24

Conflict and Development

"No society is immune from the darkest impulses of man."
Barack Obama, *New Delhi, India 27 January 2015*

24.1. Introduction

We've discussed several ways in which a society adapts to uneven growth and possibly growing inequality. From savings and human capital accumulation, to occupational choice and the use of credit and insurance, we have a wide variety of market based, *economic* responses to unevenness and change. But economics isn't just about economics, and if we think it is, we do so at our own peril. It is impossible to study phenomena like uneven growth without pondering the political and social consequences. It is in that broad context that we will now study the links between economic development and social conflict.

By *social conflict*, we refer to within-country unrest, ranging from peaceful demonstrations, processions and strikes to violent riots and civil war. In whatever form it might take, the key feature of social conflict is that it is *organized*: it involves groups and is rooted — in some way or form — in within-group identity and cross-group antagonism.[1]

Social conflict is endemic, and it is a central part of our lives in all societies. I should place things in context though. Appearances to the contrary, and though it may seem hard to believe, we possibly live in a safer world than in the past. For instance, Steven Pinker's book, *The Better Angels of Our Nature*, is a delightfully gruesome romp through the centuries, but an exemplary sanity check that argues that violence of all forms has been on the decline. And he is correct. Compared to the utter mayhem that prevailed in the Middle Ages and

[†]Some material in this chapter and the next draws heavily on Ray and Esteban (2017). Indeed, much of these chapters is based on many years of joint research with Joan Esteban and more recently with Laura Mayoral, and I am very grateful to both of them.

[1]That is not to argue that individual instances of violence, such as (unorganized) homicide, rape or theft are unimportant, and indeed, some of the considerations discussed in this chapter potentially apply to individual violence as well. But social conflict has its own particularities; specifically, its need to appeal to and build on some form of group identity: religion, caste, kin, occupational, or economic class. In short, social conflict lives off both identity and alienation.

certainly earlier, we are surely constrained — at least relatively speaking — by mutual tolerance, the institutionalized respect for cultures and religions, and by the increased economic interactions within and across societies. To this one must add the growth of States that seek to foster those interactions for the benefits of their citizens, and that internalize the understanding that violence — especially across symmetric participants —- ultimately leads nowhere.

And yet, it isn't hard to understand why this sort of long-run perspective seemingly flies in the face of the facts. We appear to live in an incredibly violent world. Not a day appears to go by when we do not hear of some new atrocity: individuals beheaded, planes shot from the sky, suicide bombings of all descriptions, mass killings, and calls to even more escalated violence. I have many friends who are firmly convinced that the world is fast sinking into an orgy of conflict and mutual annihilation, and on certain days of the week I feel the same way myself. Yet perspective is important. The Middle Ages, the early days of Christendom or the Mughal Empire did not have access to the internet where each act of savagery could be endlessly replayed on social media. With the calm afforded by a longer, historical view, a perspective that Pinker correctly brings to the table, we can place our tumultuous present into context, and perhaps even be thankful for it.

What today's violence does show, however, that there are limits to peace and civility as long as there are enormous inequities in the world. As students of development economics, it also means that there are limits to what can be gleaned from a model which *assumes* that political processes are all peaceful, such as those stemming from voting and passionate but friendly debate.

But hold on a minute: what does economics have to do with social conflict? Isn't that just a case of one religious or ethnic group attempting to blow its enemy out of the water; a case, simply put, of primordial antangonism? No doubt, there is some truth to the primordial hate story, especially when that hatred has been nurtured over decades or centuries of conflict. When all is said and done, perhaps conflict really *is* a "clash of civilizations" (Huntington, 1993), the unfortunate corollary of religious or ideological dogma. Perhaps anti-Semitism is a fundamental construct, or racism just a primitive abhorrence of the Other, or the caste system a product of some primeval, intrinsic desire to segregate human beings. Often, we can get quite far by simply using these as working explanations to predict the impact of a particular policy or socio-economic transformation.

Yet stopping there prevents us from seeing a deeper common thread: that by creating and fostering divisive attitudes, there are gains to be had, and often those gains are economic. By following the economic trail, by asking *cui bono?*, we can get further insights into the origins of prejudice and violence that will — at the very least — supplement any non-economic understanding of conflict. Even the most horrific conflicts, ones that seem entirely motivated by religious or ethnic intolerance or hatred, have that undercurrent of economic gain or loss that flows along with the violence, sometimes obscured by the more gruesome aspects of that violence, but never entirely absent. From the great religious struggles of the past to the civil wars and ethnic conflicts we see today, we can see (if we look hard enough) a battle for resources or economic gain: oil, land, business opportunities, or political

power (and political power is, in the end, a question of control over economic resources).

In this chapter and the next, we will examine the links between economic development and social conflict. We ask the following questions:

1. How is economic prosperity (or its absence) related to conflict? What is the connection between economic development and conflict? Does economic growth dampen violence, or provoke it?

2. Is the main form of economic violence between the haves and the have-nots? Is conflict born of economic similarity or difference?

3. Is there evidence for the hypothesis that "ethnic divisions" — broadly defined to include race, linguistic divisions, and religious difference — are a potential driver of conflict?

Within-Country Conflicts After World War II

Within-country conflicts account for an enormous share of deaths and hardship in the world today. Since World War II there have been 22 inter-state conflicts with more than 25 battle-related deaths per year; 9 of them have killed at least 1000 over the entire history of conflict (Gleditsch et al, 2002). The total number of attendant battle deaths in these conflicts is estimated to be around 3 to 8 million (Bethany and Gleditsch, 2005).

The very same period witnessed 240 civil conflicts with more than 25 battle-related deaths per year, and almost half of them killed more than 1000 (Gleditsch et al, 2002). Estimates of the total number of battle deaths are in the range of 5 to 10 million (Bethany and Gleditsch, 2005).

To the direct count of battle deaths one would do well to add the mass assassination of up to 25 million non-combatant civilians (Political Instability Task Force, http://eventdata.parusanalytics.com/data.dir/atrocities.html) and indirect deaths due to disease and malnutrition which have been estimated to be at least four times as high as violent deaths (Global Burden of Armed Violence, 2008), not to mention the forced displacements of sixty million individuals by 2015 (http://www.unhcr.org/558193896.html).[a]

In 2015 there were 29 ongoing conflicts that had killed 100 or more people in 2014, with cumulative deaths for many of them climbing into the tens of thousands.

Figure 24.1 depicts global trends in inter- and intra-state conflict.

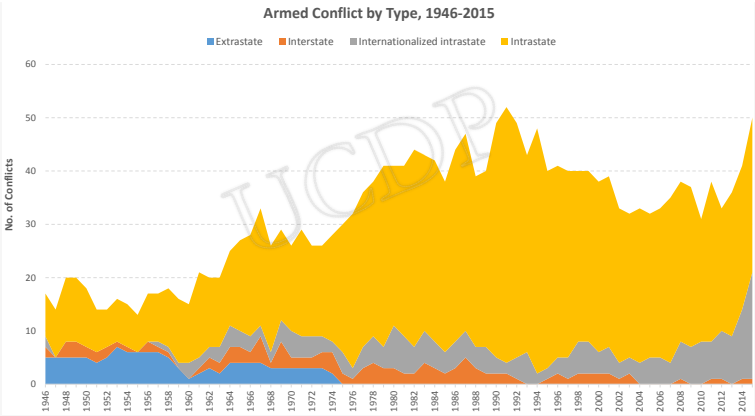


Figure 24.1. Armed Conflicts by Type. Conflicts include cases with at least twenty-five battle deaths in a single year. Source: Melander, Pettersson, and Themnér (2016).

[a]Such displacement also have a high cost in lives due to endemic sicknesses the newly settled population is not immune to (see Montalvo and Reynal-Querol (2007) and Cervellati and Sunde (2005)).

24.2. The Determinants of Conflict

We begin by setting up an extremely simple model that captures some of the essential features of a conflict. Economics will enter into it right from the start: both the gains from winning a conflict and the costs of engaging in it may depend on prevailing economic conditions.

