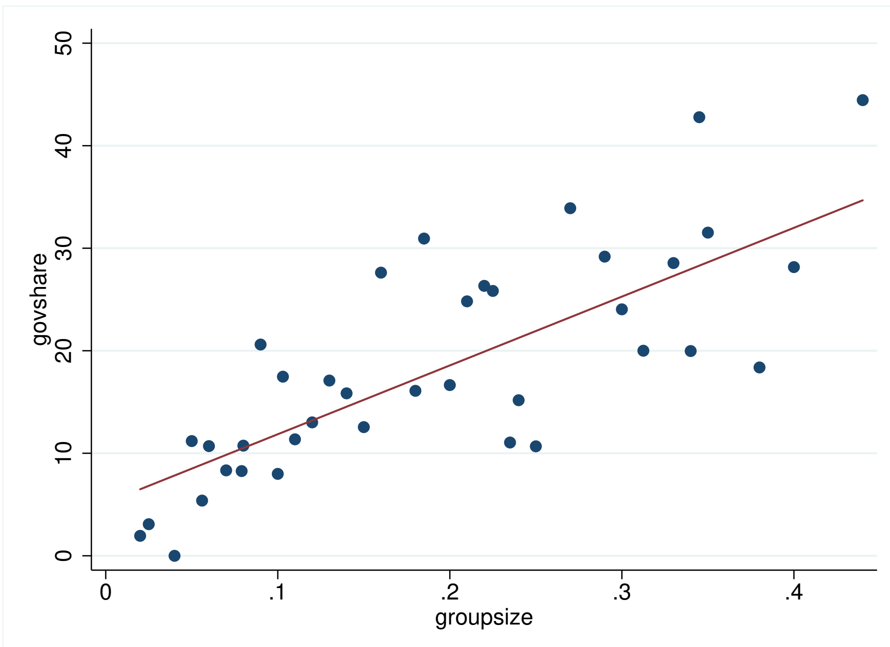
Notes: Binned scatterplot and Local polynomial regression of inclusion (left) and conflict incidence (right) on group size for non-leader groups. Inclusion assumes value 1 if group is included as junior partner, or 0 if group is excluded (powerless, discriminated or self-exclusion). Conflict incidence is dummy variable indicating if the ethnic group is conflict over the control of the government in that year. Group size is measured as the fraction of country's total population.

Figure A6: Political status distribution, by group size



Notes: Distribution of ethnic groups according to their political status (leader, included and excluded) by group size. A group is leader if political status is monopoly, dominant or senior partner. Included are junior partners. Excluded are groups categorized as powerless, discriminated or self-exclusion. Group size is measured as the fraction of country's total population.

Figure A7: Transfers to included groups, by group size



Notes: This figure plots the relationship between group size and share of cabinet appointments (govshare) for included groups only (junior partners). Data is constructed by combining EPR-2018 with ethnic affiliation of cabinet members from Rainer and Trebbi [2012] and Francois et al. [2015] for available countries.

Appendix C

Dynamic Model: Solution

This Appendix presents the conditions for each possible equilibrium strategy of the dynamic model studied in Section 2.3. We are looking for a stationary Markov Perfect Equilibrium. In what follows, I absorb subscript t, since value function will be the same every period.

Equilibrium with Exclusion and Peace of groups A and B

I aim to find the conditions for an equilibrium where:

- group A excludes group B ($\tau_B = 0$) when leader, and stay in peace for any offer when challenger ($C_A(\tau_A) = 0 \vee \tau_A \geq 0$);
- group B excludes group A ($\tau_A = 0$) when leader, and stay in peace for any offer when challenger ($C_B(\tau_B) = 0 \vee \tau_B \geq 0$)

In this equilibrium, $V_A^l = V_B^l = \frac{\pi}{1-\delta}$. For group A, the value of peace is higher than the value of conflict if:

$$V_A^{cp} = \frac{\pi \tau_A}{1-\delta} \geq V_A^{cc} = (\alpha\tau_A + \theta_A)(\delta V_A^l + \pi) - c_c \tag{C.1}$$

Since we are looking for a stationary equilibrium, the first equality above assumes that an optimal strategy in period t will also be a best response for all periods. A similar condition must be satisfied for group B. We can then derive that groups A and B play peace for any offer if:

$$\begin{cases} \theta_A \leq (1-\delta)c_c/\pi \\ \theta_B \leq (1-\delta)c_c/\pi \end{cases} \tag{C.2}$$

Under these conditions, the leader's optimal strategy is to offer zero. He obtains peace, and the value of being leader is consistent with the one used when computing the conflict payoffs.

