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**One for all and all for one.
Institutions and Ethnic Conflict**

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ONE FOR ALL AND ALL FOR ONE.

INSTITUTIONS AND ETHNIC CONFLICT

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This thesis aims to unravel how institutional improvements help in ethnic conflict resolution, in line with Easterly's (2001) results. As the main strands of the literature focus on intergroup relations by representing them as reputation games, they lose sight of groups' greed for economic and political power. Here I develop a theoretical model with multiple extensions on that of Skaperdas (1992), in which not only group incentives for conflict but also the individual choice to belong to a group or to emancipate can be identified. The theoretical results show that institutional improvements can shift the equilibrium towards a more peaceful one, either as partitioned or non-partitioned societies. Finally, these results are tested with Mexican data at the municipality level.

I. INTRODUCTION

Ethnic conflict is still one of the first items on the political agenda in many developing countries. The Rwandan Tutsi genocide of 1994 is maybe the most symbolic and recent example of how destructive ethnic wars can be for a society. The Middle East, South East Asia, Eastern Europe, and Africa are common scenarios for ethnic conflict to occur today. Here a natural question emerges: how can ethnic conflict be resolved? Easterly (2001) posed it as “can institutions resolve ethnic conflict?” and his answer was positive. Even though he mentions in some way the mechanisms I propose here, he performs a reduced-form analysis, captured in a simple equation that he proposes as $(\text{Ethnic Conflict}) = f(\text{Ethnic diversity, Institutional quality})$. In this thesis, I intend to go one step further and argue *how* institutions can resolve ethnic conflict, in a more detailed way than Easterly's (2001) function f . For doing so, I develop a theoretical model based on Skaperdas (1992), and then I test the main results with municipality-level data from Mexico.

The most relevant literature on these topics focuses either on the economic competition between ethnic groups as the root of conflict (Becker and Pascali,

2019; Jha, 2013, 2018) or on how to describe the strategy profiles carried out by ethnic groups in equilibrium to avoid conflict and explaining why they sometimes fail (Fearon and Laitin, 1996; Tabellini, 2008). Those two strands of literature share nevertheless what might be called a group-decision-dimensional approach. However, by placing the spotlight on interactions between groups, their inner structure is lost from view. As group actions are the output of collective choice, it is essential to understand what motivates individual members to remain as part of the group (and to support the chosen strategy). This paper aims to expand the analysis of ethnic conflict to a bi-dimensional approach that includes both the *group-decision* and the *individual-decision* stages, and then exploit that framework to explain how “better institutions” can dissuade conflict. Here I take the definition of “good institutions” proposed by Easterly (2001) as those “that give legal protection to minorities, guarantee freedom from expropriation, grant freedom from repudiation of contracts, and facilitate cooperation for public services” (p. 690).

In developing the model, I build on Skaperdas’ (1992) setup, in which two individuals decide how to allocate their resources between productive and offensive-defensive activities, where the outputs depend on some conflict technology. Here I extend the model so G groups interact instead of two individuals, and then I add a previous stage in which every individual born in each group decides whether to remain as a member or to emancipate. Institutions are included in the model as a parameter that determines both the outside option for individuals and the conflict technology for intergroup relations.

This thesis, as well as the aforementioned literature, supports a more general series of papers that study how cultural diversity affects the economic performance of societies, either through conflict or through other organizational and political issues, such as corruption and political consensus (Alesina et al., 1999; Alesina et al., 2003; Alesina and Giuliano, 2015; Alesina and La Ferrara, 2002, 2005; Ashraf and Galor, 2013; Easterly and Levine, 1997; Hall and Jones, 1999; Mauro, 1995).

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II. ETHNICITY AND THE NATURE OF ETHNIC CONFLICT

Not every society has to deal with the problem of ethnic conflict. For ethnic conflict to be a potential issue, some initial conditions are to be met. First, society not only needs to be ethnically heterogeneous but fractionalized, *i.e.*, divided into clearly distinguishable groups. Second, for groups members to be involved in conflict they have to maintain strong ties with their groups. These ties are in part inherited by genes or upbringing, and in part chosen because of the net benefits that belonging can bring. This is the central theme in the individual-dimensional analysis of ethnic conflict.

When those conditions are met, ethnic groups become interacting units that can be analyzed from the group-dimensional perspective. Institutions come into play in shaping both individual and group incentives and constraints. At the individual level, for example, people can go to court when they get harmed by others if the judiciary effectively works. If the state is present and the police force is therefore actively operating, groups are less prone to enter into violent conflict. It can be thought that modern states and institutions come to replace ethnic groups, leading to the homogenization of culture and preferences and making ethnic conflict a less likely issue. That may be why more developed and wealthy societies, which also have better quality institutions, show more peaceful relations among ethnic groups than the less developed ones (Easterly, 2001).

II.A. Heterogeneity, fractionalization and the potential for conflict

Since ethnic conflict is factional in nature, the more fractionalized a society is, the more likely it is to observe ethnic conflict within it. In the first place, if there is no heterogeneity among individuals, then it would not be possible to divide society into groups (as isolated Mennonite communities). Moreover, if people are uniformly heterogeneous (as in most large cities), it would not be possible either. In fact, the notion of *fractionalization* is the most commonly adopted when referring to diversity in ethnic conflict literature (Ashraf and Galor, 2013; Alesina et al., 2003; Alesina and Giuliano, 2015; Alesina and La Ferrara, 2015; Easterly, 2001; Easterly and Levine, 1997). Introducing the idea of

fractionalization requires the assumption that members of a society can be clustered in delimited and distinguishable groups. The fractionalization index (*FI*), which is the typical measure of cultural diversity in economic growth literature, can be defined as the probability that two random people in society belong to different groups. So, if a society is divided into G groups, the *FI* can be expressed as (1).

$$FI = \sum_{g=1}^G \pi_g (1 - \pi_g) = 1 - \sum_{g=1}^G \pi_g^2, \quad (1)$$

where π_g represents the fraction of people in society who belongs to group g . The *FI* was first introduced with the name of *ethnolinguistic fractionalization (ELF)* index by Taylor and Hudson (1972). The data used in this paper preserve the term. It is worth mentioning the need for a clear definition of ethnic group when estimating this index. To this end, it is necessary to understand what ethnicity is and which are its most relevant dimensions.

II.B. Ethnicity, identity shaping and the genesis of ethnic groups

For the purposes of the present analysis, ethnic groups should be thought of as endogenously determined. Individuals decide whether or not to be members of a group based on what can be summarized in two central points. On the one hand, there are intrinsic benefits of belonging that are internalized through the values formed in upbringing. This sense of sharing beliefs and values with similar people can also be interpreted as the cost of leaving the group. Some ethnic groups show greater camaraderie than others, depending on how deeply rooted the ethnicity is in the daily life of their members. On the other hand, ethnic groups have a role as suppliers of several club goods, like physical protection, financial services, and insurance networks. In return, members must be willing to make sacrifices for the common interest, such as entering into an ethnic war.

In the Encyclopaedia Britannica entry for *ethnic group*, it is defined as “a social group or category of the population that, in a larger society, is set apart and bound together by common ties of race, language, nationality, or culture” (Pauls, 2017, para. 1). This concept comprehends different shared aspects that

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define the boundaries of ethnic groups. Many of them are non-physical but there is one physical. Horowitz (1985) suggests that ethnic identity is determined by a combination of visible and non-visible cues generally imposed in the first years of life. Among visible cues, Horowitz (1985) distinguishes those determined at birth like coloring, physiognomy, and height, from the ones physically induced like earring holes, circumcision, tattoos, and modifications in teeth and earlobes. He also mentions behavioral visual cues like posture and gestures, but their recognition needs a display. Non-visible attributes are instead the ones referring to language and culture. In the framework of this thesis, the quantity of ethnic cues may increase the depth of each individual's relationship to their group, so they are thought of as parameters that increase the cost of leaving. The vast majority of those cues are exogenously imposed in the earliest years of life and are generally irreversible. The fact that most of them are permanent has a direct effect on the strength of members' ties with their group, making more difficult the eventual decision to emancipate. These cues not only determine the way of thinking and acting of people through their preferences and values (Tabellini, 2008) but also act as signaling features that ease many intergroup relations, which also give rise to discrimination. When society is deeply fractionalized, discrimination is maybe the clearest evidence of how people internalize the importance of belonging to one group or another (see Bertrand and Mullainathan, 2004; Fershtman and Gneezy, 2001; Fryer and Levitt, 2004; Hoff and Padney, 2006; Steele and Aronson, 1995).