24.2.1. Winning and Losing. To fix our ideas, suppose that there are two groups which are engaged in conflict to seize a "prize." The prize may be something as concrete as oil revenues, land, or jobs. Or it could be somewhat more abstract, such as political power or religious dominance. We can think of one of the groups as a rebel group and the other as the State that it fights, or it may be that both groups are non-State actors engaged in fighting each other (one of them possibly with the tacit or active support of the State). In what follows, we will consider thee different interpretations. We will also study the possibility of multilateral conflicts across three or more groups.

Our story is as stripped-down as we can make it. Each group contributes "resources" (time, labor, money, organization) that go into the conflict. Then one group wins and the other loses. More formally, let R_1 and R_2 be the contributions of groups 1 and 2. Then the total resources devoted to the struggle are given by

$$R = R_1 + R_2.$$

We now suppose that each group has a chance of winning that's proportional to the resources contributed by it. In other words, the probability that group

1 wins the conflict is given by

$$p_1 = \frac{R_1}{R}, \tag{24.1}$$

and a similar description applies for group 2. Following a tradition initiated by Gordon Tullock and others (see, for instance, Tullock 1980 and Skaperdas 1996), these descriptions of the probability of success are known as *contest success functions*, and we can use them to obtain the expected payoff from conflict. Neglecting for a minute the cost of the contributions, the expected payoff per-capita to group 1 is

$$p_1 W_1 + (1 - p_1) L_1,$$

where W_1 is the overall payoff to group 1 if group 1 *wins*, and L_1 is the corresponding payoff (again, to group 1) if group 1 *loses*. These payoffs incorporate the differential spoils from victory and defeat, so that W_1 is obviously a bigger number than L_1. If we define $\Pi_1 = W_1 - L_1$ to be the *net* payoff from winning, we have

$$\text{Expected Payoff } = p_1 \Pi_1 + L_1 = \frac{R_1}{R_1 + R_2} \Pi_1 + L_1. \tag{24.2}$$

Figure 24.2 depicts this expected payoff as it varies with the resources contributed by group 1. (To do this, we mentally hold fixed the contributions R_2 by group 2, but later we will consider both changes.) On the horizontal axis we have contributions R_1. The upper curve depicts the payoff to conflict, as described by equation (24.2). It is a "concave" function of R_1, with steadily diminishing marginal returns to contributions.[2]

24.2.2. The Cost of Contributions. Contributions don't come for free, of course. The larger the value of R_1, the greater the cost imposed on the group as a whole. But just what is this cost? That depends on the form that contributions take. For instance, imagine that contributions are denominated in units of labor time: e.g., hours spent in protesting, rioting, looting or lobbying. Then the *monetary* equivalent of R_1 is lost income that could have been earned by diverting that labor time to economically productive causes. So the total cost is $w_1 R_1$, where w_1 is the going wage rate for members of Group 1. But just as there are good reasons for the expected payoff to be concave in R_1, there are good reasons for the overall cost to be *convex* in R_1: for marginal cost to increase with contributions. The reason is that progressively more income lost may generate ever-stronger reductions in *utility* payoffs. (That follows from diminishing marginal utility in income.)

A general way to write this is to suppose that the individual cost of contributing an amount r is given by a function $c(r, w)$, where w is the income earned by that individual for each unit of time he spends in productive activity. If we suppose that each person in Group 1 earns the same income, the *overall* cost C_1 incurred by Group 1 in contributing aggregate resources R_1 is given by

$$C_1(R_1) = c\left(\frac{R_1}{N_1}, w_1\right) N_1,$$

[2] You can verify this by differentiating equation (24.2) with respect to R_1.

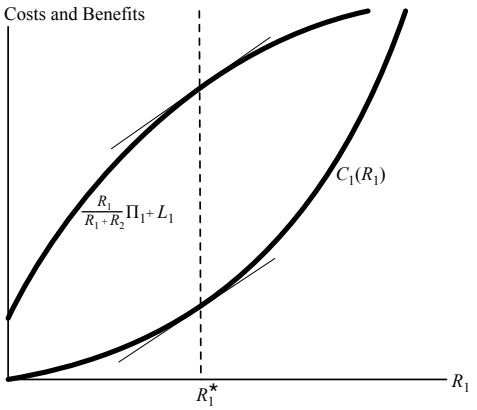


Figure 24.2. The Costs and Benefits of Conflict. The upper concave function represents benefits, the lower convex function costs. The optimal choice of contributions R_1^* equalizes marginal benefits and marginal costs.

where N_1 is the group size and w_1 is group income.[3]

The lower curve in Figure 24.2 shows this cost function of contributions. Costs rise with R_1, of course, and the function is convex.

24.2.3. Net Payoffs and Group Behavior. Given these two functions describing payoffs and costs, it is easy enough to use elementary economic theory to figure out the contributions R_1 by our group. Imagine that there is a group leader who acts in the interests of the group, and seeks to maximize the *net* expected payoffs from conflict. Combining our two functions, those net payoffs are given by

$$\frac{R_1}{R_1+R_2}\Pi_1 + L_1 - C_1(R_1), \tag{24.3}$$

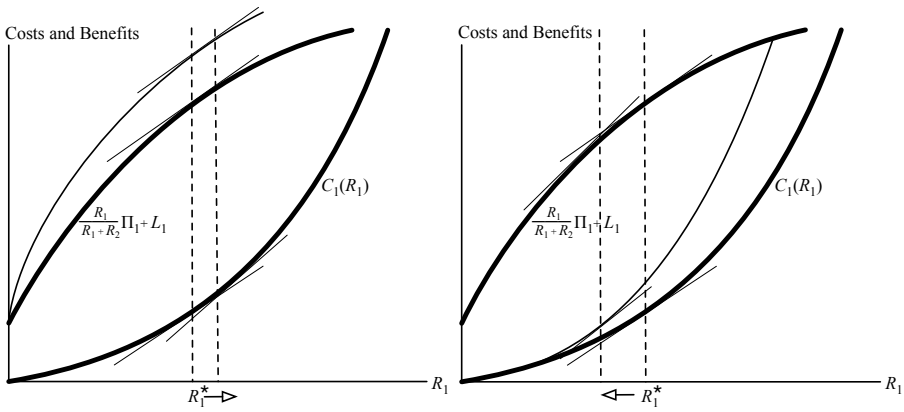
and are therefore graphically equal to the vertical distance between the two curves depicted in Figure 24.2. A rational group leader will therefore demand contributions from group members that maximize the vertical distance between the two curves, for that is where the *net* payoff is unambiguously highest. This gives rise to our usual mantra: set marginal benefit (from resource contributions) equal to marginal cost, as shown at the special point R_1^* in Figure 24.2.

24.3. Economic Change and Conflict: Some Theory

Our simple yet effective apparatus allows us to consider various economic forces that could bear on conflict. Two of them stand out as central.

24.3.1. The Prize Effect. Economic change could affect the size of the prize to be won in a conflict. The term Π_1 may be affected by factors as diverse as increased oil revenues, a higher payoff from seizing political power, windfall gains to a rival group, or policies such as trade liberalization. In each of these

[3] We've presumed here that each individual contributes equally, so that per-capita contributions are captured by R_1/N_1.



(a) Change in Benefits **(b)** Change in Costs

Figure 24.3. Changing Benefits and Costs. In Panel A, the benefit function swivels up because of the gain in net payoff Π_1, and R_1^* rises. In Panel B, the cost function swivels upwards because the opportunity cost of contributions rises, and R_1^* falls.

situations the potential gains from engaging in conflict will generally go up. The prize effect of economic growth is a bit more nuanced. It could affect Π_1 in either direction. For instance, it may be that both W_1 and L_1 are dampened by an economic shock (such as a recession), and yet the difference Π_1 goes up. In addition, economic growth will have other ancillary effects; see below.