Formally, if θ_A and θ_B satisfy conditions (C.2), the equilibrium strategies are:

i) Group A: $\tau_B^* = 0$ and $C_A^*(\tau_A) = 0 \vee \tau_A$;

ii) Group B: $\tau_A^* = 0$ and $C_B^*(\tau_B) = 0 \vee \tau_B$.

Equilibrium with Exclusion and Peace of group B and Inclusion and Peace of group A

I aim to find the conditions for an equilibrium where:

- group A excludes group B ($\tau_B = 0$) when leader, and group B plays peace;
- group B includes group A ($\tau_A > 0$) when leader, and group A accepts the offer.

In this scenario, $V_A^l = \frac{\pi}{1-\delta}$. The value of conflict for group A is:

$$V_A^{cc} = (\alpha\tau_A + \theta_A)(\delta V_A^l + \pi) - c_c$$

If peace is the optimal strategy, it will be the optimal strategy every period. Therefore, the value of peace for group A would be:

$$V_A^{cp} = \frac{\tau_A \pi}{1-\delta}$$

Peace is played if the value of peace is higher than the value of conflict, which is true when:

$$\tau_A \geq \frac{\theta_A - (1-\delta)c_c/\pi}{(1-\alpha)} = \tau_A^{min}$$

Now we must find the conditions where group B's best response is to include group A. First, we must have $\tau_A^{min} \geq 0$. This is obtained when:

$$\theta_A \geq (1-\delta)c_c/\pi \tag{C.3}$$

Second, the value of appeasing group A must be higher than excluding them and facing conflict. The value of appeasing challenger A for the leader B is given by:

$$V_B^l(\tau_A^{min}) = \frac{(1 - \frac{\theta_A - (1-\delta)c_c/\pi)}{1-\alpha}\pi}{1-\delta}$$

Meanwhile, the playoff of exclusion (and, consequently, conflict) is:

$$V_B^l(\tau_A = 0) = (1-\theta_A)(\pi + \delta V_B^l(\tau_A = 0)) - c_l \Rightarrow V_B^l(\tau_A = 0) = \frac{(1-\theta_A)\pi - c_l}{1-\delta(1-\theta_A)} \tag{C.4}$$

Finally,

$$V_B^l(\tau_A^{min}) \geq V_B^l(\tau_A = 0) \Rightarrow$$
$$\theta_A \leq \frac{-\alpha - c_c\delta^2 + c_c\delta + \sqrt{(\alpha + \delta(c_c(\delta-1)-1))^2 + 4(\delta-1)\delta(c_c(\delta-1)+(\alpha-1)c_l)} + \delta}{2\delta} \tag{C.5}$$

It remains to find the conditions where group B is excluded and still plays peace, which is consistent with the assumed value of the leader A. For that, the value of conflict must be lower than the value of peace when the offer is zero:

$$V_B^{cc} = \theta_B(\pi + \delta V_B^l) - c_c = \theta_B(\pi + \delta\frac{(1 - \frac{\theta_A - (1-\delta)c_c/\pi)}{1-\alpha}\pi)}{1-\delta}) - c_c \leq V_B^{cp} = 0 \Rightarrow$$
$$\theta_B \leq \frac{(1-\alpha)(1-\delta)c_c/\pi}{(1-\alpha-\delta\theta_A) + (1-\delta)\delta c_c/\pi} \tag{C.6}$$

It is worthy to compare this conditions with the ones from the previous equilibrium, where both players exclude the challenging group and obtain peace. Now the strength of group A is higher which requires group B to react and offer some power-sharing. In turn, the stronger group A is, the lower the value of being leader is for group B. And, consequently, the higher the maximum θ_B that supports the peaceful exclusion of group B.

