

A Conditional Model of Local Income Shock and Civil Conflict

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Common political economy models point to rationalist motives for engaging in conflict but say little about how income shocks translate into collective violence in some cases but not in others. Grievance models, in contrast, focus on structural origins of shared frustration but offer less insight into when the deprived decide to challenge the status quo. Addressing these lacunae, we develop a theoretical model of civil conflict that predicts income loss to trigger violent mobilization primarily when the shock can be linked to preexisting collective grievances. The conditional argument is supported by results of a comprehensive global statistical analysis of conflict involvement among ethnic groups. Consistent with theory, we find that this relationship is most powerful among recently downgraded groups, especially in the context of agricultural dependence and low local level of development, whereas political downgrading in the absence of adverse economic changes exerts less influence on ethnic conflict risk.

Economic explanations feature prominently in the scientific study of civil war. A central argument links loss of income, growing unemployment, and increasing living costs to the rise of insurgent organizations through reducing opportunity costs of violent behavior (Collier and Hoeffler 2004; Fearon 2008; Grossman 1991; Hirshleifer 1994). Yet, the opportunity cost model of conflict remains debated. Theoretically, criticism has focused on the individualistic nature of the opportunity-cost framework and its inattention to the roles of social networks and collective agency in shaping political mobilization (Cramer 2002; Wimmer, Cederman, and Min 2009). Empirically, much of the statistical evidence has come from country-level growth-conflict regressions, criticized for the risk of reverse causality, omitted-variable bias, and for un-

tenable assumptions about the transmission effect between aggregate growth fluctuations and changes in individual material conditions (Bazzi and Blattman 2014).

To advance our understanding of how negative changes in economic conditions can act as a catalyst of civil conflict, this study reformulates and examines the relationship between income shocks and rebellion at the more theoretically appropriate group level. While reduced opportunity costs can provide a powerful impetus for individual acts of resistance, economic theories of organized political violence also must recognize the importance of collective agency. Increased economic hardship that affects dispersed individuals with little else in common carries little potential for violent mobilization. An income shock that disproportionately affects members of a distinct

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social group, in contrast, can be cognitively linked to a common identity and raise awareness of shared misery, thereby overcoming barriers to collective action. The salience of the group dimension has a strong theoretical backing in the grievance literature, which emphasizes how structural inequalities in the distribution of assets and privileges among identity groups are central forces of contention (Cederman, Gleditsch, and Buhaug 2013; Gurr 1993; Østby 2008; Stewart 2008). Yet, whereas these perspectives point to conditions under which rebellion is more likely to occur, they offer less insight into when the deprived decide to challenge the status quo (cf. Bartusevičius and Gleditsch 2019).

Drawing on these literatures, we argue that ethnic groups that experience income losses become more prone to engage in civil conflict. We build our argument around ethnic groups, partly because of ethnicity's undisputable salience in contemporary politics and partly because politically marginalized ethnic groups often harbor more fundamental, if dormant, grievances with significant mobilization potential.¹ We consider two forms of marginalization particularly relevant for accentuating the income shock effect: ethnopolitical discrimination, whereby groups are actively targeted and denied political influence by the state, and recent loss of political power.

Our empirical strategy leverages the importance of the labor-intensive agricultural economy for welfare and livelihood in developing countries and extends earlier efforts to identify exogenous sources of economic performance (e.g., Brückner and Ciccone 2010; Miguel, Satyanath, and Sergenti 2004). We overcome data limitations by introducing a novel, group-level proxy for negative income fluctuations based on high-resolution meteorological statistics in combination with geocoded ethnic group settlements and location-specific agricultural production data. Unlike common rainfall-based instruments for economic performance, the state-of-the-art drought index we use proxies local income shocks, measured exclusively for each ethnic group's cropland areas during the growing-season months of the calendar year only, allowing us to evaluate the proposed argument at the level where it unfolds.

A comprehensive empirical analysis of civil conflict outbreak among politically relevant ethnic groups across the world, 1971–2013, reveals that a local income shock, by itself, is largely unrelated to a group's propensity to rebel. However, marginalized ethnic groups—notably those that have been subject to recent political downgrading—become significantly more likely to rebel when local incomes drop. This

effect is most pronounced in subsets of the data isolating the poorest and most agriculturally dependent groups. Consistent with our model, the estimated effect of ethnopolitical downgrading is considerably weaker in the absence of local income loss, although the ethnopolitical context, notably discrimination, has a greater influence on baseline conflict risk. In sum, these findings underline the importance of considering collective agency for understanding the impact of economic shocks. They also contribute to our understanding of the conflict potential of political marginalization, suggesting that economic shocks can help explain when aggrieved groups rebel.

The article proceeds as follows: we begin with a brief review of relevant research and explicate the tenets of our conditional, group-level model of income shock and civil conflict. We then present the data and methods that underpin our empirical approach, followed by documentation and discussion of the findings from the statistical analysis.

POINT OF DEPARTURE

An influential explanation of civil war holds that poor economic performance lowers the opportunity cost of violent behavior. Participation in rebellion is here seen as a rational response to increased individual hardship brought about by the loss of employment, reduced wages, and rising living costs. When expected returns from fighting outweigh income from regular economic activity, an individual's inclination to rebel goes up (Collier and Hoeffler 2004; Dal Bó and Dal Bó 2011; Grossman 1991; Hirshleifer 1995).

The opportunity cost argument has been substantiated by a strong and robust empirical relationship between negative growth in gross domestic product (GDP) per capita and increased risk of civil conflict (Blattman and Miguel 2010; Hegre and Sambanis 2006).² Yet, economic activity is inherently endogenous to the political context (Aisen and Veiga 2013; Fatás and Mihov 2012), and the quality of economic data for countries of key concern is poor (Jerven 2013). Attempts to address these issues through instrumental variables, typically relying on rainfall statistics or commodity prices as exogenous measures of economic performance, have yielded results more ambiguous than those derived from conventional income-conflict regressions (e.g., Bazzi and Blattman 2014; Buhaug et al. 2015; Fjelde 2015; Miguel and Satyanath 2011).