If Π_1 rises, the expected payoff curve rises and becomes steeper at every point. For the same cost function, the optimal resource contribution by group 1 must go up, as shown in the left panel of Figure 24.3. In particular, more natural resources may divert the energies of different groups into wasteful conflict, a theme that we return to below. Or economic growth may well be conflict enhancing, if that growth is unevenly distributed across groups in society, or generates new sources of seizable revenue.

24.3.2. The Opportunity Cost Effect. This second channel works via economic changes that affect the *cost* of engaging in conflict. Think of allocating your time between productive work and conflictual activity. When the society is poor, your opportunity cost of engaging in conflict is lower. If economic growth raises your wages (and wages all around), the opportunity cost of conflict will go up: the higher payoffs from engaging in non-conflict activities will lower the incentive to enter into conflict.

The right panel of Figure 24.3 displays this change. The cost function swivels upwards when the opportunity cost of engaging in conflict increases. That lowers the optimal contribution of resources by the group.

As in the case of the prize effect, a variety of interpretations are possible and we should be sensitive to the nuances of different cases. For instance, the arguments just given implicitly assume that conflict is principally carried out by individuals devoting *labor* to the struggle. But conflict resources may

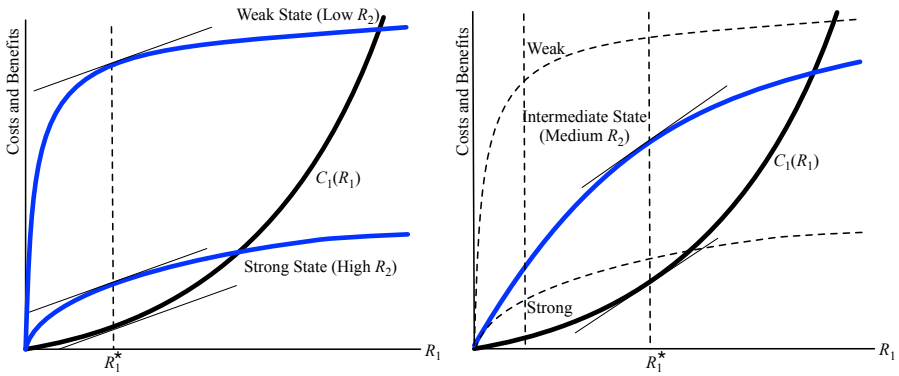
also be provided in terms of *money* and not *time*. To the extent that this is true, the arguments are reversed. An increase in income can make it easier to make financial contributions, while at the same time, it increases the *labor*-denominated opportunity costs of directly engaging in conflict. The net effect can depend on the structure of the "conflict technology": that is, the extent to which it uses capital rather than labor. As an example: the United States is a rich country. It does not have a compulsory military draft. And yet, militarily, it is extremely active.

24.3.3. State Capacity and Conflict. So far we have said very little about Group 2 — the rival that our group is up against. Presumably similar considerations apply to that group as well. Our theory of conflict is not just one of optimization by a single group, but a story of the "equilibrium interaction" of several groups, as they all adjust their efforts and contributions in response to one another. We will study such models below.

For now, let's put Group 2 to a different use. I want to think of it not as any ordinary group, but as the State, so that the situation we're considering is really a struggle between our Group 1 and a government that confronts it. So, think of R_2 as *state capacity*: the ability of the State to confront and contain unrest. A weak State will have a low effective value of R_2, thus allowing an insurgent Group 1 to overpower it more easily. On the other hand, a large value of R_2 means that the State is extremely powerful to begin with, and can easily crush any opposition.

How does a change in R_2 affect our group's willingness to conduct a conflict; that is, to expend resources R_1? Consult Figure 24.4 in what follows. Panel A shows two extreme cases. In the first, depicted by the upper blue curve, R_2 (not shown) is tiny and the State is very weak. Then it is easy to see that the probability of sucess shoots up very quickly to 1 as our group increases its own efforts: success can come at a low price. In the second case, shown by the lower blue curve, R_2 (again not shown) is huge, and the State is very strong. In this case, our group will need to expend an enormous quantity of resources to increase its win probability. *In both cases, the group fights very little, but for different reasons.* In the first, victory comes easily, and the State can be quickly overpowered: these are akin to bloodless coups. In the second case, victory is near-impossible, and our group gives up, expending little or no effort towards conflict. Both impotent and powerful States can look peaceful, but differently so.

It is in intermediate situations, depicted by the payoff curve in Panel B, that conflict can be maximal. An exercise problem will ask you to verify this with the help of a little bit of calculus. You will see that as R_2 goes up, the optimal choice of R_1 first rises and then falls back, as suggested by Figure 24.4. In short, in the intermediate case, the State is neither so weak that it can be easily overpowered, nor is it strong enough that victory is a pipe-dream. Then a group will fight hard to secure its victory, and that victory may well be a Pyrhhic one, but in any case the statistics will pick up that conflict. States with intermediate capacity may well look the most conflictual.



(a) Extreme Value of State Capacity **(b)** Intermediate Value of State Capacity

Figure 24.4. STATE CAPACITY AND CONFLICT. In Panel A, we consider two benefit functions corresponding to large and small values of R_2. In either case, R_1^* is small (shown to be the same to avoid clutter). In Panel B, R_2 assumes an intermediate value, and R_1^* is higher than in Panel A.

24.4. Economic Change and Conflict: Empirical Connections

A substantial empirical literature that attempts to unearth the correlates of conflict. Systematic studies employing statistical methods begin with Collier and Hoeffler (1998, 2004) and Fearon and Laitin (2003). Perhaps the most important finding from this literature is that conflict is negatively correlated with per-capita income. Let's take a critical look at this finding, using the theoretical discussion above.

24.4.1. A Negative Correlation. Fearon and Laitin (2003) study the onset of "civil war," a conflict that they define by (1) "fighting between agents of (or claimants to) a state and organized, nonstate groups," (2) a yearly average of at least 100 deaths, with a cumulative total of at least 1000 deaths, and (to rule out genocides or one-sided massacres) (3) at least 100 deaths on both sides. These criteria are similar to, though not identical with other criteria used in the literature[4] They conclude that "per capita income . . . is strongly significant in both a statistical and a substantive sense: $1,000 less in per capita income is associated with 41% greater annual odds of civil war onset, on average . . . "[5]

24.4.2. Evaluating the Correlation: Other Measures of Conflict.. I deliberately put up — in gory detail — the Fearon-Laitin definition of conflict for you, so that you can compare it with other possible measures. Whether threshold-like criteria involving deaths are adequate indicators of conflict depends on the type of question that we, the analysts, have in mind.

[4]These principally vary in the size of the thresholds and generally lack criterion 3.

[5]They go on to note that "the income variable is not just a proxy for 'the West,' whose states might have low rates of civil war for reasons of culture or history that have little to do with income. The estimated coefficient . . . remains strongly significant."

Many types of organized unrest can lead to relatively low levels of deadly violence: demonstrations, strikes, coups, or the detention of political prisoners. Yet their overall costs might even exceed the costs imputed to civil wars. Think of the IRA movement in the UK, the Red Army Faction in West Germany in the late seventies, the Black Panther movement in the US, the permanent turmoil situation in Italy with either real or fabricated "extreme left" terrorist actions, the military coups in Greece and Turkey, the failed coups in France in 1958 and in Spain in 1981, as well as the ETA movement (again in Spain) since the early 1970s. One could add the many revolutionary movements and bloody military coups in Latin America, in countries with per-capita income well above that of many Asian or African countries. How can it be that these trends do not sufficiently show up in the Fearon-Laitin findings? Is this because the number of deaths did not go beyond some arbitrary threshold of 50 or 100 yearly casualties? The measure matters, but the problem is that we do not have comprehensive data of this kind.