Therefore, if θ_A and θ_B satisfy conditions (C.3), (C.5) and (C.6) the equilibrium strategies are:

i) Group A: $\tau_B^* = 0$ and $C_A^*(\tau_A) = \begin{cases} 0 & if \quad \tau_A \geq \frac{\theta_A - (1-\delta)c_c/\pi}{(1-\alpha)} \\ 1 & if \quad \tau_A < \frac{\theta_A - (1-\delta)c_c/\pi}{(1-\alpha)} \end{cases}$;

ii) Group B: $\tau_A^* = \frac{\theta_A - (1-\delta)c_c/\pi}{(1-\alpha)}$ and $C_B^*(\tau_B) = 0 \vee \tau_B$.

Equilibrium with Exclusion and Peace of group B and Exclusion and Conflict of group A

I aim to find the conditions for an equilibrium where:

- group A excludes group B ($\tau_B^* = 0$) when leader, and group B plays peace;
- group B excludes group A ($\tau_A^* = 0$) when leader, and group A plays conflict.

This scenario is similar to the one just analyzed, except for a couple of differences. First, now group B must find optimal to exclude group A. This means that condition (C.5) is reverted:

$$\theta_A > \frac{-\alpha - c_c\delta^2 + c_c\delta + \sqrt{(\alpha + \delta(c_c(\delta-1)-1))^2 + 4(\delta-1)\delta(c_c(\delta-1)+(\alpha-1)c_l)} + \delta}{2\delta} \tag{C.7}$$

Second, since it is optimal to exclude group A and face conflict, the value of being leader for group B is now given by equation (C.4). Group B will play peace for any offer if:

$$V_B^{cc} = \theta_B(\pi + \delta V_B^l) - c_c = \theta_B(\pi + \delta\frac{(1-\theta_A)\pi - c_l}{1-\delta(1-\theta_A)}) - c_c \leq V_B^{cp} = 0 \Rightarrow$$
$$\theta_B \leq \frac{(1-\delta+\delta\theta_A)c_c/\pi}{1-\delta c_l/\pi} \tag{C.8}$$

When θ_A equals to the right-hand side of the expressions in (C.5) and (C.7), then the inequalities (C.6) and (C.8) are equivalent. As soon as θ_A crosses that threshold, the optimal strategy for leader B is to face war against group A, instead of sharing power. This makes the value of being leader depend on θ_A in a different way. The reason is that θ_A now determines the outcomes of conflict and not the offer in the subgame played on the equilibrium path. That's why the functions (C.6) and (C.8) are different. In turn, group B can have higher strength and still play peace under exclusion. Essentially, the payoff of conflict is low because in case of victory the group will face another conflict against a strong challenger.

Finally, if θ_A and θ_B satisfy conditions (C.7) and (C.8) the equilibrium strategies are:

i) Group A: $\tau_B^* = 0$ and $C_A^*(\tau_A) = \begin{cases} 0 & if \quad \tau_A \geq \frac{\theta_A - (1-\delta)c_c/\pi}{(1-\alpha)} \\ 1 & if \quad \tau_A < \frac{\theta_A - (1-\delta)c_c/\pi}{(1-\alpha)} \end{cases}$;

ii) Group B: $\tau_A^* = 0$ and $C_B^*(\tau_B) = 0 \vee \tau_B$.

The conditions where there is exclusion and conflict of group B, and exclusion and peace of group A on the equilibrium path are just symmetric to this one.

Equilibrium with Inclusion and Peace of group B and Inclusion and Peace of group A

I aim to find the conditions for an equilibrium where:

- group A includes group B ($\tau_B^* > 0$) when leader, and group B plays peace;
- group B includes group A ($\tau_A^* > 0$) when leader, and group A plays peace.

In this scenario, the values of being leader for groups A and B are given by:

$$V_B^l = \frac{(1 - \tau_A^*)\pi}{1 - \delta}$$

$$V_A^l = \frac{(1 - \tau_B^*)\pi}{1 - \delta}$$

where τ_A^* and τ_B^* are the optimal sharing offered by the leaders to their respective challengers.