In the wake of this ambiguity, a handful of recent studies have turned to microlevel analysis of how labor and income

1. Ethnicity is here broadly understood as any subjectively experienced sense of commonality based on the belief in common ancestry and shared culture (Wimmer et al. 2009).

2. A complementary account interprets GDP per capita as a proxy for state strength. When revenues drop, so does the regime's ability to suppress insurgency through coercion or cooptation (Bates 2008; Besley and Persson 2011; Fearon and Laitin 2003).

opportunities among individuals affect incentives to partake in rebellion (e.g., Arjona and Kalyvas 2011; Blattman and Annan 2016; Humphreys and Weinstein 2008; Verwimp 2005). Survey-based studies and field experiments are extremely valuable for assessing individual-level causal pathways and mechanisms, but single-case approaches are not suitable for generalization, and the focus on individuals limits the ability to infer about meso- and macrolevel processes.

The risk of ecological fallacy relates to a broader theoretical challenge of applying the opportunity cost argument in studies of organized political violence. Originally proposed as an economic theory of violent crime (e.g., Becker 1968), its link to collective agency was not important. When levied to explain the outbreak of civil war, however, the question of what precipitates cooperation and mobilization for a common political cause becomes a central theorizing element (Tarrow 2011). Although a sudden loss of income can credibly be expected to trigger private perception of misery and increase material incentives to forgo everyday life in favor of dissident activity, economic conditions that facilitate the outbreak of civil conflict are much more prevalent than active conflict *per se*. What is missing from these accounts is an exposition of what brings people together in a joint effort to achieve political change—a necessary intermediate step between individual-level suffering and the manifestation of collective action. Such collective agency is what sets armed conflict apart from crime and other forms of opportunistic behavior, such as illegal farming, land invasions, or social banditry (Lichbach 1994). In order to address this lacuna, we turn to consider how income shocks relate to collective identities and the contexts within which social groups operate.

GROUP-LEVEL INCOME SHOCK AND CIVIL CONFLICT

Increased individual hardship, epitomized by loss of income, employment, or assets, by itself is likely to generate little beyond private resentment. Indeed, a society can accommodate a large number of impoverished and aggrieved citizens without manifest violent contention. It is when individuals become cognizant of their shared misery and, further, believe that this can be successfully remedied through coordinated action that we see collective mobilization. From this follows that an economic shock that is experienced among members of some preexisting social group can act as a powerful signal to raise awareness of a common cause, thereby helping to overcome collective action problems and inspire and transform unorganized acts of individual defiance (or, more commonly, individual apathy) into organized resistance.³

3. Economic hardship may inspire violent contention of different kinds, and some earlier research connects interethnic inequality and income shock

In principle, any notable societal cleavage may serve as a foundation for the formation of group identity and collective action, and some scholars highlight the historical relevance of traditional economic classes, such as peasants or industrial workers, for the articulation of economic grievances and instigation of revolutionary movements (Goldstone 1991; Lichbach 1994; Scott 1976). Yet, the predominant social cleavage, around which identities are manifested, horizontal inequalities play out, and conflicts emerge, is ethnicity (Denny and Walter 2014; Horowitz 1985).

Political mobilization along ethnic lines is partly a legacy of traditional settlement patterns with separate ethnic homelands, shaped by historical barriers to mobility and interaction. Over time, uneven spatial distribution of resource endowments and trading opportunities resulted in different development trajectories across communities. Such economic differences have in many cases been extended to (and reinforced by) political inequalities, shaped by geostrategic rivalry between competing ethnic groups, as well as by discriminatory colonial powers (Alesina, Michalopoulos, and Papaioannou 2016; Bates 1983; Wucherpfennig, Hunziker, and Cederman 2016). The fundamental role of ethnicity is equally evident in heterogeneous societies today, where access to power and privileges often varies distinctly across ethnic groups, where political coalitions and governments often are formed around ethnic identities, and where claims for political power or the right to self-determination often rely on explicit references to ancient ethnic nationhood (Fearon 2006; Posner 2004; Roessler 2016; Wimmer 1997).

Ethnicity can play an instrumental role in mobilization for rebellion by providing a cognitive frame for linking increased economic hardship to grievance-based collective action. Partly, ethnicity represents an already salient political cleavage in many societies (something we return to in the next section); partly, an external shock may revive and reinforce ethnic solidarities because of the hardship inflicted and help members overcome coordination problems (Denny and Walter 2014). Through shared language and repeated social interaction (e.g., through civil society organizations, religious venues, or close-knit neighborhoods) coethnicity facilitates collective action. Apart from enhancing trust and communication, ethnic affinities—due to being more identifiable than,

with communal violence (Bohlken and Sergenti 2010; Mitra and Ray 2014). However, our theoretical model builds explicitly on the ethnopolitical context and proposes a conditional causal dynamic that leads to violent conflict primarily when income loss coincides with state-induced political sources of grievances, implying that resulting mobilization and articulation of blame will be directed toward the state.

for example, class or ideology—also facilitate informal group-enforcement mechanisms (e.g., in-group policing), raise the costs of nonparticipation, and deter free riders in ethnic political coalitions (Bates 1983; Bowles and Gintis 2004; Chandra 2009; Habyarimana et al. 2007).⁴ These characteristics of kinship networks facilitate the initial organization of and recruitment to viable rebel groups (Larson and Lewis 2018). The geographic concentration of ethnic groups further increases the feasibility of collective action through both spatial proximity to coethnics and shared identity tied to the land they inhabit (Olzak 1983; Weidmann 2009).