The strength of ethnic ties is not the only variable that determines the cost of leaving, though. The opportunity cost of belonging must also be considered. In the globalized world we live in, lots of people do not identify themselves with any well-defined ethnicity. Everyone is taught a language, but culture tends to homogenize as economies develop. When being alone becomes a tempting option, the cost of leaving decreases. But to understand why that might be the case, it is necessary to establish what the costs and benefits of belonging are.

Olson (1971) states that individuals form a group when they share a common interest for which they can "join forces" (and divide costs). Individual

interests are not always exactly aligned with the common interest, though. Being a member of a group implies individual costs. In the ethnic groups framework, these costs can be understood as the willingness to go to war, but also as contributions in physical resources. If groups are interpreted as clubs whose purpose is to provide a club good, the theory of club goods can help understand the phenomenon (Cornes and Sandler, 1986) and explaining why societies do not always organize into a single large group. In the roots of the modern conception of the state, among many political philosophers like Hobbes and Locke, Rousseau (2002) tries to explain why do people associate.

“To find a form of association that may defend and protect with the whole force of the community the person and property of every associate, and by means of which each, joining together with all, may nevertheless obey only himself, and remain as free as before.” Such is the fundamental problem of which the social contract provides the solution (p. 163).

In Rousseau’s *Social Contract*, he states that people “sign a contract” that gives birth to the state, whose main purpose is to ensure individual rights and liberties (here, the common interest is secondary). Nowadays, economists refer to the “social contract” as *institutions* (in the sense of Douglass North’s “rules of the game”). So, one might think that a well-organized society should be able to achieve the optimal provision of public goods and should not need to subdivide into groups or clubs. Thus, the reason for subdividing society into groups may be the state’s failure to enforce the “social contract” (bad institutions). As Gambetta (1996) explains in the origin of the Sicilian Mafia (and the mafia in general), when the state fails to provide property rights and human safety, plain people organize as a firm to provide them privately. Ethnic groups in violent contexts may be thought of as security providers too.

Ethnic groups are however rooted in human history from centuries before the appearance of modern states. Primitive institutions were tailor-made inside of each ethnic group. All non-biological cues from Horowitz (1985) are part of the institutional framework that kept groups cohesive. As a matter of fact, it can even be suggested that the state is the one substituting the role of ethnic groups

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on a greater scale (Lowes et al., 2017). If it was the case, the existence of ethnic groups since modernity comes from the lack of soundness of states.

Beyond their potential role of substitutes of weak States, ethnic groups present other benefits like risk pooling and access to primitive financial instruments. These benefits can be framed in social capital and social networks theory. Some of the most common instruments implemented in small groups of people are interest-free loans, mutual insurance systems, and rotating savings and credit associations (Townsend, 1994, 1995). Ethnic groups act as informal networks whose “services” can be seized by their members. Here, it is clear how “better institutions” reduce the need for informal networks. Easterly (2001) explains that good institutions, mainly in the sense of clearly defined and secure property rights and an efficient bureaucracy, deter frictions between groups. However, they can also be essential in developing modern substitutes for “ethnic capital”. When the state is present and effectively enforces property rights, the financial and insurance markets are expected to develop, but people can also rely on the state’s protection in cases of damage caused by third parties. Hence, as institutions “perform well”, the opportunity cost of belonging is expected to increase.

II.C. Ethnic groups on the board

Even though fractionalization into well-defined groups is a necessary condition for ethnic conflict to emerge, it is not a sufficient one. Twentieth-century New York City is clear evidence of how different ethnic groups can coexist in peace (Fearon and Laitin, 1996). Many papers in the field of ethnic conflict actually focus on ethnic cooperation and how it can be sustained. They model the problem as a repeated prisoner’s dilemma (Fearon and Laitin, 1996; Tabellini, 2008), in which group punishment mechanisms are treated as institutions aiming to enforce interethnic cooperation. Either through the study of different punishment schemes (Fearon and Laitin, 1996) or of generalized versus limited morality and how trust shape interethnic relationships (Tabellini, 2008), these approaches of interethnic cooperation as a reputation game lose sight of the complexity of the reasons for conflict.

Ethnic conflict may also be seen as a race for power. Horowitz (1985) is probably the most concerned author with the causes of interethnic conflict from a political point of view. In his book, he first separates the analysis into conflicts between hierarchical ranked groups and between unranked groups. While ranked groups tend to be overlapped with socio-economic strata, unranked groups may be thought of as little nations or States interacting in diplomacy codes. To Horowitz (1985), conflict between ranked groups has, therefore, an overtone of class conflict, while conflict in unranked societies is more like a search for autonomy or sovereignty. India is a clear example of a society organized in ranked ethnic groups, with its caste system. We can also think of events like the Holocaust, the Armenian Genocide of 1915, and the Rwandan Tutsi Genocide of 1994 as intents to exterminate specific subordinate groups that could represent a “threat” to the higher-ranked group. On the other hand, the Yugoslav Wars and the Russo-Georgian War can be classified in the unranked category of violent attempts to get ethnic independence and political autonomy. The “Africa’s growth tragedy” as explained by Easterly and Levine (1997) is actually a consequence of the incessant war for political control in a continent fractionalized into countless relatively equal ethnic groups looking for power and independence. Persistence, in this case, is more than imaginable as countries’ borders were defined without any considerations for ethnic distributions (Michalopoulos and Papaioannou, 2011). Reynal-Querol (2002) and Montalvo and Reynal-Querol (2005, 2008) follow this line of thought by arguing that what really matters is polarization rather than fractionalization when trying to decipher the genesis of ethnic conflict.

A good translation of the idea of groups competing for political power and control to economic terms was made by Jha (2013, 2018). He states that violence originates when ethnic groups compete in the same activities. When there exist “non-reducible and non-prone to expropriation” complementarities between groups, then peace becomes sustainable. It is a variant of Horowitz’s (1985) ideas. Groups compete not only for resources but also for the control of economic activities. In the classical framework of Acemoglu et al. (2005), the group that holds the control of economic activities and resources is the one that will

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configure the institutional structure in favor of its own interests. Becker and Pascali (2019) analyze the anti-Semitic outbreak following the Protestant Reformation using Jha's framework. They show how minorities are seen as threats if they compete with the majoritarian group. While the minority groups support the economy in a complementary way, the majority will welcome them. It is a relevant point for the analysis of the theoretical predictions presented below.

In all these contexts, institutions play in the sense of Easterly's (2001) analysis. Without strong public enforcement, groups can attempt to seize power or resources from other groups by force. As Hobbes would have said, in *bellum omnium contra omnes* we must do whatever to survive. Whether to gain political power or to protect oneself from strangers in everyday life, belonging to an ethnic group seems to be a better choice than being alone when the state is absent and property rights are unprotected.