Given the values of being leader, we must find the minimum offers that appease each group. The value of conflict for group A is given by:

$$V_A^{cc}(\tau_A) = (\alpha\tau_A + \theta_A)(\pi + \delta V_A^l) - c_c = (\alpha\tau_A + \theta_A)(\pi + \delta\frac{(1-\tau_B^*)\pi}{1-\delta}) - c_c$$

Group A prefers to play peace if:

$$\begin{aligned} V_A^{cp}(\tau_A) = \frac{\tau_A\pi}{1-\delta} \geq V_A^{cc}(\tau_A) = (\alpha\tau_A + \theta_A)(\pi + \delta\frac{(1-\tau_B^*)\pi}{1-\delta}) - c_c \Rightarrow \\ \tau_A \geq \frac{\theta_A(1-\delta\tau_B^*) - (1-\delta)c_c/\pi}{1-\alpha(1-\delta\tau_B^*)} \end{aligned} \tag{C.9}$$

Similarly, group B plays peace if:

$$\tau_B \geq \frac{\theta_B(1-\delta\tau_A^*) - (1-\delta)c_c/\pi}{1-\alpha(1-\delta\tau_A^*)} \tag{C.10}$$

In a equilibrium where the leader makes an appeasing offer, conditions (C.9) and (C.10) are satisfied with equality. This is because the leader does not have any reason to offer more than the minimum share necessary to appease the challenger. Solving the system of equations, we obtain the optimal transfers:

$$\begin{gathered} \tau_A^* = \frac{-\alpha^2 + \alpha\delta\theta_A - \alpha\delta\theta_B + 2\alpha + \delta^2\theta_A\theta_B - 1}{2\alpha\delta(1-\alpha-\delta\theta_B)} + \frac{\sqrt{F+G}}{2\alpha\delta(1-\alpha-\delta\theta_B)} \\ \text{and} \\ \tau_B^* = \frac{-\alpha^2 - \alpha\delta\theta_A + \alpha\delta\theta_B + 2\alpha + \delta^2\theta_A\theta_B - 1}{2\alpha\delta(1-\alpha-\delta\theta_A)} + \frac{\sqrt{F+G}}{2\alpha\delta(1-\alpha-\delta\theta_A)}, \end{gathered} \tag{C.11}$$

$$\begin{aligned} \textit{where} \quad F &= \left(\alpha^2 + \alpha(\delta(\theta_B - \theta_A) - 2) - \delta^2\theta_A\theta_B + 1\right)^2 \\ \textit{and} \quad G &= 4\alpha\delta(\alpha + \delta\theta_B - 1)(\theta_A(\alpha + \delta\theta_B - 1) + (\delta - 1)(\alpha + \delta\theta_A - 1)c_c/\pi) \end{aligned}$$

Now we must find conditions where the leader chooses to offer a positive transfer to the challenger. First, this requires the right-hand side of the expressions (C.9) and (C.10) to be positive. That is, peace can only be obtained with some power-sharing. This is satisfied if:

$$\begin{aligned} \theta_A &\geq \frac{(1-\delta)(1-\alpha)c_c/\pi}{1-\alpha+\delta((1-\delta)c_c/\pi-\theta_B)} \\ \theta_B &\geq \frac{(1-\delta)(1-\alpha)c_c/\pi}{1-\alpha+\delta((1-\delta)c_c/\pi-\theta_A)} \end{aligned} \tag{C.12}$$

Second, the leader must prefer to appease the challenger instead of excluding the opposing group and facing conflict. A leader A who excludes a rebel group B gets:

$$V_A^l(\tau_B=0) = (1-\theta_B)(\pi+\delta V_A^l(\tau_B=0))-c_l \Rightarrow V_A^l(\tau_B=0) = \frac{(1-\theta_B)\pi-c_l}{1-\delta(1-\theta_B)}$$