The collective agency to launch a rebellion can be channeled through existing social or economic organizations with ethnic dominance (e.g., regional political parties, trade organizations, or vigilante groups), as well as by political entrepreneurs who perceive a potent mobilizing force in invoking ethnic grievance frames in a context of economic hardships (e.g., Brass 2015; Kahl 2006; Wilkinson 2004). The plight from economic shocks might itself densify group interaction: individuals may turn to family and kin for sustenance, and coethnics may jointly seek migratory solutions or cohabit in refugee-like situations. In these circumstances, ethnicity may also be invoked internally to foster solidarity in the face of what is only a latent source of conflict (Denny and Walter 2014), thereby contributing to information sharing and overcoming the common knowledge problem (Cramton 2001). A number of experimental and observational studies underpin the expectation that once processes of violent mobilization are underway, parochialism will increase through enhanced in-group cooperation and solidarity and a hardened stance toward out-groups (e.g., Bauer et al. 2016). Hence, even where ethnic belonging represents only one of several latent cognitive frames, the economic shock may trigger societal processes that reinforce the salience of the ethnic identity and turn it to an important political cleavage along which violent mobilization plays out.

In developing countries, where most civil conflicts occur, the populations are still predominantly rural. In the absence of well-developed coping mechanisms, for example, those associated with a “moral economy” (Scott 1976), a sudden reduction in economic returns from farming exhibits a near

immediate impact on local employment opportunities and income levels and may directly threaten livelihood and human security. The fact that most agricultural populations have low capital mobility (Boix 2008), whereas the supply of nonagrarian rural employment is limited, restricts the scope of viable coping strategies. As a result, individuals may be left with few options other than to collectively levy demands on the central state when facing economic hardship—and to join efforts to change the status quo by military means if all else fails. Indeed, contemporary armed conflicts often have a salient rural dimension, where farmers and landless rural laborers provide the primary base of popular support and source of rebel recruits (Desai and Eckstein 1990; Kalyvas 2004). Also consistent with this view, Toft (2002) presents statistical evidence that ethnic groups with a rural base are more likely to be mobilized for violent rebellion—partly because segregated rural populations are especially attached to the land they inhabit and partly because their skills and assets are less mobile in the face of crisis.

In sum, we expect that the economic vulnerability that local income shock imposes on the individual can translate into violent collective action along group lines. Kinship networks—which may become even more salient in the face of economic hardship—help individuals become aware of shared misery and provide solidarity in the face of a latent source of conflict. As lower individual opportunity cost for joining a rebellion coincides with the organizational advantages bestowed by kinship networks on rebel group formation, violence becomes more likely. Using this logic, we formulate the first hypothesis:

H1. A local income shock increases the likelihood that ethnic groups will rebel.

A CONDITIONAL MODEL OF LOCAL INCOME SHOCK AND CIVIL CONFLICT

A shared experience of income and livelihood loss may increase incentives for irregular political behavior, but groups evidently vary in their propensity to mobilize and respond in a violent manner. The conflict-inducing effect of an external shock is determined not only by the severity of the shock but also by the affected population’s coping capacity, the immediate response by the central state, the range of policy options available to redress the hardship, and chance. Informed by recent scholarship, we propose that the political status of affected ethnic groups plays a central role in shaping the outcome of collective grievances sparked by a local income shock.

Unequal access to political power and privileges is a common feature of many heterogeneous societies, but the

4. This does not imply that ethnic groups are static or impermeable. Ethnic groups can be crafted, e.g., through reinforcing particular affinities or invoking distinct out-group stereotypes (Posner 2004). Ethnicity provides a latent frame for grievance formation, which could become salient in times of hardship, e.g., through elite manipulation. While our argument predicts the consolidation of ethnic identities in the face of collective income loss, it is clear that the behavioral expression of ethnic identities may be more diverse at the individual level (see Kalyvas 2008).

extent of intergroup inequality varies greatly. In some cases, political marginalization implies lack of minority representation in central government while allowing for considerable local autonomy. In more extreme cases, exclusion takes the form of active discrimination such as legal restrictions on political participation and cultural practices, frequent scapegoating, and ruthless repression. In regimes where access to power is structured along ethnic lines, political mobility tends to be low, implying that members of some groups are consistently disadvantaged and discriminated against, with little hope to improve on their situation through formal political channels. Lack of prospect to redress grievances through peaceful means is an important reason why politically marginalized groups are generally overrepresented among communities engaged in violent conflict with the central state (e.g., Cederman et al. 2013). Recent downgrading in political status is particularly destabilizing; loss of power, prestige, and privileges produces an especially pronounced sense of deprivation that facilitates political mobilization of group members (Kemper 1978; Williams 2003; Wimmer 2017).

Asymmetric and shifting configurations of power may also exert a more indirect effect on groups' propensity to rebel via the connection between ethnopolitical status and public goods provision, including the distribution of compensation and relief aid in the aftermath of disaster (de Waal 2018; Raleigh 2010), and evidence of ethnic favoritism and clientelism in heterogeneous societies abounds (Ilorah 2009; Stewart 2008). This means that marginalized ethnic communities are more vulnerable to severe income shocks than other social groups. Like many poor, rural populations, they have limited financial means to cope on their own, and being excluded from participation in political processes further implies that they are less likely to be on the receiving end of government-sanctioned redistribution or relief programs.