IV. THE MODEL

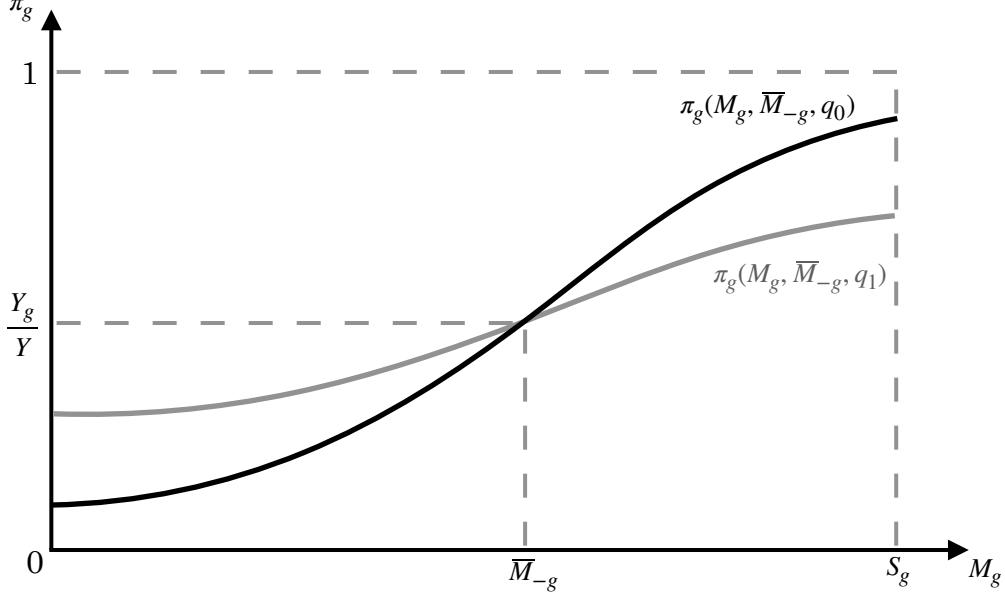
This section integrates the decision-making process of organizing into groups and handling conflict in a model of rational optimization, such that the mechanisms through which better institutions can lead to the reduction of ethnic conflict can be identified. I start from the basic Skaperdas's (1992) model, in which two agents have to decide how to allocate their resources between productive and offensive-defensive activities (arms) in the absence of property rights. In Skaperdas' model, there are three possible equilibria: full cooperation, in which all resources are reserved for production; partial cooperation, in which only one agent invests in arms; and conflict, in which both invest. The model presented here intends to capture both the individual decision and the group decision, so it consists of a two-stage decision process. In the first stage, the individual dimension takes place, in which people have to decide whether to remain in their natal ethnic group or emancipate, taking into account the strength of their ethnic ties, the opportunity cost, and the expected utility of remaining in the group. In the second stage, the group dimension takes place, in which groups interact with each other à la Skaperdas. Differentiating the model

into two stages also allows discriminating the relevance of each dimension in the definition of equilibria and analyzing more deeply the role of institutions and the state in each independent stage.

Let's consider a society of N individuals exogenously divided into G ethnic groups of different sizes. Each agent is endowed with one unit of resources. First, they have to decide whether to remain in their own groups or emancipate. Then, if they resign their membership, they have to pay a personal cost of leaving $\lambda_g \geq 0$ related to the strength of the moral tie they have with their ethnicity, so it is the same for every member of group g but vary across groups. The state is the only support for independent people, so their outside option will positively depend on the quality of institutions. Consider $q \in [0,1]$ as the institutional quality, where 1 represents a state that perfectly enforces the rules and 0 is an absent one. The outside option can be thought of as a function of institutions $\omega(q) \in [0,1]$, where $\omega' > 0$. It can also be interpreted as the probability of keep the endowment, evaluated with a Bernoulli utility function. Taking the notion of Easterly (2001), perfect institutions ($q = 1$) imply a present state that enforces property rights and ensures independent people will seize their wealth without any loss ($\omega(1) = 1$). In contrast, an absent state will not be able to protect agents against any damage, so they are expected to lose all their resources in a context of anarchy ($\omega(0) = 0$). On the other hand, all individuals who decide to stay in group g (a number S_g of individuals) contribute their entire units of resources to a common fund, from which they collectively decide how much to invest in military resources (M_g) and how much to reserve for consumption (Y_g), such that $S_g = M_g + Y_g$. Utility here depends on the outcome of ethnic conflict, which is represented by equation (2) and explained below.

A rational individual would decide to stay or leave the group in a process of backward induction. So, the analysis will begin from the end of the game. I rely on the assumption that ethnic conflict only concerns directly to consolidated groups and independent people just receive a negative externality (reflected on the fact that $\omega(q) \leq 1$).

FIGURE I. Conflict technology



As mentioned above, each group can invest part of its budget in military resources. Consider a *conflict technology* $\pi_g(M_g, \bar{M}_{-g}, q)$ that defines the relative military power of group g , where $\bar{M}_{-g} = \sum_{k \neq g} M_k / (G - 1)$ is the average investment on military of other groups and q is the measure of institutional quality presented before. As in Skaperdas (1992), π_g can be thought of as the probability of group g of winning the entire available resources $Y = \sum_{g=1}^G (S_g - M_g)$, or the fraction of Y that the group will obtain as a result of conflict or war. To shape the conflict technology, the following assumptions are proposed.

ASSUMPTIONS:

- | | |
|--|--|
| (i) $0 \leq \pi_g \leq 1; \sum_{g=1}^G \pi_g = 1$ | (v) $\frac{\partial^2 \pi_g}{\partial M_g \partial q} < 0$ |
| (ii) $\frac{\partial \pi_g}{\partial M_g} \geq 0$ | (vi) $\frac{\partial \pi_g}{\partial q} \gtrless 0$ as $M_g \gtrless \bar{M}_{-g}$ |
| (iii) $\frac{\partial^2 \pi_g}{\partial M_g^2} \gtrless 0$ as $M_g \lessgtr \bar{M}_{-g}$ | (vii) $\pi_g = \frac{Y_g}{Y} \Leftrightarrow M_g = \bar{M}_{-g}$ |
| (iv) $\frac{\partial^2 \pi_g}{\partial M_g \partial \bar{M}_{-g}} \lessgtr 0$ as $M_g \lessgtr \bar{M}_{-g}$ | (viii) $\frac{\partial \pi_g}{\partial M_g} = 0 \Leftrightarrow q = 1$ |

Under these assumptions, (i) it is possible for groups to lose everything or to seize all the available wealth Y , depending on relative sizes and investment in

military. When a group decides to increase its military investment, (ii) it will claim a higher fraction of total resources, and (iii) this marginal gain will be increasing while the group's investment is under the mean and decreasing while it is over the mean. It means that those groups under the mean military investment will face higher rates of return to militarize than those highly militarized. (iv) The marginal return to military investment will be higher the closer the investment of group g is to the average. Finally, assumptions (v) to (viii) capture the idea that a more present state that effectively enforces the rules (a higher q) makes military activities less effective by lowering the marginal return to militarization and making the distribution of disposable income the most representative of the actual share of contributions to the total wealth. In an extreme case, in which institutional quality is perfect, (viii) military investment would be completely ineffective. Under these assumptions, an increase in institutional quality makes the conflict technology converge to a less effective one. Figure I represents how function $\pi_g : [0, S_g] \rightarrow [0, 1]$ responds to an increase in institutional quality from q_0 to $q_1 > q_0$. It is visible that increasing the military investment rises the share of total disposable resources that group g will seize, but the curve flattens as institutions improve, showing that military investment becomes ineffective.

In this setup, bilateral conflict cannot be distinguished, because any armed group would attempt to plunder all other less armed groups and will defend against attacks from more militarily advanced ones. However, it is possible to classify equilibria with generalized peace, partial or total conflict and also identify which groups are the ones with the incentives to invest in military.

IV.A. Peaceful equilibrium

As in Skaperdas (1992), this model considers a peaceful scenario as one in which no group invests in arms. It is actually the most common equilibrium in the real world, and as the model predicts, better institutions make the full cooperation equilibrium a more likely and stable one.

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To find the equilibria, it is first necessary to define a utility function. Under the assumption that each group will equally distribute its booty among its members, the utility function can be defined as (2).

$$U_{i_g} = \frac{1}{S_g} Y \pi_g(M_g, \bar{M}_{-g}, q) \quad (2)$$

Since all members are identical, the decision of how much to invest in military for a given group comes from unanimity in this setup. If heterogeneity in individual wealth were introduced in the model, it would also be necessary to define a collective choice mechanism inside each group. It could be acceptable to apply the median voter theorem and continue with the optimization of the utility function for the group member with the median wealth. Anyway, homogeneity is assumed, which simplifies the analysis, as if one representative member would decide the military investment of the entire group.