24.4.3. Evaluating the Correlation: Endogeneity.. Both reverse causality and possible omitted variables can contaminate the interpretation of the measured negative correlation. Certainly, ongoing conflict will destroy productive capacity, leading to lower per-capita income. For instance, Hess (2003) estimates to cost of all civil wars to be 8% of world's GDP, and de Groot (2009) finds that global GDP in 2007 would have been 14.3% higher if there had not been any conflict since 1960. Collier and Hoeffler (2004a,b) estimate the typical cost of a civil war to be around $50 billion and argue that this significantly reduces future growth. Gates et al (2012) argue that a medium-sized conflict with 2500 battle deaths increases undernutrition by an additional 3.3%, reduces life expectancy by about 1 year, increases infant mortality by 10%, and deprives an additional 1.8% of the population from access to potable water. Undoubtedly, that in turn affects per-capita income.

There are also important omitted variables to be contended with. Both low per-capita income and conflict could be the joint outcome of weak political institutions or poor State capacity. Djankov and Reynal-Querol (2010) argue that country-specific historical factors are highly significant in explaining both conflict and weak institutions and that they render non-significant the role of low per capita income. Besley and Reynal-Querol (2014) find that local conflicts over the past few centuries are highly significant in explaining today's civil wars, as well as today's development outcomes. Ashraf and Galor (2013) and Arbath, Ashraf and Galor (2015) argue that genetic diversity explains both the level of development and social conflict.

24.4.4. Evaluating the Correlation: A Good Instrument?. A good instrument for per-capita income would alleviate some of these concerns, but remember a good instrument is about as rare as a unicorn. Here's one: try rainfall, as Miguel, Satyanath and Sergenti (2004) do. The idea is simple and reasonably compelling: rainfall shocks will affect per-capita income, and should have no *separate* effects on conflict. This latter assertion can, of course, be challenged, in ways more or less outlandish depending on how literal you want to get

Variable	[1] Prio25	[2] Prio25	[3] Prio1000
Economic growth t	-0.410	-1.130	*-1.48
	(1.480)	(1.400)	(0.82)
Economic growth $t-1$	**-2.250	**-2.550	-0.77
	(1.070)	(1.100)	(0.70)
Country Controls	Yes	No	No
Country Fixed Effects	No	Yes	Yes
Root mean square error	0.36	0.32	0.24
Observations	743	743	743

Table 24.1. Economic Growth and Civil Conflict in Sub-Saharan Africa, 1981–1999 Source: Miguel, Satyanath and Sergenti (2004), Table 4. *Notes.* Dependent variable for columns 1 and 2: deaths ≥ 25; for column 3, deaths ≥ 1000, as reported by the Peace Research Institute of Oslo. Economic growth variables are instrumented by current and lagged growth in rainfall. Country-specific year time trends in all specifications. Huber robust standard errors in parentheses. *= significantly different from zero at 10% level. **= significantly different from zero at 5% level. ***= significantly different from zero at 1% level.

about exclusion restrictions.[6] That said, any such analysis must rely on regions in which rainfall significantly affects output, which explains Miguel, Satyanath and Sergenti's focus on sub-Saharan Africa, for which a first stage regression of income growth on weather shock works well.[7]

Miguel, Satyanath and Sergenti (2004) work with a conflict database developed by the Peace Research Institute of Oslo (PRIO) in conjunction with the University of Uppsala. Unlike Collier-Hoeffler-Fearon-Laitin, they relate the incidence of civil conflict in sub-Saharan Africa (over 1981–1999) to the *growth rate* of per-capita GDP (and not its level). In fact they do not find level effects, but the relationship they uncover for growth rates is strong: "a five-percentage-point drop in annual economic growth increases the likelihood of a civil conflict (at least 25 deaths per year) in the following year by over 12 percentage points, which amounts to an increase of more than one-half in the likelihood of civil war." Table 24.1 reproduces the main results from this paper.

This is suggestive evidence that economic growth may quell conflict, but it is far from conclusive. There is no evidence that higher levels of per-capita income tend to bring down outbreaks of conflict, especially if we take the broader measures of conflict into account, as in Section 24.4.2. At best what we see from the (very useful) exercise summarized here is that *shocks* to economic growth appear to have an adverse effect on conflict. But even this

[6] For instance: perhaps a rainfall shock negatively affects forest cover for guerrillas, which makes it easier to counter them. Or rainfall shocks create a water shortage or affects temperatures, which affects conflict quite apart from effects on per-capita income.

[7] This strategy is obviously limited. Rainfall shocks do not work well outside the sub-Saharan sample, and indeed, even over more recent time periods for sub-Saharan Africa.

observation, as we will argue more than once in the discussions to follow, will depend on the nature of the shock; see the Box on Oil and Coffee in Colombia, for instance.

24.4.5. Prize and Opportunity-Cost Effects Revisited. To interpret these results, it is very useful to return to the prize effects and opportunity-cost effects introduced in Section 24.3. Specifically, recall the opportunity cost effect, which states that economic growth increases the returns from productive activity, and so dampens the incentives to enter into conflict. It is not at all far-fetched to imagine that this is exactly what is happening, at least on those felicitous occasions when economic growth reduces conflict. Indeed, this is the interpretation favored by Collier and Hoeffler (1998, 2004) and Miguel, Satyanath and Sergenti (2004).[8] It is a venerable and compelling argument that goes back to Becker (1968), Ehrlich (1973) and Grossman and Kim (1995), and it is echoed in the work of many others.[9]

That said, it would be inadequate (to say the least) to trot out the opportunity cost argument as the only game in town when economic growth happens. True, the opportunity cost of conflict is lower, but so presumably are the gains from conflict in a poorer society: there is less to seize. If there is a serious argument to be made that growth *invariably* reduces conflict, it must connect the opportunity costs of conflict *relative* to the potential gains from conflict. But the movement of per-capita income up or down does not immediately affect this relative magnitude in any particular way. So even if considerations of opportunity cost are appropriate — and we believe they are — once nested into the context at hand, the explanation leaves something to be desired.

In summary, theories of uneven growth demand that we keep track of the opportunity cost of engaging in conflict *relative* to the expected payoff from it. It may well be that the latter rises while the former increases less so, thereby making rebellion a more likely outcome. Specifically, a change in economic fortunes can have two effects. One changes the cost of seizing a prize, the other affects the prize itself. It is this schizophrenic nature of economic change that generates really interesting predictions about conflict and development, but those predictions will need to be examined under a finer lens, and not through considerations of aggregate income alone. We will return to this question.

24.4.6. A Remark on Weak States. A second explanation for the prevalence of social conflict in poorer countries is one favored by Fearon and Laitin (2003a): the State is too weak, either to adequately solve the competing claims of different groups, or to effectively prevent conflict when it does break out. Their empirical findings, while similar to those of Collier and Hoeffler, are interpreted thus: "[T]he civil wars of the period have structural roots, in the combination of a simple, robust military technology and decolonization,

[8] A somewhat different argument is advanced by Fearon and Laitin (2003): that States in poor societies are ill-equipped to handle the demands and pressures of conflicting groups and so succumb more easily to open conflict.

[9] For instance, Hirshleifer (1995) writes: "[R]ational behavior in a conflict interaction . . . is for the poorer side to specialize more in fighting, the richer side more in production."

which created an international system numerically dominated by fragile states with limited administrative control of their peripheries . . . [O]ur analysis suggests that while economic growth may correlate with fewer civil wars, the causal mechanism is more likely a well-financed and administratively competent government."

Just as in the case of the opportunity cost argument, the effect of a weak state on the likelihood of conflict must balance two forces in opposite directions. Weak states are easier to confront, true, but the payoff from victory is equally modest, if for no reason than the fact that victory can in turn be challenged (Mehlum and Moene, 2015). Moreover, a really weak state can be very easy to overcome — say, in the form of a bloodless coup — which may not be reflected in indicators of conflict. So, while "state capacity" certainly matters, it may matter in a highly non-linear fashion that demands more research. This is the argument that we outlined in Section 24.3.3.