A central question remains: Why would groups direct their anger at the government for an income shock that, in the context of the rural economy, results from natural causes like extreme weather? Let us give two reasons: First, marginalized populations will react to being denied material compensation they feel entitled to if more powerful groups are insulated from the shock or quickly remedied. One example of such a dynamic played out in Ethiopia during the Sahelian drought of the mid-1980s, where the Derg regime deliberately obstructed the distribution of relief aid to the struggling Tigray population in an effort to pacify the minority group (de Waal 1991). Second, a local income shock can be seen as the epitome of general government mismanagement: a critical reminder to members of the marginalized group about more profound and unjust structural inequalities produced by systematic and lasting political, economic, or cultural discrimi-

nation.⁵ An exogenous shock may thus prompt group members to update their assessment of the status quo and reassess the relative cost of resistance vis-à-vis subordination. Recently degraded groups, whose recollection of better times will be most vivid, offer the best foundation for mobilization in this context. Since politically marginalized groups by design often are unable to seek alliance with political parties, influential civil society organizations or independent media sources, their repertoire of contention may be limited to organized direct action. In urban landscapes, such mobilization can take the form of occupation, demonstration, or riot. However, in the rural periphery, where most ethnic minorities reside, such acts of contention are less effective, and insurgency is more likely to be perceived as a viable strategy to achieve political and economic change.⁶

To summarize, fundamental grievances related to durable ethnopolitical discrimination provide powerful motives for resistance. The likelihood of rebellion may still be modest, however, since long-standing marginalization coincides with limited coordination potential and general apathy. A sudden, adverse change in income and livelihood may offset this equilibrium by accentuating the miserable situation, raising awareness of collective mistreatment, and increasing material incentives for forgoing normal economic activity, all of which may serve as a window of opportunity for mobilization and collective action. Given that recently degraded groups are particularly likely to be politically active—after all, their relative deprivation is shaped by both temporal and between-group comparisons—an income shock may prove especially destabilizing in this context. This conditional logic gives two related testable expectations:

H2a. A local income shock increases the likelihood that discriminated ethnic groups will rebel.

H2b. A local income shock increases the likelihood that downgraded ethnic groups will rebel.

5. For example, Robinson (2014) reveals that individuals' attachment to ethnic identity in Africa is linked to covariates of poverty such as rural residence and employment in the traditional sector. Also in line with our argument, Detges (2017) shows that discriminated populations in sub-Saharan Africa report higher support for the use of violence when hit by a severe drought.

6. Another corollary that can be derived from this reasoning (which we do not investigate further here) is that where ethnocratic rulers are unable to protect their kin groups, such that an economic shock affects privileged and marginalized groups equally severely, revolutionary mobilization or intraregime factionalism may become more likely outcomes than ethnonationalist uprising.

DATA AND RESEARCH DESIGN

In order to evaluate the empirical merit of the theoretical framework, we construct a global panel data set with yearly observations of politically relevant ethnic groups in ethnically heterogeneous countries for all years 1970–2013. The operational definition of ethnicity follows the Ethnic Power Relations (EPR) project and captures ethnolinguistic, ethnosomatic, and ethnoreligious differences (Cederman, Wimmer, and Min 2010). According to this source, an ethnic group is considered politically relevant if at least one significant political actor claims to represent the interests of that group in the national political arena or if group members are systematically and intentionally discriminated against in the domain of public politics. To maintain theoretical coherence, we exclude groups that form a central part of the ruling government, and we further limit focus to groups with a distinct settlement base within the territory of the host country.

The spatial delineation of ethnic groups is taken from the GeoEPR 2014 data set (Wucherpfennig et al. 2011). Although the exogenously defined group polygons may seem at odds with the notion that identity awareness and ethnic salience are endogenous to socioeconomic processes, our approach is fully compatible with such views, where the group polygons should be seen as geographical representations of latent ethnic strongholds where a shared sense of belonging is more potent and more likely to be mobilized when con-

ditions are ripe. In fact, the explicit combination of group-specific income shocks and the mediating role of political status is a way to model this heterogeneity. In total, our data set contains yearly observations for 485 ethnic groups in 116 heterogeneous countries worldwide (fig. 1; see the appendix, available online, for details).

Dependent variable: Ethnic civil conflict onset

The dependent variable is a binary indicator of the outbreak of civil (antigovernmental) conflict involving group i in year t , based on the UCDP/PRIO Armed Conflict Dataset (Allansson, Melander, and Themner 2017). Civil conflict is here understood as an armed contest between a government and an organized nonstate actor over government or a specific territory that results in at least 25 battle-related deaths in a calendar year. This commonly applied minimum severity threshold is high enough for the violence to represent a politically significant event but low enough to not exclude organized resistance movements that never escalate to the level of civil war (typically defined as causing at least 1,000 deaths per year), such as the Northern Ireland conflict in the United Kingdom or the Palestine independence struggle in Israel. Since our units of observation are ethnic groups, we only consider conflicts involving rebel organizations that claim to fight on behalf of a politically relevant ethnic group. We link the UCDP conflict data to the EPR groups using the ACD2EPR data set