The peace equilibrium consists thus in a scenario in which every group is disarmed and no one has incentives to invest in military. The condition for peace can be written as (3).

$$\frac{\partial U_{i_g}}{\partial M_g}(M_g = 0, \bar{M}_{-g} = 0) \leq 0 \quad \forall g \quad (3)$$

Condition (4.a) arises directly from (3) and shows that the marginal benefit from beginning conflict must be lesser than the marginal cost of doing so for all groups for peace to be an equilibrium. Here, $\pi_g^0 = \pi_g(M_g = 0, \bar{M}_{-g} = 0)$.

$$\frac{\partial \pi_g^0}{\partial M_g} Y \leq \pi_g^0 \quad \forall g \quad (4.a)$$

Condition (4.a) can also be expressed as (4.b), which indicates that the marginal return to invest in arms in a peaceful scenario must be small enough to maintain the position. This is a central condition and can be empirically tested. If the smallest group is relatively larger, it might be expected to observe less conflict, because there would be fewer groups with incentives to attack others.

$$\frac{\partial \pi_g^0}{\partial M_g} \leq \frac{S_g}{(\sum_{k=1}^G S_k)^2} \quad \forall g \quad (4.b)$$

Because of assumption (v), it can be concluded that peace will be more likely in scenarios with better institutions, beyond relative and absolute group sizes. It is because better institutions will decrease the marginal rate of return of conflict, discouraging all groups from beginning conflict. It can also be empirically tested. Now consider a society fractionalized into many small groups. The right-hand term of (4.b) will be very little for small groups. The marginal rate of return of investing in military is, in contrast, the same for every group, and there are no reasons to think it depends on relative sizes. It can be then concluded that smaller groups will find it more attractive to steal wealth from others, making it more difficult to maintain peace. Given that military resources are equally effective for any group, small ones will seize a relatively larger booty than bigger ones, while those bigger groups will find it inefficient to reduce consumption for little gains in relation to their existing wealth.

IV.B. Partial conflict

A second possible equilibrium is one in which only one or a few groups invest in military while others decide to keep all their resources for consumption. Given the previous conclusion, the groups more likely to invest in arms are the smaller ones, because their marginal benefit will be relatively higher (in proportion) than those of the bigger groups. The partial conflict conditions can be then established as (5.a) and (5.b), in which the groups are ordered by size from the smallest to the biggest group and \bar{g} is the biggest group investing in military.

$$\frac{\partial U_{i_g}}{\partial M_g}(M_g = 0, M_k = M_k^*) \leq 0 \quad \forall g > \bar{g} \quad (5.a)$$

$$\frac{\partial U_{i_k}}{\partial M_k}(M_g = 0, M_k = M_k^*) = 0 \quad \forall k \leq \bar{g} \quad (5.b)$$

In this equilibrium, each group investing in military has a different optimal level of investment M_k^* , which eventually depends on its own size and the

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choices of all other groups. Condition (6), obtained from (5.a), implies that peaceful groups have a lesser marginal benefit from entering into conflict than their marginal cost, analogous to (4.a), where $\pi_g^{PC} = \pi_g(M_g = 0, \bar{M}_{-g} = \bar{M}_{-g}^*)$. Here it is important to notice that $\pi_g^{PC} < \pi_g^0$ as peaceful groups are being besieged by armed ones, but also total resources Y and the marginal rate of investing in military are smaller than in the peaceful equilibria because there are less resources left to consumption and because of assumption (iv).

$$\frac{\partial \pi_g^{PC}}{\partial M_g} Y \leq \pi_g^{PC} \quad \forall g > \bar{g} \quad (6)$$

On the other hand, from (5.b) it can be obtained the optimal level of military investment (7.a) for each conflictive group k as the best response to the investment of other groups, where $\pi_k^{PC} = \pi_k(M_k = M_k^*, \bar{M}_{-k} = \bar{M}_{-k}^*)$. This optimal level of investment will be positive only if the marginal benefit of investing in that point is greater than the marginal cost, *i.e.*, if condition (7.b) is met, and zero otherwise. In addition, it cannot be higher than S_g .

$$M_k^{BR}(M_{-k}) = \text{median} \left\{ 0; S - \sum_{j \neq k} M_j - \frac{\pi_k^{PC}}{\partial \pi_k^{PC} / \partial M_k}; S_g \right\} \quad (7.a)$$

$$\frac{\partial \pi_k^{PC}}{\partial M_k} (S - \sum_{j \neq k} M_j) > \pi_k^{PC} \quad (7.b)$$

Here the groups investing over the average military investment can be distinguished from those investing under the mean. If they are over the mean, then $\pi_k^{PC} > \pi_k^0$ and their marginal rate of return from military will be lower, making a positive investment an unlikely scenario. An interesting point here is that institutional quality plays an ambiguous role in determining the optimal level of military investment when groups are investing over the mean because it decreases π_k^{PC} because of assumption (vi), but it also decreases the marginal rate of return because of assumption (v). For those groups under the mean, better institutions dissuade military investment unambiguously, though.

When all military investments from (7.a) are aggregated, (8) is obtained, which indicates the optimal level of total investment across conflictive groups.

$$\sum_{j \leq \bar{g}} M_j^* = S - \frac{1}{\bar{g}} \sum_{j \leq \bar{g}} \frac{\pi_j^{PC}}{\partial \pi_j^{PC} / \partial M_j} \quad (8)$$

As stated before, if institutional quality increases, the effective share of disposable income seized by group j will increase only if it invests under the mean and decrease if it is above ($\partial \pi_j^{PC} / \partial q \geq 0$ if $M_j \leq \bar{M}$). The marginal rate of return will always decrease as institutions improve ($\partial^2 \pi_j^{PC} / (\partial M_j \partial q) < 0$). On the other hand, if the incentives for militarize decrease, \bar{g} might also decrease. For the total military investment to be decreasing in institutional quality, condition (9) must be satisfied. This condition implies that the effect of institutions on dissuading the less armed groups must be higher than the aggregate effect of incentives modifications in the most militarized.

$$\sum_{j/M_j \leq \bar{M}} \frac{\partial}{\partial q} \left(\frac{\pi_j^{PC}}{\partial \pi_j^{PC} / \partial M_j} \right) > \sum_{j/M_j > \bar{M}} \frac{\partial}{\partial q} \left(\frac{\pi_j^{PC}}{\partial \pi_j^{PC} / \partial M_j} \right) \quad (9)$$

IV.C. Full conflict

The last possible intergroup equilibrium is one in which all groups invest in military. Here condition (10) can be taken as a sufficient condition. If every group has incentives to invest while none is already armed, then the outcome will be that no group will remain peaceful.

$$\frac{\partial U_{i_g}}{\partial M_g}(M_g = 0, \bar{M}_{-g} = 0) > 0 \quad \forall g \quad (10)$$

In this scenario, the optimal investment should be (7.a) for all groups. If it is unreachable, then their optimal investment should be $M_g^* = S_g$. It is clearly the less efficient equilibrium and also the less likely in the real world. As stated before, there may be small groups with incentives to arm, but it is difficult to believe that the biggest groups would rather invest in military when their

relative gains are minimal. For total conflict to be a credible equilibrium, society must be fractionalized into lots of small groups and must not have any big group. Some African countries are maybe the only examples of these societies.

IV.D. Partitions in the equilibrium

From the intergroup dimension perspective, three possible equilibria have been defined: peace, partial conflict, and total conflict. However, there is another characteristic of equilibria coming from the individual dimension: how partitioned is society and how large is the independent group. That is the main contribution of the individual stage extension of Skaperdas (1992) proposed here.

As stated before, the outside option for leavers has two principal components. On the one hand, people face an expected utility from consumption of $\omega(q)$. On the other, they have to pay a moral cost of leaving related to the strength of their tie with the group λ_g . Independent people do not have their group's shelter, so they can only rely on the state's protection (if there is any), and other facilities like private security and insurance services, which can be assumed to develop when the state correctly enforces property rights. The parameter λ_g is similar to the idea of "cost of conversion" in Botticini and Eckstein's (2007) model for conversions in Jewish history. They state that the longer the history of a community, the more deeply attached its members will feel to their religion. Their argument is used in the next section to empirically test the theoretical predictions of partitions. In line with this assumption, an ethnic group with a strongly marked ethnicity, *i.e.*, composed of lots of Horowitz's (1985) cues, has a larger λ_g .