Then, the payoff of inclusion is higher than exclusion if:

$$V_A^l(\tau_B=\tau_B^*) \geq V_A^l(\tau_B=0) \Rightarrow \frac{(1-\tau_B^*(\theta_B,\theta_A))\pi}{1-\delta} \geq \frac{(1-\theta_B)\pi-c_l}{1-\delta(1-\theta_B)} \tag{C.13}$$

If θ_B is below the minimum required by expression (C.12), and consequently satisfies inequality (C.6), a leader A could obtain peace by offering nothing to challenger B. As θ_B marginally increases above the minimum required by the inequality (C.12), the value of inclusion is clearly greater than the value of exclusion. The reason is that the minimum τ_B that achieves peace is just marginally greater than zero, and the leader would then lose just a marginal share of the total surplus. On the other hand, in case of exclusion, the leader's payoff drop discontinuously because of the costs of war.

Solving the inequality (C.13) for θ_B is difficult since the optimal sharing is a complicated function of the parameters of the model (Equation (C.11)). However, it is possible to inspect this inequality for the whole range of the parameter space. This is possible since all parameters of this model must fall in a very specific range for them to make any sense: $\delta < 1, c_c/\pi, c_l/\pi < 1, \theta_A, \theta_B < 1-\alpha, \alpha < 1$. The inspection of the inequality (C.13) shows that either: i) the value of a peaceful inclusion is always greater than the value of exclusion; or ii) there is θ_B^{**}, such that $V_A^l(\tau_B = \tau_B^*) \geq V_A^l(\tau_B = 0) \iff \theta_B \leq \theta_B^{**}$, conditional on (C.12).

By analogy, the same result is replicated for the values of θ_A. Therefore, conditional on (C.12), θ_A^{**} and θ_B^{**} (if they exist) satisfy the following:

$$\begin{gathered} \frac{(1-\tau_B^*(\theta_B^{**}, \theta_A))\pi}{1-\delta} = \frac{(1-\theta_B^{**})\pi - c_l}{1-\delta(1-\theta_B^{**})} \\ and \\ \frac{(1-\tau_A^*(\theta_A^{**}, \theta_B))\pi}{1-\delta} = \frac{(1-\theta_A^{**})\pi - c_l}{1-\delta(1-\theta_A^{**})} \end{gathered} \tag{C.14}$$

In conclusion, if θ_A and θ_B are such that (C.12) is satisfied, $\theta_A \leq \theta_A^{**}$ (if it exists), and $\theta_B \leq \theta_B^{**}$ (if it exists), the equilibrium strategies are:

i) Group A: τ_B^* and $C_A^*(\tau_A) = \begin{cases} 0 & if \quad \tau_A \geq \tau_A^* \\ 1 & if \quad \tau_A < \tau_A^* \end{cases}$

ii) Group B: τ_A^* and $C_B^*(\tau_B) = \begin{cases} 0 & if \quad \tau_B \geq \tau_B^* \\ 1 & if \quad \tau_B < \tau_B^*, \end{cases}$

where τ_A^* and τ_A^* are given by (C.11).

Equilibrium with Inclusion and Peace of group B and Exclusion and Conflict of group A

I aim to find the conditions for an equilibrium where:

- group A includes group B ($\tau_B^* > 0$) when leader, and group B plays peace;
- group B excludes group A ($\tau_A^* = 0$) when leader, and group A plays conflict.

In this scenario, the values of being leader are:

$$V_B^l = (1 - \theta_A)(\pi + \delta V_B^l) - c_l \Rightarrow V_B^l = \frac{(1 - \theta_A)\pi - c_l}{1 - \delta(1 - \theta_A)}$$

$$V_A^l = \frac{(1 - \tau_B^*)\pi}{1 - \delta},$$

where τ_B^* is the optimal sharing offered by leader A to challenger B.