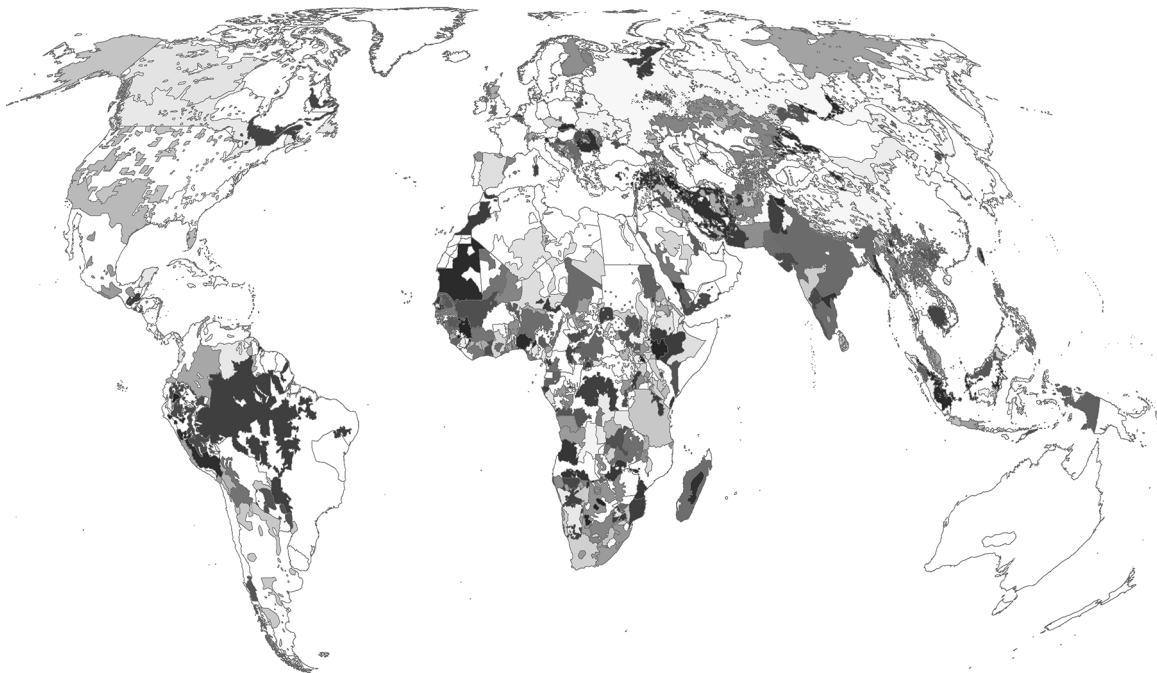


Figure 1. Ethnic groups at risk of civil conflict. Shaded polygons represent settlement areas of ethnic groups included in the global sample. White terrestrial areas are excluded from analysis because (a) the area is uninhabited or because the local ethnic population (b) constitutes a central part of the ruling regime, (c) lacks a concentrated settlement pattern, (d) constitutes the only spatially defined ethnic group in the country, or (e) resides in a country where ethnicity is politically irrelevant.

(Wucherpfennig et al. 2012). We code onset as the first year of reported fighting involving the group, as well as the first year of renewed fighting after at least two calendar years without recorded conflict activity. Subsequent years of fighting are censored, whereas years when the group is not involved in conflict are coded 0. The final data set contains 160 records of ethnic civil conflict outbreak among 15,145 group years.

Main independent variable: Local income shock

Reliable time-varying data on income levels by ethnic group are unavailable for most countries, implying that we cannot measure local economic activity directly. Instead, we pursue an indirect estimation strategy. Our variable of primary interest, group-level income shock (*g_shock*), captures the extent of drought, measured specifically for each group's cropland areas during the calendar months of the most recent growing season, based on the standardized precipitation-evapotranspiration index, SPEI (Beguería et al. 2014). The *g_shock* index has a theoretical range from 0 to 1, although in our sample the maximum recorded *g_shock* score is 0.8, and few observations have values above 0.2, owing to the rare nature of severe droughts. Importantly, the drought index is normalized by location, implying that *g_shock* can be considered a random treatment with equal probability of occurrence across units over time. See appendix section A for further details and alternative operationalizations.

Severe growing-season drought exposure is an imperfect measure of local income shock, and the strength of the transmission channels from climatic anomalies to harvest failure and from harvest failure to declining community incomes are bound to vary across the contexts we study. To verify that *g_shock* still captures important dynamics in the rural economy, we conducted two validation tests: the extent to which *g_shock* explains temporal variation in groups' energy consumption (nighttime light emission) and the extent to which country-aggregated *g_shock* explains fluctuations in GDP growth. These tests, documented in appendix section B, give us confidence that growing-season drought is a reasonable proxy for local income loss, particularly where rain-fed farming is a leading source of livelihood.

Conditioning factors

As outlined in the theoretical discussion, the causal effect of local income shock on civil conflict risk is expected to be sensitive to the ethnopolitical context. We examine the conditioning role of political marginalization via two complementary measures. First, we flag all group years that were characterized by explicit and targeted political discrimination by the central government. Discrimination is a powerful source of (latent) grievance that carries significant mobilization po-

tential.⁷ Second, we flag groups that have seen recent political downgrading, implying loss of political status and privileges during the previous 10 years. Recently downgraded groups are likely to be cognizant of their relative deprivation and therefore especially amenable to mobilization efforts in response to an exogenous shock. Both marginalization variables are coded using the EPR data, and the context-sensitive effect is modeled via interaction terms.

The theorized conditional nature of the income shock effect should explain some of the observed variation in conflict frequency among drought-affected communities, but groups also differ in their economic sensitivity to extreme weather, regardless of the ethnopolitical context. We address this concern by specifying two alternative subsamples to complement the full global sample. The first subsample is limited to groups characterized by low local development, defined as below-median average nighttime light emission per capita. The second subsample contains groups in countries with above-median shares of the workforce employed in agriculture (World Bank 2017). These subsets of data are likely to capture groups that (a) lack effective irrigation systems, (b) have limited or no access to reliable seasonal weather forecasts, (c) lack material resources to cushion a severe income shock, and (d) have a limited scope of alternative livelihoods—all of which accentuate the economic and social impacts of a severe growing-season drought.

Estimation

All models documented below are estimated via two-level mixed-effects logistic regression, given by $y_{i,t} = \alpha + \beta x_{i,t-1} + \theta_i + \nu_j + \varepsilon_{i,t}$, where y is the observed binary outcome for group i at time t , α is the common intercept, β is a vector of coefficients for a set of group-specific time-varying variables x , θ is a common time trend, ν is the random intercept for country j in which the group is embedded, and ε is the error term. This statistical model allows for examining both spatial and temporal variation in conflict risk while taking into account dependence between observations within countries and within groups over time (Gelman and Hill 2007). We specify random intercepts to account for systematic differences in baseline conflict risk between groups belonging to different countries, while the slopes, or variable effect sizes, are assumed constant across all groups.

To ensure a correct sequencing of events, a one-year time lag is applied to our main independent variables. In the interest of parsimony, we limit the selection of controls to a core set of variables that capture temporal trends in the data:

7. We consider ethnopolitical exclusion as an alternative condition in the appendix.

a post-Cold War dummy (coded 1 for 1989 and subsequent years) to account for a sudden shift in the system-level frequency of ethnic conflict (see Kalyvas and Balcells 2010), a logged group-level count of the number of years since the previous conflict, and a time trend to capture unobserved trending factors. Appendix section C provides results for alternative model specifications.