Considering their outside option and cost of leaving, individuals must then decide whether to remain and obtain their group dividend or emancipate. Given the assumption of homogeneity among group members, all of them would decide the same, giving as an outcome the existence or dissolution of groups and not their sizes. If heterogeneity in wealth were introduced, it would be expected that wealthier people to have incentives to emancipate and poorer ones would find it more attractive to stay, enabling a continuum of possible equilibria. The

conclusions would be the same to the interest of this work, though, so the homogeneity assumption is maintained. The model thus begins with an exogenous set of group sizes and arrives at the conclusion of which groups “survive” and which cease to exist.

As the decision is determined by backward induction at this stage, people’s choices will depend on the expected utility from the intergroup stage previously treated. If there will be a peaceful equilibrium among groups, everyone will obtain invariably one unit of utility. Here, remaining in the group will always be (weakly) preferred to emancipating, as $\omega(q) - \lambda_g \leq 1$. The indifference would only occur under perfect institutions ($q = 1$) and no cost of leaving ($\lambda_g = 0$). If there are some conflictive groups, then some people would prefer to emancipate. The members of those groups investing above the average will obtain a utility higher than one, so they will prefer to stay in the group for sure. Those in groups that invest below the average (or do not invest at all) may prefer to leave the group if condition (11) is satisfied.

$$\omega(q) - \lambda_g \geq \frac{1}{S_g} Y \pi_g(q) \quad (11)$$

Now it is to be noted how the intergroup dimension of equilibrium also depends on (11). If some groups decide to disperse, then S will decrease and also will Y do. Returning to (4.b), it can be found that it will be easier to maintain peace when some groups disappear. The equilibrium will therefore be a peaceful scenario with several independent people. Arriving at this equilibrium would need (11) to be met, in principle. For understanding the effect of institutional quality, it is necessary to look at condition (12). If it is satisfied, then a peaceful non-partitioned scenario will be more likely as institutional quality increases. If (12) is not met, on the other hand, better institutions will promote peace but without tempting people to emancipate. This condition, together with (4.b) are the ones that capture the main results from the model and are empirically tested in the next section.

$$\frac{\partial \omega}{\partial q}(q) > \frac{1}{S_g} Y \frac{\partial \pi_g}{\partial q}(q) \quad (12)$$

What (12) means is that the marginal benefit of having better institutions for independent people should be higher than the marginal benefit for members of the less armed groups. This condition is more likely to be met for larger groups, when total disposable resources are scarce, when the conflict technology is less responsive to changes in institutional quality, and when independent people perceive a higher return to institutional quality. The two last possibilities highly depend on the particular institutional setup of a society.

IV.E. Institutional quality on equilibrium determination

Six possible equilibria were defined. They are combinations of the two categories that emerged from the individual dimension (partitioned or non-partitioned societies) and the three that emerged from the intergroup dimension (peaceful, partially conflictive, or totally conflictive relations among groups). The contribution of the present model is allowing to identify how institutions can determine which of those six equilibria will be the actual one. As Easterly (2001) concluded, better institutions lead to peaceful relations in ethnically diverse societies. This model shows possible mechanisms through which that happens.

First of all, when institutional quality increases, everyone is benefited. Independent people are better protected and their property rights are safer. Insurance companies and security agencies can offer their services at a lower cost. Ethnic groups are also better protected against attacks and pressures from other groups. Therefore, people inside and outside groups are better off.

In big cities and developed countries, there are lots of people who do not identify themselves with any well-defined ethnic group. It can be then concluded that those societies satisfy condition (12), which means that institutional improvements are greater for independent people. It may happen also because the cost of leaving of certain groups is actually low. Israel is perhaps a good example of a high λ_g (Botticini and Eckstein, 2007) because even having formidable institutions, ethnic groups are clearly defined and war goes on.

When the spotlight is placed on intergroup relations, institutions have a more specific effect. Under the proposed assumptions of the conflict technology, better institutions deter investment in military resources by the reduction of its marginal rate of return. However, the final effect is not so straightforward. Better institutions also reduce the marginal cost of the most militarized groups, because they will seize a smaller part of the total available resources. For peace to be a more likely equilibrium as institutions get better, condition (9) must be satisfied, indicating that the effect (reduction) on the marginal gain from military investment must be in the aggregate and in absolute value greater than the reduction on the marginal cost for the most militarized groups. Beyond this discussion, it is also known that as better institutional quality induces emancipation, groups in dispute will be fewer and relatively larger. This secondary effect also helps in the maintenance of peace because of (4.b).

V. EMPIRICAL EVIDENCE. THE MEXICAN INDIGENOUS POPULATION

The main results from the model are captured in equations (9) and (12). The former represents the condition that must be satisfied for an institutional improvement to reduce the aggregate military investment, while the latter is the condition for that improvement to also increase the probability of emancipation. To properly test condition (9) with the data, it would be required to count with measures of military investment and total resources for each ethnic group. Thus, the relationship between institutional quality and the ratios of share of total output seized to the rate of return in the aggregate could be estimated. It may also be checked if the condition is met in that context. Constructing this ideal dataset is quite difficult, however. Equation (4.b) partially reflects a similar result in a simpler way. Instead of showing what should happen for the total military investment to be decreasing in the institutional quality, it states the condition for peace to be a more likely equilibrium. Even though the marginal rate of return to militarization in peace cannot be estimated, under assumption (v) it is decreasing in institutional quality, so the data could actually be used for estimate the probability of condition (4.b) to be met. The group size measure is

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TABLE 1. SUMMARY STATISTICS

	Min	Max	Mean	SD
Non-indigenous	0	1	0.7475	0.3567
ELF index	0	1	0.6036	0.2962
SGRS	0	1	0.0006	0.021
From 25 to 64	0	1	0.3962	0.0761
More than 65	0	1	0.0906	0.0831
Institutional quality	1	2,456	1,228.5	709.1305
Rural population	0	0.988	0.446	0.2842
Poverty	0.087	0.973	0.6742	0.1852
Gini index	0.286	0.591	0.412	0.0395
Illiteracy rate	0.006	0.667	0.1406	0.0968
Education lag	0.031	0.813	0.3417	0.1295
Unemployment rate	0	0.515	0.0451	0.0395
Presence of cartel	0	1	0.4202	0.4937
Homicide rate	0	812.74	7.5891	27.5288
Crime rate	0	3,140	230.5334	300.8012

perhaps the simplest to obtain. This is, however, a rather indirect and weak way of testing the theoretical results of the group-dimension decision-making stage. Condition (12), on the other hand, represents the individual choice of belonging. Here what can be tested is the logical consequent of the condition. If the data show that societies with better institutions are associated with higher emancipation rates, equation (12) may be correct, while if it is not the case, this condition is violated and improvements in institutional quality may not be motivating emancipation.

For empirically testing the theoretical results, I appeal to the municipal almanac developed by the *Observatorio de Desarrollo Regional y Promoción Social* (ODP henceforth). It is an extensive database covering social, economic, and political features from all 2,456 municipalities of Mexico in the year 2015 (or the most recent previous estimations). Mexico is an interesting case of study because of several reasons. First, it has a relatively high level of ethnic