Group A plays peace if:

$$\begin{gathered} V_A^{cp}(\tau_A) = \frac{\tau_A \pi}{1 - \delta} \geq V_A^{cc}(\tau_A) = (\alpha\tau_A + \theta_A)(\pi + \delta\frac{(1 - \tau_B^*)\pi}{1 - \delta}) - c_c \Rightarrow \\ \tau_A \geq \frac{\theta_A(1 - \delta\tau_B^*) - (1 - \delta)c_c/\pi}{1 - \alpha(1 - \delta\tau_B^*)} = \tau_A^{min} \end{gathered} \tag{C.15}$$

Group B plays peace if:

$$\begin{gathered} V_B^{cp}(\tau_B) = \frac{\tau_B \pi}{1 - \delta} \geq V_B^{cc}(\tau_B) = (\alpha\tau_B + \theta_B)(\pi + \delta\frac{(1 - \theta_A)\pi - c_l}{1 - \delta(1 - \theta_A)}) - c_c \Rightarrow \\ \tau_B \geq \frac{(1 - \delta)((\delta(1 - \theta_A) - 1)c_c/\pi + \theta_B - \delta\theta_B c_l/\pi)}{1 + \alpha\delta - \alpha + \delta\theta_A - \delta + \alpha(\delta - 1)\delta c_l/\pi} = \tau_B^* \end{gathered} \tag{C.16}$$

First, we must find conditions where groups would be in conflict if they were offered nothing. For group B, this is:

$$V_B^{cc}(\tau_B = 0) = \theta_B(\pi + \delta\frac{(1 - \theta_A)\pi - c_l}{1 - \delta(1 - \theta_A)}) - c_c \geq 0 \Rightarrow \theta_B \geq \frac{(1 - \delta + \delta\theta_A)c_c/\pi}{1 - \delta c_l/\pi} \tag{C.17}$$

and

$$V_A^{cc}(\tau_A = 0) = \theta_A(\pi + \delta\frac{(1 - \tau_B^*)\pi}{1 - \delta}) - c_c \geq 0 \Rightarrow$$

$$\begin{aligned} &\theta_A \geq \frac{(1 - \delta)}{2\delta(1 - (1 - \delta)c_c/\pi\delta)}[\alpha + \delta^2 c_c/\pi + \delta\theta_B - \alpha\delta c_l/\pi - \delta^2\theta_B c_l/\pi - 1 \\ &+ \sqrt{\left(\alpha + \delta^2 c_c/\pi + \delta\theta_B - \alpha\delta c_l/\pi - \delta^2\theta_B c_l/\pi - 1\right)^2 - 4\delta c_c/\pi((\delta - 1)\delta c_c/\pi - 1)(\alpha(\delta c_l/\pi - 1) + 1)}] \end{aligned} \tag{C.18}$$

Second, group A must prefer the inclusion of group B than facing conflict against them:

$$V_A^l(\tau_B = \tau_B^*) \geq V_A^l(\tau_B = 0) \Rightarrow \frac{(1-\tau_B^*(\theta_B, \theta_A))\pi}{1-\delta} \geq \frac{(1-\theta_B)\pi - c_l}{1-\delta(1-\theta_B)} \Rightarrow$$

$$\begin{aligned}
&\theta_B \leq \frac{1}{2(1-\delta)\delta(1-\delta c_l \pi)}[-\alpha + \delta + c_c/\pi\delta + \delta c_l/\pi + \alpha\delta + \alpha\delta c_l/\pi - \delta^2 - 2c_c/\pi\delta^2 - 2\delta^2 c_l/\pi - \\
&\quad \alpha\delta^2 c_l/\pi + c_c/\pi\delta^3 + \delta^3 c_l/\pi + \delta\theta_A + c_c/\pi\delta^2\theta_A - c_c/\pi\delta^3\theta_A + \sqrt{C+D}], \\
&\text{where} \quad C = 4\delta(\delta-1)^2(\delta c_l/\pi - 1)(c_c/\pi(\delta-1)(\delta(\theta_A - 1)+1) + c_l/\pi(\delta(-\theta_A) + \delta + \\
&\quad \alpha(\delta-1)(\delta c_l/\pi - 1) - 1)) \\
&\text{and} \quad D = (\delta(c_c/\pi(\delta-1)(\delta(\theta_A-1)+1) + \delta - \theta_A + (\delta-1)^2(-c_l/\pi) - 1) + \\
&\quad \alpha(\delta-1)(\delta c_l/\pi - 1))^2
\end{aligned} \tag{C.19}$$