And finally, returning to questions of endogeneity, state capacity and conflict can jointly evolve in a self-reinforcing manner. For instance, countries that have undergone civil war experience a loss in capacity (see, e.g., Chowdhury and Mansoob, 2013), which makes the government less able to manage public affairs, to effectively confront future uprisings, or to generate growth. The recent contributions by Besley and Persson (2008, 2009, 2010, and 2011) and Mc Bride et al (2011) have not only popularized among economists the notion of "state capacity," but have developed a more nuanced theoretical basis for thinking about the intertwined connections between capacity and conflict.

Oil, Coffee and Conflict in Colombia

The Colombian civil war is rooted in the violence that followed the assassination of the populist leader Jorge Eliécer Gaitán, followed by a period of repression that spawned the organization of guerrilla groups in the 1960s, spearheaded by the Revolutionary Armed Forces of Colombia (FARC). It became a conflict in which several actors were involved: FARC and the National Liberation Army (ELN) on the one side, aligned against the government of Colombia and various paramilitary groups on the other, and a large involvement of crime syndicates in between, not to mention the contributions and backing of anti-guerrilla forces by multinational companies and the United States government. FARC and its compatriots claim to fight for land redistribution and social justice, the Colombian government for law and order, the paramilitary groups for staving off the threat of communism.

While low-intensity for much of the period from the 1960s to the present, conflict has spiked over different periods, leading to immense loss of life (well over 200,000 killed) and an enormous amount of civilian displacement (over 5 million between 1985 and 2012). A historic ceasefire deal signed in 2016 between the FARC and the Colombian government was narrowly rejected in an entirely polarized referendum, following which a revised peace deal was ratified and signed. But

sadly, no peace deal can fully overcome the extraordinary polarization of economic, political and ethical opinion, and the situation remains violent.

Both the paramilitaries and guerrilla forces rely on funding, often via predation. Apart from drugs, kidnappings and extortion, there was the substantial predation on the municipal funds generated by natural resources, particularly oil, which is a major export for Colombia. Oeindrila Dube and Juán Vargas (2013) study how Colombian violence was affected by the movements of world prices for oil and coffee. (Colombia is a major exporter of both.) For each of these commodities, they interacted its price with the amount of that good produced in each municipality. There are several considerations involved in doing this right: see this footnote for more.[a]

Their results: when coffee prices rise, conflict falls more in coffee-producing municipalities. In sharp contrast, when oil prices rise, conflict *increases* in oil-producing municipalities. These observation are in line with the model described above. Coffee production is a relatively labor-intensive activity, so that a rise in coffee prices is likely to lead to an increase in wages relative to the overall price index. The opportunity cost argument then kicks in, reducing conflict. On the other hand, oil extraction and processing is capital-intensive, so that the opportunity cost argument runs in the opposite direction, with positive shocks generating conflict.

As it so happens, coffee prices fall by 68% over 1997–2003, while oil prices rise by 137% over 1998–2005. The Dube-Vargas estimates suggest that the former led to 18% more guerrilla attacks and 31% more paramilitary attacks in the average coffee municipality, relative to non-coffee municipalities. In contrast, the rise in oil prices appears to induce an additional increase of 14% in paramilitary attacks in the average oil municipality. Again, there is evidence of the channel: oil municipality tax revenue increases, and so does the kidnapping of politicians and leaders.

[a] Briefly, it is easier to define an oil-producing municipality rather than a coffee-producing municipality, because the intensity of coffee production can be endogenous to the extent of conflict. There are similar concerns with Colombian coffee prices. Thus coffee production needs to be instrumented with production suitability and internal coffee prices by production volumes in competing countries; see their paper for details.

24.5. Group Size and Conflict: Theory

In what follows, we embark on a detailed study of the connections between population distributions over groups on the one hand, and inter-group conflict on the other. This is a prelude to linking important characteristics of society, such as polarization and fractionalization, to its potential for conflict. The rest of this chapter will begin the analysis by studying whether *small* or *large* groups have a greater tendency to initiate conflict. The story is subtle but with a bit of patience, not at all difficult to understand, so bear with me while we return more deeply to the theory we've already set up.

Recall our basic model of two-group conflict. So far we've talked about reactions by any one group to economic change, but now we must study the reactions of both groups *as a simultaneous, interactive process*. We've seen such cases of strategic interaction before, and we know how to approach them using game theoretic methods (but see the Game Theory Appendix if you're feeling rusty). To begin with, recall our net payoff function for Group 1:

$$\frac{R_1}{R_1 + R_2}\Pi_1 + L_1 - C_1(R_1).$$

Let's put some more structure on this. First, we may as well normalize L_1 to equal zero, as it has no impact on optimal choices. Second, we will think of R_1 as equal to $r_1 N_1$, where N_1 is the size of group 1, and r_1 is the individual contribution, and we will suppose that r_1 has a quadratic payoff cost $(1/2)r_1^2$: the higher the effort required, the higher the *marginal* cost of engaging in conflict. Putting all this together, we have the more structured form for net payoff per person:

$$\frac{r_1 N_1}{r_1 N_1 + r_2 N_2}\pi_1 - (1/2)r_1^2, \tag{24.4}$$

where the lower case π_1 simply stands for the *per-capita* prize Π_1/N_1. A similar expression applies to the rival Group 2:

$$\frac{r_2 N_2}{r_1 N_1 + r_2 N_2}\pi_2 - (1/2)r_2^2. \tag{24.5}$$

What follows needs a little bit of calculus, but it will yield rich rewards, so bear with me. Each group seeks to set its marginal benefit from conflict equal to marginal cost, and we are going to restate in terms of algebra exactly what we did in Figure 24.2:

$$\pi_1\left[\frac{N_1}{N_1 r_1 + N_2 r_2} - \frac{N_1^2 r_1}{(N_1 r_1 + N_2 r_2)^2}\right] = r_1. \tag{24.6}$$

The left hand side of this equation is the marginal benefit from conflict (as you can easily see by differentiating the expected gross payoff $\frac{r_1 N_1}{r_1 N_1 + r_2 N_2}\pi_1$ with respect to r_1), while the right hand side is the marginal cost (as you can see once again by differentiating the marginal cost $(1/2)r_1^2$, again with respect to r_1). A little algebra applied to equation (24.6), and remembering that p_1 is given by equation (24.1), yields the convenient simplification

$$\pi_1 p_1 (1 - p_1) = \pi_1 p_1 p_2 = r_1^2 \tag{24.7}$$

(come on, try it, it isn't hard!), and an corresponding expression holds for Group 2:

$$\pi_2 p_2 p_1 = r_2^2. \tag{24.8}$$

Armed with these two equations, we can say quite a bit about group divisions and conflict. It will be important to distinguish between two sorts of prizes.

24.5.1. Public Prize. First, we consider the case of a symmetric *public prize*. The essential defining quality of a public prize is that the per-capita payoff to a group member is independent of the *size* of the group. When India wins (or loses) a cricket match, it isn't as if there is a fixed aggregate pool of joy (or sorrow) that is minutely shared by every Indian. It's the same per-capita feeling, no matter how many are sharing it (and by the way, this also goes some way towards explaining why India, one of the poorest but most populous countries in the world, is *the* financial powerhouse in the world of cricket). More generally, law and order, a clean environment, or a free press are universal public goods that come readily to mind, and they apply to all, not just the members of a particular group. But in the particular context of a conflict, the examples are could be more group-specific: religious or cultural dominance, political control, primordial hatred for a rival, the provision of particular types of religious or discriminatory education, or economic protection by means of tariffs — or even, occasionally, cricket or soccer.[10] The additional assumption of symmetry is for convenience, so that we can suppose that each group has an equal per-capita stake in victory, and focus exclusively on the distribution of the population across the groups.

In terms of the algebra used earlier, there is simply a *per-capita* prize π at stake, so $\pi_1 = \pi_2 = \pi$.[11] Therefore equations (24.7) and (24.8) immediately imply $r_1 = r_2$. In particular, if we denote the total population of the society by $N = N_1 + N_2$, then

$$p_1 = \frac{N_1}{N} \text{ and } p_2 = \frac{N_2}{N}, \tag{24.9}$$

so that win probabilities are exactly proportional to group population shares.