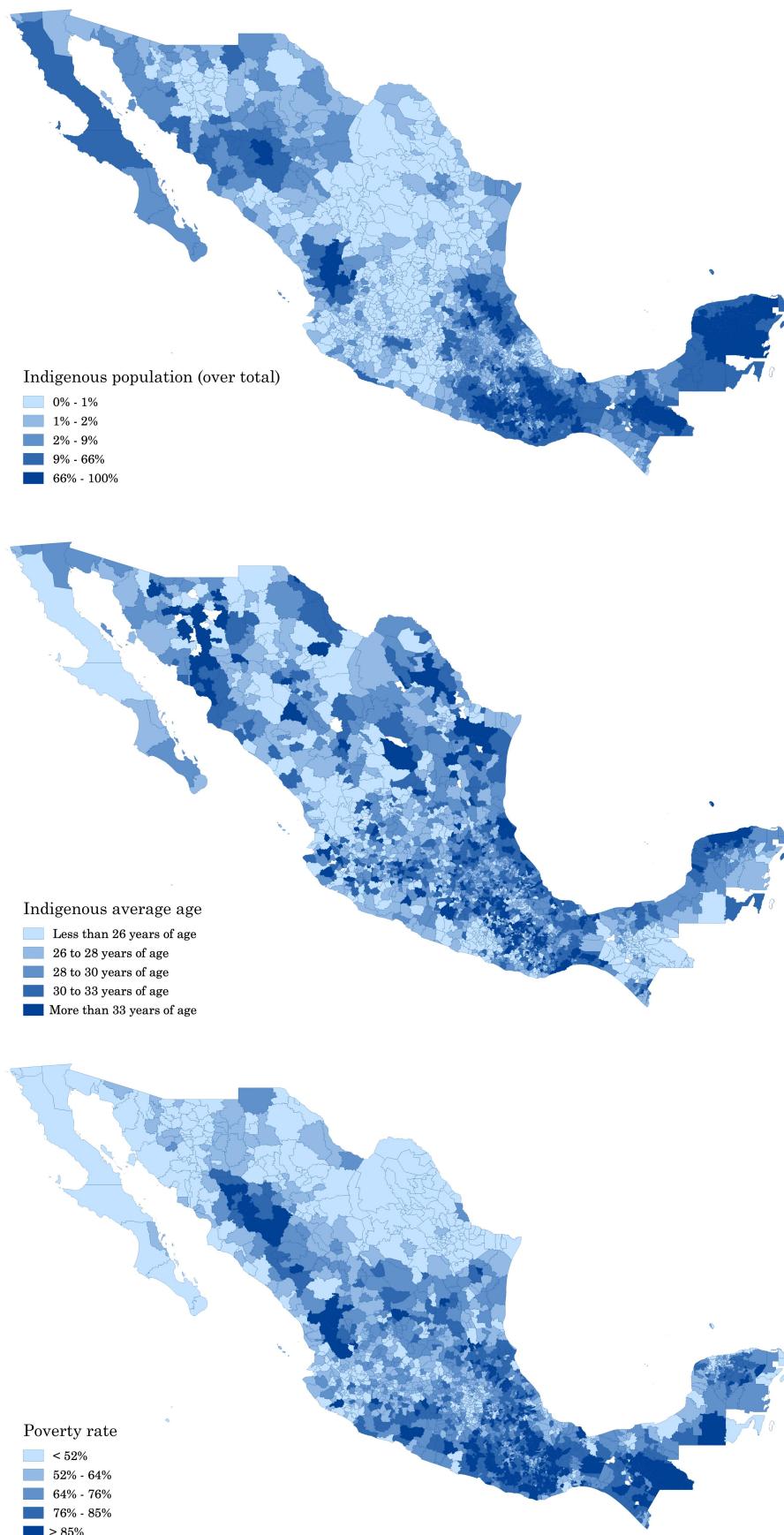
fractionalization at the national level. As Fearon (2003) calculated, Mexico has an ELF index of 0.542, compared to the world average of between 0.43 and 0.48 (based on Fearon, 2003, and Taylor and Hudson, 1972). According to the ODP data, as Table I shows, the average municipal ELF index is close to 0.6 (with a standard deviation of 0.3). Second, the number of observations (2,456) makes inference more reliable in these estimations, even though I do not aim to prove causality because of highly potential endogeneity problems. Third, Mexico has already been studied through the lens of ethnic conflict and development before (Jha, 2018), because of its large and diverse indigenous population (and its relevant quantity of indigenous conflicts).

In this section, indigenous language groups are taken as the ethnic groups and all non-indigenous population as the outsiders. Given that armed ethnic conflict in Mexico in the present is mainly among indigenous groups and not between indigenous and non-indigenous people, it is reasonable to make the analysis in that framework. However, like the rest of the variables, it is a proxy and could not be the optimal measure for the purpose of this study. Moreover, as people do not forget a language when they emancipate, taking the non-indigenous as the emancipated population is more representative of a long-term scenario than of a short-term one. As more people decide to emancipate, fewer children are raised inside ethnic groups. This measure of the emancipation rate is then a sticky one, and the main theoretical results from the individual dimension may not be clearly represented.

V.A. The individual-decision dimension in the Mexican data

As data are at the municipality level, there is not a straightforward way of testing the individual-decision dimension. As mentioned before, however, it is captured in the idea that an improvement in institutional quality positively affects both people inside and outside groups, as shown in equation (12). Therefore, this condition can be actually tested in data. If it is satisfied, then people are expected to emancipate at a higher rate as institutions are better, because the most benefited agents are the independent ones. If equation (12) is actually an equality, then institutional improvements should not affect the rates

FIGURE II. Indigenous communities and poverty



of emancipation. Finally, if the inequality is in the opposite direction, then those people that remain as group members will be the most benefited when institutional quality increases. The strategy followed to test whether or not condition (12) is met is to estimate the relation between better institutional quality and a proxy for emancipation rate controlling for proxies of moral attachment and the quality of the outside option. As stated before, it would be a check of its consequent and cannot be taken as a direct evidence of equation (12).

The ODP constructed a ranking of territorial governance, considering measures of threats to the State, absence of the State, social vulnerability, conflicts over property rights, and political exclusion. It is an endogenous variable for the analysis, so causal effects cannot be warranted, even though many control variables are included. However, it is the most direct available measure for what the model treats as “institutional quality”, in which 1 means that the municipality has the lowest institutional quality and 2,456 is the municipality with the best institutions. A caveat to this measure is that it must be assumed that there are no significant jumps between subsequent ranking positions in terms of institutional quality for the estimates to be reliable. On the other hand, the share of the population not comprehended as indigenous is used as a proxy for emancipation rates. For estimating some kind of attachment (an aggregate of λ_g from the theoretical model), it can be used the share of the indigenous population who are older than 65 years of age. The idea behind this measure is that more aged indigenous populations may have stronger ties to their ethnic “roots”, following Botticini and Eckstein (2007). I also introduce the share of indigenous people between 25 and 64 years of age in the specification, and control for those societies that do not host any indigenous population. To estimate the quality of the outside option (ω in the model), I mainly rely on the percentage of the rural population over the total municipal population and the poverty rate of the municipality. Other controls such as the illiteracy rate, the education lag (share of population older than 15 years of age who did not finish primary education), the unemployment rate, an indicator of the presence of a drug cartel, and the municipal ELF index are included.

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TABLE 2. INSTITUTIONS AND EMANCIPATION

	Non-indigenous population share		
	(1)	(2)	(3)
Institutional quality	0.0001*** (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
IP between 25 and 64 years old	0.4318*** (0.0982)	-0.2310*** (0.0888)	-0.1584*** (0.0590)
IP older than 65	-0.2158** (0.0873)	0.1515** (0.0763)	0.3678*** (0.0529)
No IP	0.2355*** (0.0623)	0.1352** (0.0538)	-0.2254*** (0.0367)
Rural population		0.1508*** (0.0252)	0.0157 (0.0180)
Poverty rate		-1.1356*** (0.0402)	-0.2756*** (0.0455)
Presence of cartel			0.0010 (0.0126)
Illiteracy rate			-2.9692*** (0.1080)
Education lag			1.4000*** (0.0917)
Unemployment rate			0.2366** (0.1056)
ELF Index			-0.4770*** (0.0181)
Constant	0.5166*** (0.0405)	1.5174*** (0.0518)	1.2003*** (0.0710)
State FE	No	No	Yes
Observations	2,456	2,415	2,404
R-squared	0.0396	0.2829	0.7178

Standard errors in parentheses

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

Figures II and III show the geographic disposition of some of these variables. The average age of the indigenous population by municipality is an approximated estimation. That is why it is not included in the model and the empirical cumulative distributions of age are used instead. The estimated model is (13), in which $NoIP_i$ is the share of the population of municipality i that do not belong to any indigenous group, IQ_i is the position of municipality i in the ranking of institutional quality, A'_i is the vector of attachment related characteristics, W'_i is the vector of economic conditions defining the quality of the outside option, ε_i is the error term, and β , λ and ω are the coefficients of interest.

$$NoIP_i = \beta_0 + \beta_1 IQ_i + A'_i \lambda + W'_i \omega + \varepsilon_i \quad (13)$$

Even though this is a quite weak approximation to the result described in equation (12), it may be thought that (13) captures the long-term consequences of what (12) predicts. Table II shows the estimations by OLS of (13) in the individual-dimension empirical approach. Column (1) only considers the institutional quality and ethnicity variables. Here it can be observed that the municipality with the highest institutional quality has a smaller indigenous population than the municipality with the worst institutions by approximately 15.3% of the total population. Even though this relation is significant at the 1% level, all economic contextual variables are being omitted, so the estimation of β_1 may be upward biased and unreliable, because better institutions are supposed to be correlated with economic development and it is expected to be observed in places with less indigenous population. Specifications in columns (2) and (3) include all other variables already mentioned and also fixed effects by state (Mexico is divided into 32 states). It can be noticed thus that the institutional quality loses any significance.