On the other hand, in this equilibrium leader B prefers the exclusion of A than its inclusion:

$$V_B^l(\tau_A = \tau_A^{min}) < V_B^l(\tau_A = 0) \Rightarrow \frac{(1-\tau_A^{min}(\theta_A, \theta_B))\pi}{1-\delta} < \frac{(1-\theta_A)\pi - c_l}{1-\delta(1-\theta_A)} \tag{C.20}$$

Again, it is difficult to find a closed-form solution for θ_A. I use the same approach taken in the previous section. Similarly, it is possible to show that either: i) there is no θ_A that satisfies the inequality; or ii) there is θ_A^{**} such that the inequality is satisfied for any $\theta_A \geq \theta_A^{**}$.

In sum, if θ_A and θ_B are in the region given by (C.17), (C.17), (C.20) and (C.19), the equilibrium strategies are:

i) Group A: τ_B^* and $C_A^*(\tau_A) = \begin{cases} 0 & if \quad \tau_A \geq \tau_A^{min} \\ 1 & if \quad \tau_A < \tau_A^{min} \end{cases}$

ii) Group B: $\tau_A^* = 0$ and $C_B^*(\tau_B) = \begin{cases} 0 & if \quad \tau_B \geq \tau_B^* \\ 1 & if \quad \tau_B < \tau_B^*, \end{cases}$

where τ_A^{min} and τ_B^* are given by (C.15) and (C.16).

The conditions where there is inclusion and peace of group A, and exclusion and conflict of group B on the equilibrium path are symmetric to this one.

Equilibrium with Exclusion and Conflict of group B and Exclusion and Conflict of group A

I aim to find the conditions for an equilibrium where:

- group A excludes group B ($\tau_B^* = 0$) when leader, and group B plays conflict;
- group B excludes group A ($\tau_A^* = 0$) when leader, and group A plays conflict.

In this scenario, the values of being leader are:

$$V_A^l = (1-\theta_B)(\pi + \delta V_A^l) - c_l \Rightarrow V_A^l = \frac{(1-\theta_B)\pi - c_l}{1-\delta(1-\theta_B)}$$

$$V_B^l = (1-\theta_A)(\pi + \delta V_B^l) - c_l \Rightarrow V_B^l = \frac{(1-\theta_A)\pi - c_l}{1-\delta(1-\theta_A)}$$

The minimum shares that appease the respective challenging groups are given by:

$$\begin{gathered}
V_A^{cp}(\tau_A) = \frac{\tau_A \pi}{1-\delta} \geq V_A^{cc}(\tau_A) = (\alpha\tau_A + \theta_A)(\pi + \delta\frac{(1-\theta_B)\pi - c_l}{1-\delta(1-\theta_B)}) - c_c \Rightarrow \\
\tau_A \geq \frac{(1-\delta)((\delta(1-\theta_B)-1)c_c/\pi + \theta_A - \delta\theta_A c_l/\pi)}{1+\alpha\delta-\alpha+\delta\theta_B-\delta+\alpha(\delta-1)\delta c_l/\pi} = \tau_A^{min} \\
and \\
V_B^{cp}(\tau_B) = \frac{\tau_B \pi}{1-\delta} \geq V_B^{cc}(\tau_B) = (\alpha\tau_B + \theta_B)(\pi + \delta\frac{(1-\theta_A)\pi - c_l}{1-\delta(1-\theta_A)}) - c_c \Rightarrow \\
\tau_B \geq \frac{(1-\delta)((\delta(1-\theta_A)-1)c_c/\pi + \theta_B - \delta\theta_B c_l/\pi)}{1+\alpha\delta-\alpha+\delta\theta_A-\delta+\alpha(\delta-1)\delta c_l/\pi} = \tau_B^{min}
\end{gathered} \tag{C.21}$$