Conflict Intensity. What about overall conflict? Well, we add: $R = r_1N_1 + r_2N_2 = rN$, where r is the common per-capita expenditure of conflict resources. Using equation (24.7)–(24.9), we can easily solve out for the common value of r:

$$r = \sqrt{\pi p_1 p_2} = \sqrt{\pi \frac{N_1}{N}\frac{N_2}{N}} = \sqrt{\pi n_1 n_2},$$

where we are defining n_1 and n_2 to be the population shares of the two groups; they add up to 1. Total conflict is therefore given by

$$R = N\sqrt{\pi n_1 n_2}. \tag{24.10}$$

How does conflict change with the distribution of population across the two groups? Equation (24.10) yields the answer: it will generally be inverted-U shaped in the population share of any one group, rising and then falling as (say) n_1 runs the gamut between 0 and 1. (Note that $n_2 = 1 - n_1$ and will change with n_1.) Conflict is at a maximum when the two groups are fully polarized, with equal population strengths in each group.

To be sure, this highly symmetric outcome is the result of our assumption that the stakes on both sides are symmetric. If the prizes have asymmetric

[10] Ryszard Kapuściński's 1991 book, *The Soccer War*, is an account of a conflict between Honduras and El Salvador, ignited in part by a soccer match between the two countries.

[11] That is, the corresponding aggregate prizes are just $\Pi_1 = \pi N_1$ and $\Pi_2 = \pi N_2$.

value, then conflict will not be maximal at equal population strengths, but at some other value of group share. Yet the inverted-U property will still persist. The same is true if conflict is across two groups with unequal financial power.

There is an even more subtle consideration when three or more groups are in conflict. *Even if* the groups are symmetric in their prizes and in their financial strengths, conflict will generally not be maximized when the population shares in all three groups are the same. Generally, maximal conflict will occur when *two* of the groups are big. This consideration does not emerge cleanly in the two-group case, but it lies at the heart of an important distinction that we will return to later.

Conflict Initiation. It should be noted that the above relationship between conflict and group distribution holds only if there is conflict to begin with. It may be that both parties willingly desist from entering into conflict in the first place. To analyze such questions, it is imperative to have some notion of what peacetime payoffs look like.[12] The simplest way to approach this question is to suppose that under peace, each group is awarded an equal per-capita payoff; say by power-sharing or giving equal airtime (or none) to all religions and cultures. Because there is no expenditure on conflict resources under peace, the payoff is extremely simple: it is just equal to $\pi/2$ for all members of society. Meanwhile, we can easily predict the net expected payoffs to conflict: for group 1, say, they are given by

$$n_1\pi - (1/2)r_1^2 = \pi[n_1 - (1/2)n_1(1-n_1)]$$

where we're using the solution $r_1 = \pi n_1 n_2 = \pi n_1(1-n_1)$. For Group 1 to willingly risk conflict, then, this expected payoff must exceed the peacetime payoff; that is, we must have

$$\pi[n_1 - (1/2)n_1(1-n_1)] > \pi/2,$$

which on simplification yields the condition

$$n_1 + n_1^2 > 1.$$

This is an intriguing condition. It is satisfied when the share of the first group is about 2/3 or larger. It is not satisfied at lower values because even though the stakes are higher — a full π rather than half of it — there are costs of conflict, and a group would anticipate some of those costs in deciding whether or not the struggle is worth it. Our analysis tells us that the net payoffs are higher under conflict only when a group is "large enough," and for two groups that threshold condition is approximately 65%.

The deduction that when the prize is public, larger groups are more likely to intimidate smaller groups, is an example of the *tyranny of the majority*, a phrase made famous by the writings of Alexis de Toqueville (1835). We've already seen this in the context of voting; we see that a similar outcome can hold under conflict as well. Indeed, in the introduction to his essay, "On Liberty," John Stuart Mill writes:

"Society ... practices a social tyranny more formidable than many kinds of political oppression ... Protection, therefore, against the tyranny of the

[12]See Esteban and Ray (J Peace Research xx) and Mayoral and Ray (2015).

magistrate is not enough; there needs protection also against the tyranny of the prevailing opinion and feeling, against the tendency of society to impose, by other means than civil penalties, its own ideas and practices as rules of conduct on those who dissent from them . . . "

As we shall now see, however, matters will be different when the prize is private.

24.5.2. Private Prize. Now we change the nature of the prize: to an excludable, *private* good. To fix ideas, suppose that conflict is over the control of oil revenues, and that the spoils once seized will be divided among the members of the winning group. Fortunately for you (and me too, writing this), little changes in the description of the resulting equilibrium. The per-capita prize is still what it is — π_1 and π_2 — and the same equations (24.7) and (24.8), reproduced here for convenience, describe group behavior:

$$\pi_1 p_1 p_2 = r_1^2 \text{ and } \pi_2 p_2 p_1 = r_2^2. \tag{24.11}$$

But now, in contrast to the case of public goods, the per-capita value of the prize *will* change with group size, and we will need to take this into account. This leads to a slightly more involved analysis than the one in the previous section, but with a little patience we will have no problem in understanding it.

To proceed, let's say that the *overall* prize is symmetric, so that $\Pi_1 = \Pi_2 = \Pi$, say. Then $\pi_1 = \Pi/N_1$ and $\pi = \Pi/N_2$, and using this in equation (24.11), we must conclude that

$$(r_1/r_2) = \sqrt{N_2/N_1}. \tag{24.12}$$

This is a very interesting equation, and I would like you to note that it is completely different from the case of public goods, in which r_1 and r_2 were the same. Now they are different, but different in a very predictable way: *the smaller group fights harder in per-capita terms*. This will have implications for conflict initiation, as we shall soon see.

Let's first pin down the winning probability, say for group 1. Because of the different per-capita exertions that we've just chronicled, this probability is no longer the same as the population share. Recall that by assumption, the winning probability for a group is the share of resources contributed to conflict by that group, which is

$$p_1 = \frac{N_1 r_1}{N_1 r_1 + N_2 r_2}.$$

Using equation (24.12) and manipulating this expression just a bit, it is easy to see that

$$p_1 = \frac{N_1 (r_1/r_2)}{N_1 (r_1/r_2) + N_2} = \frac{\sqrt{n_1}}{\sqrt{n_1} + \sqrt{n_2}}, \tag{24.13}$$

where n_1 and n_2 are the population shares, just as before. This is another interesting equation. It tells us that even though the smaller group fights harder, it does not fight "harder enough," in general, to overcome the handicap of its size. For equation (24.13) makes it quite apparent that the smaller group still has the lower probability of winning. But it is still doing well *relative* to its size.

Just as in the case of public goods, we can study conflict intensity and conflict initiation.

Conflict Intensity. Recall Equation (24.10) for public goods conflict, reproduced here for convenient comparison:

$$R = N\sqrt{\pi n_1 n_2}. \tag{24.14}$$

This is inverted-U shaped in population distribution, maxed at equal population shares $n_1 = n_2$ over the two groups. Matters are more complex but still similar under private goods conflict. Remembering that $\pi_1 p_1 p_2 = r_1^2$, where π_1 is just the per-capita prize M/N_1. It follows that

$$r_1^2 = \frac{M}{N_1} p_1 p_2 = \frac{M}{N_1}\frac{N_1 r_1}{R}\frac{N_2 r_2}{R} = M\frac{r_1 r_2 N_2}{R^2},$$

and now remembering from Equation (24.12) that $r_1/r_2 = \sqrt{N_2}/\sqrt{N_1}$, and combining this with the formula above, we have

$$R^4 = M^2 n_1 n_2. \tag{24.15}$$

Interesting. Under private goods conflict, the equilibrium amount of conflict is once again inverted-U shaped in the population distribution, though the specific argument needed to get to Equation (24.15) is somewhat different from the argument taking us to its public goods counterpart (24.14). Both public goods conflict and private goods conflict appear to be maximized for symmetric population distributions.