Looking back to equation (12), what the data seem to show is that the positive effects of institutional improvements on the utility of people inside and outside groups may be balanced or, at most, the outsiders may be the most benefited (in that case, better institutions would lead to emancipation, as it would be expected in the theory). The conclusions here lead to neutralized effects

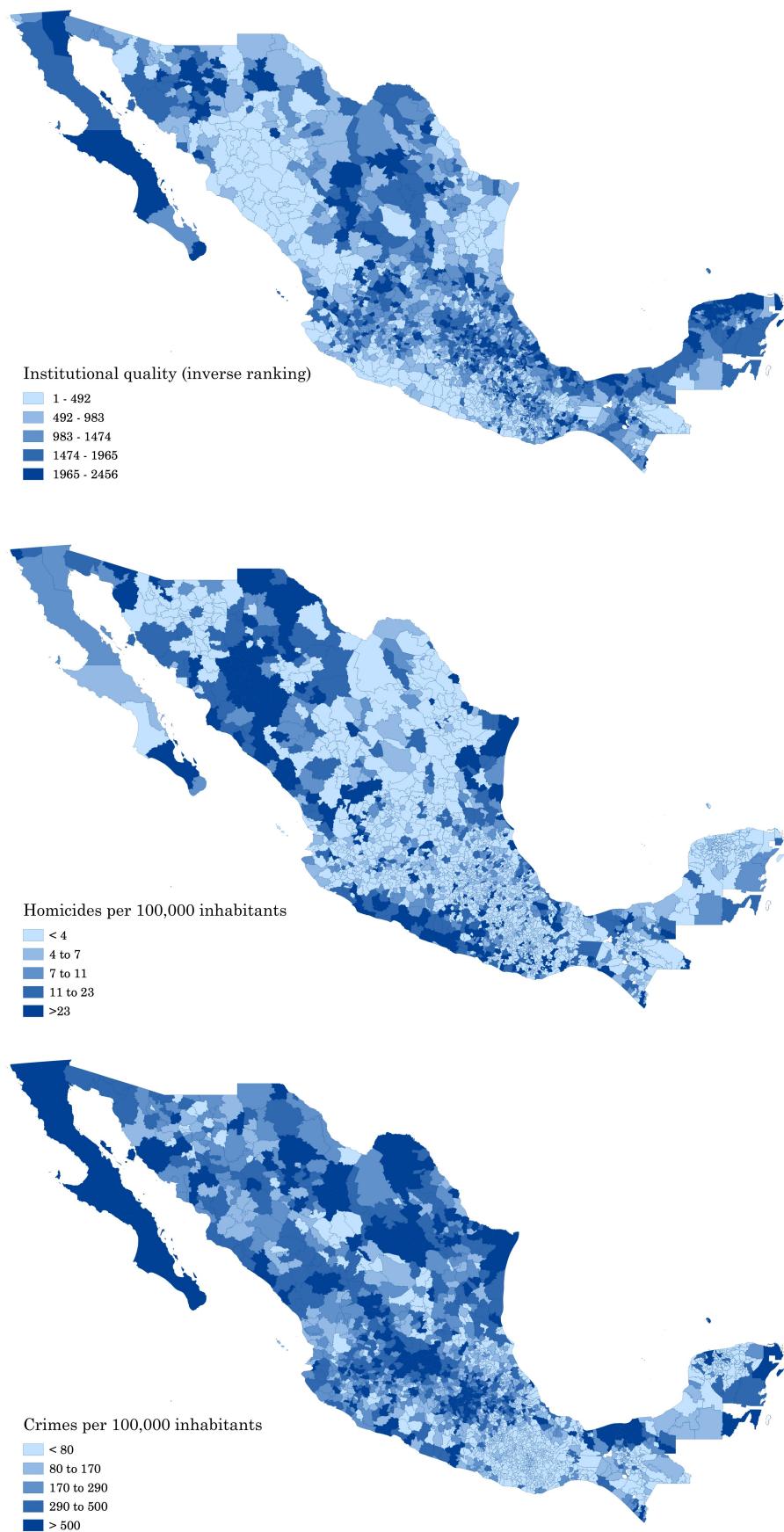
of institutions on the determination of partitions. Therefore, if institutions reduce ethnic conflict, as Easterly (2001) suggests, the main effect should be seen in the group-decision dimension in the Mexican data. It is worth noting that these estimations rely on weak proxies for all relevant variables. The optimal estimations would require data on the true rates of emancipation, which is time-varying in nature and is probably not in any large-scale dataset like the one from the ODP. An ideal dataset would have therefore panel variability and consider information about changes in institutional quality and emancipations from ethnic groups. Even so, institutional quality may still be endogenous with high probability and, as the bias has not a clear direction, the result predicted from equation (12) is not obvious. For example, institutions could be better in less fractionalized societies (as proposed by scholars like Easterly and Levine, 1997), and then β_1 could have a positive bias which may be counteracting with a negative effect of institutions on emancipation. These are some of the most significant problems of counting on a far from ideal dataset, as stated before.

V.B. The group-decision dimension in the Mexican data

Even though the Mexican data do not clearly support the result of the institutional incentives to emancipate, institutions can still reduce conflict through the typical intergroup channel. As stated in equation (9), the aggregate effect of institutions over the cost of militarization for the less armed groups must be greater in absolute value than the aggregate effect over the marginal cost of military investments for the most armed groups. Given that it is not a directly testable result, condition (4.b) can be used instead for the empirical test of the group-decision dimension results.

When condition (4.b) is satisfied, peace becomes the actual equilibrium. The left-hand side of the condition, the marginal rate of return from militarization, must be lesser than the relative size of the group (the right-hand term). If this condition is met for the smallest group, then it will also be for the rest. Under assumption (v), a better institutional arrangement would reduce the rate of return from military investment (the left-hand term), discouraging groups from entering into conflict. The right-hand term does not directly depend on

FIGURE III. Institutions and crime



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TABLE 3. INSTITUTIONS, SMALLEST GROUP RELATIVE SIZE, AND CRIME

	Homicides per 100,000 inh.		Total crimes per 100,000 inh.	
	(1)	(2)	(3)	(4)
Institutional quality	-0.008*** (0.001)	-0.009*** (0.001)	0.027*** (0.009)	-0.064*** (0.006)
$\min_g \{S_g/S^2\}$	-15.609 (28.747)	-13.129 (26.807)	-61.635 (319.675)	-368.515** (182.580)
$\text{IQ} * \min_g \{S_g/S^2\}$	-0.019 (0.082)	0.002 (0.078)	0.081 (0.906)	-1.062** (0.534)
No IP share		5.313** (2.376)		11.255 (16.182)
Rural population		-6.743*** (2.382)		-181.010*** (16.226)
Poverty rate		-15.764*** (5.979)		-310.328*** (40.721)
Gini index		48.178*** (15.224)		270.692*** (103.688)
Presence of cartel		1.238 (1.664)		87.726*** (11.336)
Illiteracy rate		18.276 (16.253)		463.528*** (110.695)
Education lag		-20.863* (12.592)		-671.925*** (85.766)
Unemployment rate		-2.120 (13.860)		-34.749 (94.400)
Constant	16.943*** (1.091)	7.453 (11.018)	197.270*** (12.136)	923.458*** (75.044)
State FE	No	Yes	No	Yes
Observations	2,456	2,402	2,456	2,402
R-squared	0.038	0.131	0.004	0.665

Standard errors in parentheses

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

institutions. The smallest ethnic groups will have more incentives to militarize since they are the ones with the maximum relative gain from conflict. As the smallest group is even smaller, the probability of condition (4.b) to be satisfied is lower for any given level of q . If the smallest group is not too small in relation to the rest of the ethnic population, then institutions might be relevant in the definition of the equilibrium. The ODP data allows the estimation of a measure for the smallest group relative size as it is presented in equation (4.b) for each municipality, *i.e.*, $\min_g\{S_g/S^2\}$. Again, with the territorial governance index as a proxy for institutional quality, model (14) can be estimated.

$$\text{Conflict}_i = \beta_0 + \beta_1 IQ_i + \beta_2 SGRS_i + \beta_3 IQ_i \times SGRS_i + X'_i \gamma + \varepsilon_i \quad (14)$$

A second central obstacle emerges here. There is not a fit measure of conflict, so we must rely on imperfect proxies as total crime and homicides. These are not ideal measures of conflict at all, because the fraction of crimes caused by interethnic confrontations cannot be distinguished. Mexico is furthermore plagued with organized crime activities, such as drugs and arms trafficking. Hence even after controlling for many economic variables and the presence of organized crime, the estimations of the model cannot be taken as blindly reliable.