Now we must find the conditions for which exclusion is better than an appeasing inclusion. This is satisfied for group A if:

$$V_A^l(\tau_B = \tau_B^{min}) < V_A^l(\tau_B = 0) \Rightarrow \frac{(1-\tau_B^{min}(\theta_B,\theta_A))\pi}{1-\delta} < \frac{(1-\theta_B)\pi - c_l}{1-\delta(1-\theta_B)} \Rightarrow$$

$$\begin{aligned}
&\theta_B > \frac{1}{2(1-\delta)\delta(1-\delta c_l\pi)}[-\alpha+\delta+c_c/\pi\delta+\delta c_l/\pi+\alpha\delta+\alpha\delta c_l/\pi-\delta^2-2c_c/\pi\delta^2-2\delta^2 c_l/\pi- \\
&\quad \alpha\delta^2 c_l/\pi + c_c/\pi\delta^3+\delta^3 c_l/\pi+\delta\theta_A+c_c/\pi\delta^2\theta_A-c_c/\pi\delta^3\theta_A+\sqrt{C+D}], \\
&\text{where} \quad C = 4\delta(\delta-1)^2(\delta c_l/\pi-1)(c_c/\pi(\delta-1)(\delta(\theta_A-1)+1)+c_l/\pi(\delta(-\theta_A)+\delta+ \\
&\quad \alpha(\delta-1)(\delta c_l/\pi-1)-1)) \\
&\text{and} \quad D = (\delta(c_c/\pi(\delta-1)(\delta(\theta_A-1)+1)+\delta-\theta_A+(\delta-1)^2(-c_l/\pi)-1)+ \\
&\quad \alpha(\delta-1)(\delta c_l/\pi-1))^2
\end{aligned} \tag{C.22}$$

Similarly for group B:

$$\begin{aligned}
&\theta_A > \frac{1}{2(1-\delta)\delta(1-\delta c_l\pi)}[-\alpha+\delta+c_c/\pi\delta+\delta c_l/\pi+\alpha\delta+\alpha\delta c_l/\pi-\delta^2-2c_c/\pi\delta^2-2\delta^2 c_l/\pi- \\
&\quad \alpha\delta^2 c_l/\pi + c_c/\pi\delta^3+\delta^3 c_l/\pi+\delta\theta_B+c_c/\pi\delta^2\theta_B-c_c/\pi\delta^3\theta_B+\sqrt{\tilde{C}+\tilde{D}}], \\
&\text{where} \quad \tilde{C} = 4\delta(\delta-1)^2(\delta c_l/\pi-1)(c_c/\pi(\delta-1)(\delta(\theta_B-1)+1)+c_l/\pi(\delta(-\theta_B)+\delta+ \\
&\quad \alpha(\delta-1)(\delta c_l/\pi-1)-1)) \\
&\text{and} \quad \tilde{D} = (\delta(c_c/\pi(\delta-1)(\delta(\theta_B-1)+1)+\delta-\theta_B+(\delta-1)^2(-c_l/\pi)-1)+ \\
&\quad \alpha(\delta-1)(\delta c_l/\pi-1))^2
\end{aligned} \tag{C.23}$$

In sum, if θ_A and θ_B are in the region given by (C.23) and (C.22), the equilibrium strategies are:

i) Group A: $\tau_B^* = 0$ and $C_A^*(\tau_A) = \begin{cases} 0 & if \quad \tau_A \geq \tau_A^{min} \\ 1 & if \quad \tau_A < \tau_A^{min} \end{cases}$

ii) Group B: $\tau_A^* = 0$ and $C_B^*(\tau_B) = \begin{cases} 0 & if \quad \tau_B \geq \tau_B^{min} \\ 1 & if \quad \tau_B < \tau_B^{min}, \end{cases}$

where τ_A^{min} and τ_B^{min} are given by (C.21).

It can be verified that all conditions for each equilibrium are mutually exclusive. In fact, when values of θ_A and θ_B reach the limit of the inequality conditions of one equilibrium, they will necessarily satisfy the conditions of the next equilibrium. For instance, suppose the parameters are such that there is neither sharing nor conflict on the equilibrium path. When the strength of a group reaches the upper limit that supports such equilibrium, this upper limit will coincide with the lower limit for the group to be included and in peace.

Taking all the above results together, a result very similar to the static model can be obtained. This is summarized by Proposition 2.