RESULTS AND DISCUSSION

We present the results from the empirical analysis in two tables. Table 1 contains output from the global sample, whereas table 2 reveals results for the two subsamples. We estimate three models on each sample: a baseline model (testing hypothesis 1), an interaction model between income shock and

discrimination (hypothesis 2a), and an interaction between income shock and downgrading (hypothesis 2b).

Hypothesis 1 posits that drought-induced income loss exerts a positive effect on the average ethnic group’s propensity to rebel. Model 1 offers modest support for this expectation; while the point estimate of *g_shock* has the predicted positive sign, the size of the effect is small and fails to obtain statistical significance. The frail evidence for a direct effect is perhaps not surprising. For relatively well-off communities (of which there are many in the global sample), a temporary loss of harvest may not constitute a direct threat to the mode of living and therefore would be insufficient to trigger large-scale mobilization. Besides, in many open societies, social actors will find other and more cost-effective means of redressing a sudden hardship than forgoing their livelihood and forming an armed uprising.

Subsequent models in table 1 provide more plausible tests, where the effect of income shock is modeled as a function of political discrimination and downgrading, respectively. While model 2 fails to support the conditional theoretical argument articulated in hypothesis 2a, model 3 suggests that drought-related shocks indeed can trigger a conflict for groups that have experienced political downgrading in the recent past. The same pattern can be detected by simpler bivariate statistics; the onset rate for downgraded groups with at least moderate drought exposure (*g_shock* > 0.1) is more than four times greater than that for other groups exposed to a similar shock (3.6% vs. 0.8%). Interestingly, the interaction term absorbs much of the direct effect of being downgraded, indicating that loss of prestige and privileges triggers conflict mostly in combination with loss of economic resources. Hypothesis 2b receives preliminary support.

In table 2, we discard the strong assumption about a globally applicable income shock effect and instead zoom in on subsets of the data considered particularly sensitive to drought. Among groups marked by below-median average levels of nighttime light emission per capita, we find some indication of an unconditional effect of income shock as the parameter estimate in model 4 is significant with a 10% margin of uncertainty. Model 5 suggests that the conflict-inducing effect of drought is higher for discriminated groups, but the overall contribution of the interaction term is feeble. However, for groups that have been subject to recent political downgrading, we again observe a significant increase in conflict propensity, consistent with hypothesis 2b (model 6).

The remainder of table 2 presents the results from similarly specified models on the alternative subsample that is limited to groups in countries with a large agricultural sector. Despite these subsamples being defined from widely different data, we observe the same general pattern, whereby the weak

Table 1. Income Shock and Ethnic Conflict Onset, 1971–2013

	(1)	(2)	(3)
<i>g_shock</i> (<i>t</i> – 1)	1.364 (.953)	1.817+ (1.077)	.523 (1.076)
<i>g_shock</i> × discriminated (<i>t</i> – 1)		–1.753 (2.164)	
<i>g_shock</i> × downgraded (<i>t</i> – 1)			5.678* (2.459)
Discriminated (<i>t</i> – 1)	1.143** (.217)	1.276** (.269)	1.141** (.218)
Downgraded (<i>t</i> – 1)	.654** (.241)	.659** (.241)	.179 (.334)
Post-Cold War	.890** (.260)	.887** (.260)	.897** (.260)
Peace years (ln)	–.383** (.074)	–.380** (.074)	–.387** (.074)
Time trend	–.016 (.010)	–.016 (.010)	–.016 (.010)
Constant (group)	–4.482** (.360)	–4.531** (.365)	–4.418** (.361)
Constant (country)	.899** (.326)	.913** (.330)	.885** (.322)
Logistic regression test versus logistic χ^2	39.85**	40.31**	39.29**
Bayesian information criterion	1,666.9	1,675.9	1,671.6
ROC AUC	.872	.873	.874

Note. Two-level random effects logit estimates with standard errors in parentheses. Dependent variable is outbreak of civil conflict involving ethnic group *i* in year *t*. ROC AUC = receiver operating curve area under the curve. *N* = 15,145.

+ *p* < .10.

* *p* < .05.

** *p* < .01.

Table 2. Income Shock and Ethnic Conflict Onset, 1971–2013: Subsamples

	Low Economic Development			High Agriculture Employment		
	(4)	(5)	(6)	(7)	(8)	(9)
<i>g_shock</i> (<i>t</i> – 1)	1.927 ⁺ (1.126)	1.832 (1.228)	.939 (1.291)	2.174* (1.059)	2.154 ⁺ (1.156)	1.084 (1.245)
<i>g_shock</i> × discriminated (<i>t</i> – 1)		.608 (3.014)			.117 (2.789)	
<i>g_shock</i> × downgraded (<i>t</i> – 1)			6.320* (2.846)			6.010* (2.582)
Discriminated (<i>t</i> – 1)	1.247** (.279)	1.208** (.343)	1.248** (.280)	1.407** (.265)	1.398** (.330)	1.412** (.266)
Downgraded (<i>t</i> – 1)	.619* (.306)	.617* (.306)	.103 (.408)	.726** (.268)	.726** (.268)	.237 (.358)
Post–Cold War	1.086** (.332)	1.089** (.332)	1.069** (.332)	.893** (.311)	.893** (.311)	.872** (.311)
Peace years (ln)	–.289** (.091)	–.290** (.091)	–.294** (.090)	–.313** (.090)	–.314** (.090)	–.321** (.090)
Time trend	–.021 (.013)	–.021 (.013)	–.020 (.013)	–.014 (.012)	–.014 (.012)	–.013 (.012)
Constant (group)	–4.573** (.470)	–4.562** (.472)	–4.497** (.471)	–4.565** (.418)	–4.562** (.423)	–4.478** (.420)
Constant (country)	1.031* (.494)	1.026* (.492)	1.052* (.501)	.697* (.303)	.697* (.303)	.717* (.310)
<i>N</i>	7,096	7,096	7,096	9,096	9,096	9,096
Logistic regression test versus logistic χ^2	24.77**	24.56**	25.42**	26.47**	26.42**	27.20**
Bayesian information criterion	1,077.0	1,085.8	1,081.4	1,183.6	1,192.7	1,187.7
ROC AUC	.854	.854	.857	.840	.840	.845

Note. Two-level random effects logit estimates with standard errors in parentheses. Dependent variable is outbreak of civil conflict involving ethnic group *i* in year *t*. ROC AUC = receiver operating curve area under the curve.