Total crimes include extortions, assaults, burglaries, robberies, muggings, kidnappings, and homicides. Both measures are used here as proxies of Conflict_i . As before, IQ_i is the position occupied by municipality i in the territorial governance index ranking (ascending in institutional quality). $SGRS_i$ is the measure of $\min_g\{S_g/S^2\}$ for each municipality, and X'_i is a vector of control variables such as the share of the population outside indigenous groups, the Gini index, and all the variables in W'_i from (13). Coefficient β_1 captures lots of effects of institutions on crime apart from the reduction in ethnic conflict. Crime is expected to reduce when institutions improve in any context. On the other hand, as the IQ index is constructed using variables related to political instability, β_1 may be overestimated because of a problem of reverse causality. Coefficient β_3 is what really matters for testing equation (4.b), as explained below. Figure III shows the level of crime of each municipality measured as the number of

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TABLE IV. INSTITUTIONS, FRACTIONALIZATION, AND CRIME

	Homicides per 100,000 inh. (1)	Homicides per 100,000 inh. (2)	Total crimes per 100,000 inh. (3)	Total crimes per 100,000 inh. (4)
Institutional quality	-0.013*** (0.002)	-0.011*** (0.002)	-0.003 (0.018)	-0.063*** (0.012)
ELF index	-21.850*** (3.723)	-9.919** (4.273)	-451.228*** (37.932)	-58.681** (29.151)
IQ * ELF index	0.009*** (0.003)	0.005* (0.003)	0.019 (0.026)	0.002 (0.018)
No IP share		3.336 (2.658)		-14.943 (18.132)
Rural population		-6.311*** (2.389)		-175.213*** (16.298)
Poverty rate		-15.395** (5.985)		-299.747*** (40.829)
Gini index		47.717*** (15.223)		289.600*** (103.850)
Presence of cartel		0.974 (1.668)		84.850*** (11.379)
Illiteracy rate		19.745 (16.343)		444.618*** (111.490)
Education lag		-20.669 (12.620)		-658.888*** (86.092)
Unemployment rate		-0.057 (13.874)		-14.783 (94.645)
Constant	30.950*** (2.595)	15.156 (11.515)	493.561*** (26.440)	954.484*** (78.555)
State FE	No	Yes	No	Yes
Observations	2,456	2,402	2,456	2,402
R-squared	0.057	0.133	0.180	0.665

Standard errors in parentheses

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

homicides and the number of total crimes per 100,000 inhabitants in the year 2015.

Table III shows the estimations of (14) by the OLS method. Columns (1) and (2) are the specifications with the homicide rate as the dependent variable, with and without controlling for X'_i . Columns (3) and (4) show the same estimations treating the total crime rate as the dependent variable. The effect of the smallest group relative size also negative and significant in the last specification, supporting the interpretation of condition (4.b). On the other hand, the significant negative relation between institutional quality and both measures of crime shows that institutions seem to reduce crime. As the territorial governance index is constructed considering variables related to crime (as threats to the state) it is an upward biased estimation. Moreover, the effect of institutions on crime is clearly broader than the present discussion. Institutional improvements dissuade crime under any ethnic and social arrangement. The interaction between IQ_i and $SGRS_i$ is what matters to the analysis, therefore. It can be interpreted as how the institutional effect changes according to the municipal ethnic composition. Condition (4.b) states that a better institutional setup will have a more significant effect as the smallest group is relatively larger. In that way, the negative estimation of β_3 can be interpreted as condition (4.b) is actually working on the data. As the smallest group is relatively larger, institutional improvements have a stronger effect on the reduction of crime.

Table IV presents the same estimations replacing $SGRS_i$ with the ethnolinguistic fractionalization index. From the aggregation of (4.b) across groups, condition (15) can be obtained. This is a necessary but not a sufficient condition for (4.b) to be met for all groups. Even under (15), some of the smallest groups may not be satisfying (4.b).

$$\sum_{g=1}^G S_g \frac{\partial \pi_g^0}{\partial M_g} \leq 1 - FI \quad (15)$$

Under condition (15), a higher fractionalization index implies that peace will be a less likely event, and institutional improvements will also have less

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effect. Again, the empirical test of condition (15) is weak and, furthermore, is about a more relaxed condition than (4.b). In column (1) of Table IV, data seem to support this result, but in the rest of the specifications, it does not seem to have a significant effect. It may be because condition (15) is more relaxed than (4.b). As a matter of fact, contrary to the literature on ethnic diversity and conflict, ODP data shows a negative relation between fractionalization and crime. It might be because of some kind of endogeneity. Crime is highly correlated with the presence of organized crime in Mexico, and the most fractionalized municipalities are those in which organized crime is not present (there is a negative correlation of 0.34). Even controlling for the presence of drug cartels, there might be other variables of this nature generating biases in the estimation of β_2 . If highly fractionalized societies were more prone to have relatively larger groups (and less likely to have minorities), then these results might be supporting the initial hypothesis.

VI. CONCLUSIONS

As Easterly (2001) concluded, institutions seem to help in the dissuasion of ethnic conflict. In line with his results, these pages covered some of the mechanisms through which that may be the case. For a better understanding of this process, I developed a theoretical model based on Skaperdas (1992) and tested its predictions with Mexican data at the municipality level. The main hypothesis here is that institutions not only plays a role in shaping the relationships between ethnic groups but also may determine the decision of people to abandon their groups and become “independent” ones.

Under the proposed assumptions, the theoretical predictions derived from the model indicate that a higher institutional quality improves the situation for everyone. From the perspective of the individual dimension, people who opt for emancipation face a higher outside option utility as institutions improve because of safer property rights and implicit improvements in general economic conditions, but those who decide to stay also face a better prospect inside the group. The data from Mexico seem to show that the two effects balance each

other out. On the other hand, from the group-decision perspective, as military investment turns ineffective, there are fewer ethnic groups prone to initiate conflict. The model also predicts that the groups more likely to arm themselves are the smaller ones, which face a greater marginal net benefit from obtaining resources from harassment. In this sense, it could be expected to find that institutional quality is more effective in conflict dissuasion as the smallest groups are relatively larger (no minorities). The Mexican data seem to support these results, but what is found is not the cleanest or most straightforward.

In further research, the most relevant next step would be to find better data for the empirical tests. The most important measures to look for should be actual emancipation rates, rates of crime related to ethnic conflict, and some more direct institutional quality, rather than a ranking. With a better dataset, it may be possible to check for robustness of the empirical results and find clearer stylized facts.

Other relevant further deepenings would be to check how theoretical predictions change if some underlying assumptions are modified. In the first place, how the equilibria could change if heterogeneity in wealth among groups, or even among members inside each group is allowed. I ventured to forecast that the main results would remain unchanged, but there is more to learn about the heterogeneous effects and the relations between ranked groups.

To sum up, it can be thought that as time goes by and as institutions and economic conditions develop, it would be more likely to find a sustained decrease in ethnic conflict. If the cost of cooperation becomes lower and the quality of life for independent people gets better, then we could arrive at either homogenous and globalized societies or fractionalized but peaceful ones.

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