This apparent similarity will be worth revisiting, because with three or more groups the implications of the two types of conflict will indeed diverge from each other.

Conflict Initiation. Just as in the case of public goods, we can now study the conditions under which a group will initiate conflict. Once again, we look at equal payoffs in peacetime, which means that each individual gets the same (gross and net) payoff Π/N, where $N = N_1 + N_2$ is the total population as before. So Group 1 will want to initiate conflict if

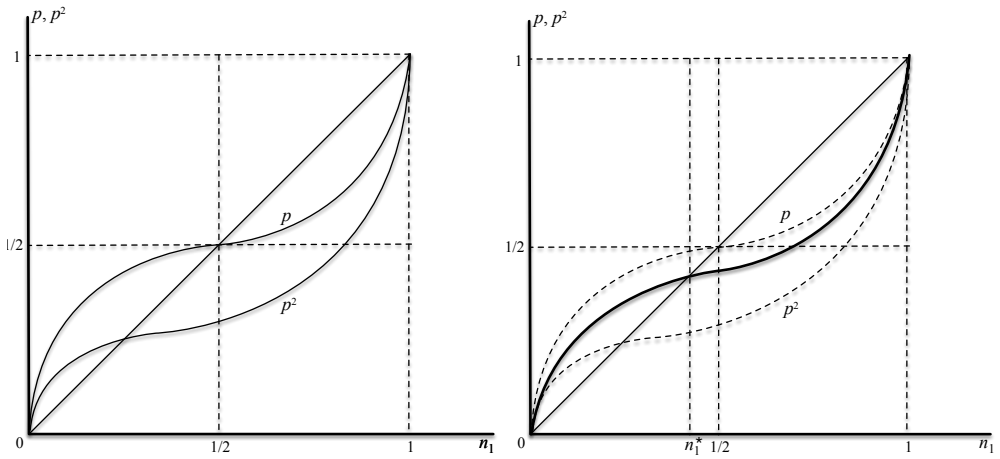
$$p_1\pi_1 - (1/2)r_1^2 = p_1\pi_1 - (1/2)\pi_1 p_1 p_2 \pi_1 = (1/2)\pi_1\left[p_1 + p_1^2\right] > \frac{\Pi}{N},$$

where we are substituting out for r_1 using equation (24.11). Now recall that $\pi_1 = \Pi/N_1$, and use this in the equation above to conclude that the required condition for conflict is just

$$\frac{p_1 + p_1^2}{2} > \frac{N_1}{N} = n_1.$$

This is a slightly tougher nut to crack than the corresponding condition for the public goods case, but crack it we shall. Figure 24.5 plots n_1 on the horizontal axis as it ranges between 0 and 1. In Panel (a), it plots p_1 and p_1^2 as functions of n_1, using the formula in equation (24.13). A little experimentation with a calculator or computer will convince you that p has the shape it does.[13] It is symmetric and takes on a value of $1/2$ at $1/2$, with shape as shown. The

[13]For instance, go to wolframalpha.com and ask it to plot p as a function of n_1 as in (24.13).



(a) The Functions p and p^2 **(b)** Determining the Threshold

Figure 24.5. Why Small Groups Initiate Private-Goods Conflicts

number p^2 is smaller than p for values between 0 and 1, and so is scaled down relative to p. Panel (b) of the Figure takes the average of p and p^2, just as the left-hand side of equation (24.5.2) wants us to do; this is the heavy line. Equation (24.5.2) informs us that a group will want to initiate conflict if this heavy line lies above the 45^0 line, also helpfully shown in the Figure. It is immediate that conflict will be preferable to peace for group sizes below some threshold $n_1^* < 1/2$. With private prizes, *smaller groups are more likely to initiate conflict than larger groups*.

This is a subtle change from the public goods case, in which *larger* groups were more interested in initiating conflict. It isn't that smaller groups are necessarily more likely to win; we've already seen that they are not (scan equation (24.13) again). It is that they are more likely to win *relative to their population shares*, and this is what causes them to throw their hat into the conflict ring.[14]

In contrast to the tyranny of the majority, the Pareto-Olson thesis (see Pareto 1927 and Olson 1965) argues that small groups may be more effective than large groups. In the words of Pareto (1927, p. 379), who was remarking on protectionist tendencies in trade,

"[A] protectionist measure provides large benefits to a small number of people, and causes a very great number of consumers a slight loss. This circumstance makes it easier to put a protection measure into practice."

[14]Without wishing to unnecessarily complicate matters, I should sound a note of caution here. The analysis above assumes that there are no fixed costs to entering into conflict. If there are, very tiny groups will not entertain violent ambitions simply because the entry ticket is too expensive. Think of the analysis above applying only to groups that pass that entry ticket threshold.

It is clear that this argument fundamentally depends on the presumption that the prize is an excludable private good, so that group size erodes per-capita payoffs.[15] In this section, we've shown carefully that the same intuition works for situations of conflict.

The bottom line is I want you to appreciate the sharp contrast in group incentives when a public prize is at stake, as opposed to a private prize. The tyranny of the majority applies to the former, and the Pareto-Olson thesis applies to the latter.

24.6. Group Size and Conflict: Empirics

We now turn to the empirical relationship between group size, the public or private nature of the payoffs, and conflict.[16] Our theory, developed in detail in the previous sections, implies that larger groups are associated with conflict if the prize is public, while the opposite is true if the prize is private. Taking implications such as these to the data are not easy, and (like all empirical analyses that attempt to examine test a non-trivial prediction) invariably open to criticism.

24.6.1. Some Central Variables. The first empirical question is how to choose the social cleavages that define potential Rebel groups. We settle for ethnicity, and study ethnic conflicts. Such conflicts account for between 50–75% of internal conflicts since 1945 (Fearon and Laitin 2003, Doyle and Sambanis 2006). The dataset used provides information on the homelands of 929 ethnic groups. Because these ethnic homelends are often spread out over countries, that gives us 1475 distinct group-country pairs in the dataset. Their homelands are fixed for the analysis: a frozen snapshot from the late 1950s and early 1960s.[17]

The second issue has to do with the definition of a private or public prize in conflict. As a proxy for a private prize, we consider resources — oil, in the baseline setting — that are located in the homeland of each ethnic group. The underlying presumption is that the State seeks to extract those resources (or output from the homeland) and distribute them more evenly across the country, and that the ethnic group in question can either accept the State policy, or reject it.

To implement the idea of a public prize, we consider several proxies for the *lack of access* to public goods. The public prize is then represented by the potential expansion of such public goods if the battle against the State is won. In the baseline specification, we use — again a frozen snapshot — a pre-sample index capturing the *lack of political and civil rights*.[18]

[15] This point has been noted in various settings by Chamberlin (1974), McGuire (1974), Marwell and Oliver (1993), Oliver and Marwell (1988), Sandler (1992), Taylor (1987), Esteban and Ray (2001, 2011), and Mayoral and Ray (2015). xx add, change?

[16] The analysis that follows is based on Mayoral and Ray (2019).

[17] This has advantages and disadvantages. On the negative side, settlement patterns may be outdated for some parts of the world. On the positive side, it alleviates concerns that ethnic group locations are endogenous to the conflicts we aim to explain.

[18] This baseline specification for public prizes can be augmented by alternative proxies. Each such proxy seeks to measure the gains from seizure of political power at the Center. See Mayoral and Ray (2019) for more details.