⁺ $p < .10$.

* $p < .05$.

** $p < .01$.

direct income shock effect (model 7) becomes much more prominent when modeled in interaction with recent ethnopolitical downgrading (model 9). Although each of these fluctuating conditions—income shock and political downgrading—has the potential to trigger organized resistance on its own, rebellion is much more likely to occur when economic and political shocks coincide (see also Stewart 2008).

The estimated effect of income shock on conflict propensity among downgraded groups is both statistically significant and substantively meaningful. Figure 2 displays marginal effects of *g_shock* for a change from 0 to 0.1 (equivalent to a shift from 0 to the 75th percentile value) across specifications. The point estimates are positive throughout, even though the confidence intervals cross 0 in most models. Yet, in line with hypothesis 2b, the interaction of income shock with downgrading is a notable and consistent exception. For downgraded groups, an income shock of $g_shock = 0.1$ nearly

doubles the estimated risk of conflict in the full sample and more than doubles the risk in the subsamples characterized by low development or a high share of agricultural employment. More research is needed to fully understand why the effect of ethnopolitical discrimination on conflict risk is less sensitive to the economic context than political downgrading. As we argued above, groups who recently lost power are more likely to be politically mobilized and therefore better able to respond rapidly to arising windows of opportunity. A complementary explanation could be that for downgraded groups, a sense of relative deprivation arises from a comparison with the group's own brighter past as well as with other groups in society, whereas the reference point for chronically discriminated groups lacks the temporal dimension. Be that as it may, overall the combination of losing political power and losing out economically seems to make violent ethnic mobilization particularly likely.

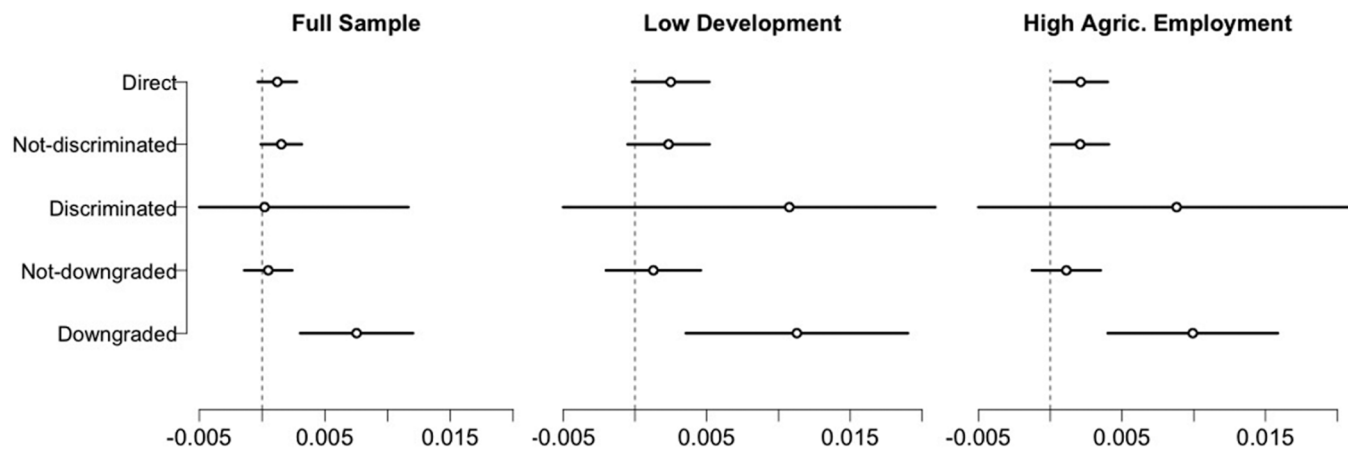


Figure 2. Estimated marginal effect of income shock on group-level conflict risk for a change in g_shock from 0 to 0.1 (equivalent to a growing-season drought at the 75th percentile level of severity) with whiskers indicating 95% confidence intervals, based on models in tables 1 and 2. The top row represents direct relationships; subsequent rows represent the total estimated marginal effect for models including interaction terms with the relevant marginalization variable set to 0 and 1, respectively. For all models, control variables are set to their mean (continuous variables) or mode (categorical variables) value.

Despite significant effects in specific contexts, the overall estimated conflict potential of income shocks should still be seen as modest in comparison with some of the other factors accounted for, such as ethnopolitical discrimination. All else constant, discriminated groups are more than twice as likely to rebel in all scenarios. The effect of downgrading is comparatively weaker, with an estimated increase in conflict risk of around 60%–75%, depending on the model. Naturally, comparison of effect sizes between these models should be made with caution since the contextual variables might suffer from omitted-variable bias and endogeneity (unlike the exogenous g_shock). However, the general pattern across the models clearly suggests that discrimination shapes the risk of ethnic group conflict in general, whereas income shock has a substantial effect on conflict risk primarily in interaction with recent loss of political status.

Time-series income and livelihood data at the level of rural communities in the Global South are exceedingly difficult to obtain, and it is equally challenging to determine the driving motives underpinning observed mobilization and violent resistance, hindering a systematic, in-depth verification of the theoretical model. However, a closer investigation of some of the data points that drive the correlations offer some validity to our interpretation. One such case is the Moro group in the Philippines. During their long-standing separatist campaign, a new armed actor, Abu Sayyaf (ASG), formed in the shadow of extreme drought and depressed agricultural yields in the early 1990s (Lansigan, de los Santos, and Coladilla 2000). Consistent with theory, ASG enjoyed strong support in areas that lacked economic opportunities and relied on agriculture as the main source of livelihood, and the prospect of wealth and status appears to have been a much more

important motivational factor than ideological fulfillment (Quimpo 1999).

A second example is the Uyghurs in northwest China, a rural Turkic minority group whose increasing marginalization vis-à-vis the Han Chinese is cited as a major cause of resistance (Hopper and Webber 2009). Our data indicate that the Uyghurs experienced widespread growing-season droughts during 2006–7, shortly before the East Turkestan Islamic Movement (ETIM) initiated a series of attacks on local police and government offices that led to a short-lived armed conflict (UCDP 2019). Given the high local reliance on agriculture, it is likely that the droughts caused economic depression among Uyghurs, although it cannot be established with certainty that worsening economic conditions were a decisive factor in ETIM mobilization.

A third case picked up by our data are the Tuaregs in Niger. The nomadic population suffered greatly during the 1980s Sahelian drought, which triggered considerable out-migration to neighboring countries. After being expelled from Algeria and Libya in 1990, many returned to Niger, when another drought challenged local livelihoods and violence broke out (World Bank 2013). The ensuing rebellion in Niger and neighboring Mali has been described as the reaction of the Tuaregs to misappropriation of international drought relief funds by local governments, adding to widespread feelings of political marginalization by government elites (Benjaminsen 2008).

To add further rigor to our analysis, we implement a comprehensive set of sensitivity tests. These tests, described in detail in appendix section C, include the following alterations: removal of influential outliers, inclusion of an expanded set of controls, specification of group and year fixed effects, and exploring alternative high-risk subsamples. We also explore

the contribution of *g_shock* to the model's out-of-sample predictive performance through fivefold cross-validation (Ward, Greenhill, and Bakke 2010). These tests jointly lend additional credibility to the results reported here.

Overall, drought-induced income loss has a modest contribution to the models' statistical performance. While likelihood ratio tests and receiver operating curves reported in tables 1 and 2 confirm that the interaction models with downgrading are superior to the simpler models, the difference in test scores is small. According to the Bayesian information criterion, which implements a stronger penalty on model complexity, the simpler models are more efficient. Even so, we interpret the reported results as consistent with the conditional theoretical framework, specifically, hypothesis 2b, and believe they show that a rural income shock can provide a window of opportunity for staging organized resistance. The empirical analysis constitutes a hard test for the theory, considering that it rests on the use of meteorological proxies for group-level income fluctuations and the fact that we are studying a very rare outcome. Modeling income shock in combination with infrequent ethnopolitical downgrading for the most likely subsets of ethnic groups (table 2) necessarily makes the analysis more demanding still. Even so, the results are stronger and more robust when limiting focus to subsets of poor and agriculturally dependent societies, consistent with the theorized link to the rural economy.

CONCLUDING REMARKS

The paucity of resistance among marginalized ethnic groups has sometimes been taken as evidence of the irrelevance of grievance theory (Tilly 1978). Instead, it is argued, the absence of civil war in these cases can be explained by a lack of feasibility of rebellion due to a strong and repressive state (Fearon and Laitin 2003), deficiency of entrepreneurs and resources required to mobilize the aggrieved (McCarthy and Zald 1977), or insufficient individual material incentives to forgo normal modes of living (Collier and Hoeffler 2004). Others claim that the latter materialist interpretations rely on inadequate empirical measures that ignore collective emotions and fail to capture important intergroup inequalities that often underpin civil conflicts (Cederman, Weidmann, and Gleditsch 2011).

Economic conditions feature centrally in all of these models, but individually they are insufficient for explaining the outbreak of collective violence. In this article, we provide an explanation for the onset of civil conflict that combines the strengths of the grievance and opportunity cost approaches: the attention to salient, collective identities that allow individual grievances to translate into group behavior, on the one hand, and the emphasis on feasibility and temporal variations

in opportunity cost structures presented by economic downturns, on the other. The result is a conditional model of local income shock and civil conflict that predicts widespread loss of income to serve as a focal point for mobilization primarily when it affects politically marginalized individuals with pre-existing ethnic ties. Politically demoted groups are considered especially vulnerable in this context. Among such groups, a sudden shock can offset the social equilibrium and increase the perceived feasibility of collective action.

The results from a comprehensive empirical analysis—to our knowledge the first global, group-level investigation of its kind—are largely consistent with the proposed conditional theory of civil war. Although severe income loss has a modest effect on the average ethnic group's propensity to rebel, recently downgraded groups become significantly more conflict prone in the aftermath of a local economic shock. This effect is strongest among the poorest and most vulnerable groups. We also find that political downgrading is much less destabilizing in the absence of economic contraction. While further probing of the causal mechanisms, for example, via survey data and process tracing, should be a priority for future research, these results lend support to the argument that an exogenous shock that aggravates an already dire situation can raise awareness about fundamental origins of shared deprivation and thereby facilitate violent collective action.

It would be a mistake to conclude that outbreaks of ethnic rebellion during economic crises are solely, or even primarily, about worsening economic conditions. Ethnic groups that respond violently to a severe income shock are likely to harbor preexisting animosities toward the regime that relate to more fundamental forms of marginalization. Herein lies an important policy implication: the solutions to latent and simmering ethnic insurgencies are primarily political in nature. Sustained investments in poor, agrarian regions may make marginalized rural communities more resilient to weather extremes and dampen a potential trigger effect (Tester and Langridge 2010). However, technological advances and productivity improvements do not address underlying causes of collective frustration related to unequal land distribution, underdeveloped property rights, corruption, lack of political representation, and various forms of overt and covert state-sponsored discrimination. Addressing these fundamental political issues is paramount for successful conflict prevention and a lasting peace.

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