Finally, as in the Miguel-Satyanath-Sergent exercise, the conflict data we employ is a subset of the UCDP/PRIO Armed Conflict Dataset, which records conflicts between ethnic groups and the State.[19]

	Dependent Variable: Prio25 Conflict						
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
size	-0.015	0.032	0.066***	0.066**	-0.002	0.011	0.084**
	(0.307)	(0.101)	(0.001)	(0.013)	(0.915)	(0.656)	(0.019)
oil	0.448**	0.684***	0.771***		0.887*	0.828*	
	(0.040)	(0.009)	(0.007)		(0.062)	(0.069)	
size× oil		-13.628***	-14.433***		-14.455**	-12.836**	
		(0.000)	(0.000)		(0.036)	(0.026)	
size× private index				-0.049***			-0.046**
				(0.001)			(0.016)
size× lack rights					0.068*	0.083**	
					(0.062)	(0.035)	
size× public index							0.023*
							(0.080)
private index				0.002**			0.002
				(0.017)			(0.122)
public index							0.110
							(0.386)
controls	No	No	Yes	Yes	No	Yes	Yes
lag	0.895***	0.895***	0.894***	0.894***	0.898***	0.900***	0.900***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.844	0.844	0.847	0.847	0.850	0.855	0.853
Obs	64839	64839	55289	54486	41314	38341	35755

Table 24.2. Group Size and Conflict. Source: Mayoral and Ray (2019, Table 1). This table regresses Prio25 conflict on group size and indices of private and public prizes, along with interactions between these variables as suggested by the theory in Section 24.5. All regressions contain year dummies and country fixed effects. The time period considered is 1960-2006 (1975-2006) in regressions 1–3 (4–7). p-values are reported in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

24.6.2. Results. Each column in Table 24.2 reports on a different linear probability specification, all with country and year fixed effects, and lagged conflict. See the Appendix to this chapter for more details on the specifications used.

Column 1 regresses conflict on only two variables: the population share of the ethnic group (size) and group-level oil abundance on the homeland of that group (oil). size has no particular sign of any significance. This is precisely what the theory would lead us to expect, as it predicts that the *unconditional* effect of group size on conflict is ambiguous. In contrast, the presence of oil unambiguously increases conflict — a well known and predictable implication of the "prize effect" studied earlier in this chapter.

[19] Data on group-level conflict has been taken from Cederman, Buhaug and Rod (2009, who use the UCDP/PRIO Armed Conflict Dataset (Gleditsch et al. 2002) and check this list against previous sources that identify ethnic civil wars (such as Fearon and Laitin 2003, Licklider 1995 and Sambanis 2001). Ethnic conflicts are coded based on whether mobilization was shaped by ethnic affiliation.

Column 2 interacts SIZE and OIL. What does this mean? The idea is to see if the effect of ethnic group size on conflict is exacerbated or attenuated in the presence of a private prize. The theory tells us that that *small* groups influence conflict even more when there are private prizes at stake. Working through the implied tangle of double negatives, you should be able to see that this prediction is the same as the assertion that the coefficient of our interaction term must be negative and significant. And indeed, that's what it is. Column 3 adds on controls to the regression in Column 2. The results are the same. Column 4 replaces OIL by an alternative proxy of privateness, PRIVATE INDEX, computed using three indicators of resource abundance: oil, land and mineral abundance on the homeland. Again, the same result is obtained.

Column 5 introduces the interaction of public prize (as measured by LACK RIGHTS) with group size, on top of the earlier interaction. Recall that to allay concerns of reverse causality, LACK RIGHTS is a pre-sample time-invariant index computed by averaging its values from 1972 (the first year it exists) to 1975. Then, the resulting index is employed in regressions including post-1975 observations only.[20] The interaction of SIZE and LACK RIGHTS has the predicted positive sign and is highly significant. (Column 6 is a variant of 5 with all additional controls introduced, with the same results.)

Finally, Column 7 introduces an alternative proxy of publicness, called PUBLIC INDEX, obtained by combining five indicators of (pre-sample) lack of public goods: lack of political rights, lack of civil rights, the level of autocracy, group exclusion from central power and infant mortality rates.[21] Our conclusions remain unchanged.

These effects are not only significant, they are sizable. For LACK RIGHTS $= 0$ and a high value of oil (at the 95th percentile) an increase of one standard deviation in SIZE decreases the unconditional probability of conflict incidence by 4.9%. Similarly, if OIL $= 0$ and LACK RIGHTS is high ($= 1$), an increase of one standard deviation in SIZE increases the probability of conflict by 7.3%.

It is worth noting an obvious but important point: while the data are replete with conflicts over private and public payoffs, the two are sometimes closely intertwined. For instance, even a conflict as seemingly primordial as Rwanda was permeated with economic looting, such as land grabs under the cover of ethnic violence. The Second Civil War in the Sudan is about different cultural and religious identities, but it is also — to some degree — about oil; so is the Chechnyan War. The Zimbabwean conflict is about identity and political power, but it is also about land, and so on. In the light of these expected complications, it is of interest that the two interaction predictions made by the theory hold up separately and robustly. They give some confidence that our basic model of conflict is not drawn from a vacuum; that the theory does really say something about the world. In the next chapter we take this theory a step further.

[20] Note that LACK RIGHTS does not appear as an independent regressor, as it is subsumed in the country fixed effects

[21] See Mayoral and Ray (2019) for a lot more detail using these indices separately.

Appendix: More Details on Section 24.6

We run variants of the following specification:

$$\begin{aligned}\text{CONFLICT}_{c,g,t} = {} & \beta_1 \text{SIZE}_{c,g} + \beta_2 \text{SIZE}_{c,g} \times \text{PRIV}_{c,g,t} + \beta_3 \text{PRIV}_{c,g,t} + \beta_4 \text{SIZE}_{c,g} \times \text{PUB}_c \\ & + X'_{c,g,t}\alpha + Y'_{c,t}\delta + Z'_c\gamma + W'_t\eta + \epsilon_{c,g,t}, \end{aligned} \tag{24.16}$$

for countries $c = 1, \ldots, C$, groups $g = 1, \ldots, G_c$, and dates $t = 1, \ldots, T$. Our main outcome variable CONFLICT is the PRIO25 measure of conflict: 25 or more battle deaths in a given year.[22] PRIV and PUB are our measures of privateness and publicness, respectively, and their interactions with size are of particular interest. Our theory predicts that β_2, the coefficient associated with SIZE × PRIV, is negative, implying that smaller groups are more likely to be involved in conflict as the private prize in the homeland becomes more abundant.

As for the public prize, the measures use lack of political and civil rights, autocracy, group exclusion, infant mortality rates, as well as an index of publicness that summarizes all these variables, and predicts that β_4, the coefficient associated with the interaction of group size and PUB, is expected to be positive, so that the impact of group size on conflict increases as the public prize gets larger.

In Table 24.2, we always employ group- and country-level controls ($X_{c,g,t}$ and $Y_{c,t}$ respectively), a vector Z_c of country fixed effects and year dummies W_t. Identification for the interaction term SIZE×OIL is achieved both because we have variation in ethnic groups within countries — so that size varies — and intertemporal variation in oil prices or in known reserves. However, the imposition of country fixed effects means that the only source of variation for the interaction term SIZE×AUTOC is changes in ethnic groups within countries, because AUTOC is a *country-level*, time-invariant indicator.

We estimate equation (24.16) by OLS. The reason for fitting a linear probability model (rather than a non-linear specification, such as probit or logit) is that our key variables are interactions and interpreting them in nonlinear models isn't straightforward, as Ai and Norton (2003) point out.[23]

Finally, robust and clustered standard errors have been computed in all cases. We follow Abadie et al. (2017) and cluster errors according to the level of clustering of the assigned treatment. That is, whenever the "treatment" of interest is assigned at the group (country) level, we cluster errors at the group (country) level as well. This implies that in regressions where only private payoffs are considered (which are assigned at the ethnic group level), we cluster errors at the group level. When public payoffs are also in the regression, standard errors are clustered at the country level, as public payoffs are typically assigned at the country level.[24]

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[22] Mayoral and Ray (2019) study variations of this outcome variable.

[23] In linear models, the coefficient of the interaction term has a direct interpretation, as it is just the value of the cross derivative of the dependent variable with respect to the variables in the interaction. However, this logic does not extend to nonlinear models; see Statistical Appendix xx for a more detailed discussion.

[24] The results obtained here are robust to other clustering strategies as, for instance, two-way clustering (at the country and ethnic group level, where the latter considers all the territories occupied by the same group, even if they belong to different countries).