

# **The Motivating and Mobilizing Effect of Inequality on Civil Conflict**

By

**Hye-Ryoung Jung**

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**The Dual Causal Effects of Social Capital  
on Political Violence: Evidence from Africa**

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**The Socio-Economic Effect of Community-Driven Development  
in Conflict-affected Communities: Evidence from Cambodia**

By

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# Chapter 1

## The Motivating and Mobilizing Effects of Inequality on Civil Conflict

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### Abstract

*This study has two aims: 1) to identify the causal effect of income inequality on civil conflict and 2) to find the mechanism by which deprived individuals mobilize collective violence. Applying the Heckscher-Ohlin and Stolper-Samuelson theorems, this research documents a statistically significant causal effect of inequality on conflict by exploiting exogenous time variation in inequality due to tariff changes from 1989 to 2016 and its cross-sectional variation in factor endowments across 111 countries. To identify the mobilizing effect of inequality, this study tests whether the disequalizing income changes within the group facilitate the mobilization of labor and finance for civil conflict. Using a microlevel dataset of nearly 115 million individuals from 221 ethnic groups, the analysis finds that when holding total ethnic income constant, trade-induced within-group inequality that is proxied by the unemployment rate is strongly correlated with the groups propensity to precipitate conflict.*

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## I Introduction

Whether economic inequality causes social unrest is one of the most enduring questions in social science. Ever since Marx and Engels (1848) claimed that widespread discontent over high inequality along the class cleavage is the source of internal conflict, many researchers have sought empirical evidence of uneven wealth distribution's causal impact on political violence (Esteban & Ray, 2011b; Fajnzylber, Lederman, & Loayza, 2002). However, meta-analyses have found that causal estimates from macro quantitative studies are unclear and inconsistent (Fearon & Laitin, 2003; Lichbach, 1989; Nygard et al., 2017). Lichbach(1989, 464) states that "the statistical modelers have revealed that no clear answer about the economic inequality and political conflict nexus exists. Economic inequality is neither necessary, sufficient, nor clearly probabilistically related to [political] dissent." Fearon and Laitin (2003, 85) concur that "the Gini coefficient estimates of income inequality do not come close to either statistical or substantive significance [in relation to civil war]."

Emphasizing the cleavage generated by ethnic origin, instead of class, a body of contemporary research attributes the literature's failures to misconceptualizations of inequality, rather than to, the absence of a causal relationship between income inequality and civil conflict. The explanatory focus, therefore, must shift from vertical (between households or individuals) to horizontal (between groups) inequality (Cederman, Weidmann, & Gleditsch, 2011; Østby, 2008; Stewart, 2005). However, given that horizontal inequality theory equates an individual's motivation to participate in insurgency (relative deprivation) with a feature of his/her group (being relatively deprived), its causal mechanism parallels the Marxian paradigm. Both theories explain that the relative deprivation based on inter-group comparisons breeds individual resentment, which then raises the group (class) consciousness by the sharing of grievances against the privileged opponents (capitalists); this group consciousness provokes group (class) mobilization for violent collective action. Empirically, although studies of horizontal inequality substantiate the association between inter-group inequality and civil conflict (Cederman et al., 2011; Østby, 2008), it is debatable whether this correlation represents a valid causal relationship. The ordinary least squares (OLS) estimation that horizontal inequality literature relies on cannot address endogeneity issues, including reverse causality, or joint determination, which results in distorted estimates

in both directions that are ambiguous *ex ante*. Moreover, omitted variable bias, stemming from insufficient controls in its identification models, undermines the accuracy of the estimates due to confounding factors possibly creating spurious relationships.

While maintaining the reduced-form prediction that greater inequality increases the probability of civil conflict, this study proposes alternative frameworks that specify the causal mechanisms of inequality on conflict by differentiating the effects according to their influence domain. The first effect of inequality is on individual's inclination to engage in conflict, while the second effect makes the group condition feasible for the mobilization of conflict resources. Addressing the first effect, this study integrates a general equilibrium model of social conflict (Dal Bó & Dal Bó, 2011) with international trade theorems on the distributional effect of trade (Spilimbergo, Londoño, & Székely, 1999; Stolper & Samuelson, 1941). This combined framework captures how trade-induced inequality lowers the opportunity cost of fighting along the structure of factor ownership, leading marginalized workers to rebel. Regarding the mobilizing effect, this study examines within-group heterogeneity dynamics in an inter-ethnic group competition context (Esteban & Ray, 2008, 2011b; Gavrillets & Fortunato, 2014; Olzak & Shanahan, 1996). Increasing intra-group income heterogeneity facilitates the provision of inputs for conflicts since the rich have more resources to mobilize combatants, while poor workers can be mobilized at lower cost (Esteban & Ray, 2011b). These voluntary provisions are provoked when inter-group competition is intensified over niches shared by similarly ranked people from different ethnic groups. Based on these theoretical foundations, the second framework for the mobilizing effect suggests that within-group inequality, rather than the between-group inequality, makes the group more likely to precipitate civil conflict (Esteban & Ray, 2008, 2011b).

This study's major contribution is the development of a strategy documenting the causal mechanisms of inequality on internal conflict. Because of data availability, econometric analyses are designed differently for each level of influence domain, but reveal coherently connected causal mechanisms. The first identification strategy is the two-stage least squares (2SLS) estimation of which instrument aligns with the Heckscher-Ohline and Stolper-Samuelson theorems. As the theorems explain how trade determines the level of inequality conditional on a country's factor endowments, this study exploits exogenous time variation in tariffs from 1989 to 2016, and spatial variation in relative land abundance to labor across 111 countries to estimate the

causal effect of inequality on civil conflict. Technically, this instrumental variable (IV) approach addresses the chronic endogeneity issues that have plagued previous literature and solves the measurement errors embedded in the dataset creating attenuation bias; thus, it enables the generation of larger in magnitude and more precise causal estimates of inequality on conflict than OLS estimates (Blattman & Miguel, 2010; Jong-Sung & Khagram, 2005; Nygard et al., 2017; Ray & Esteban, 2017). As an extension of the IV estimation, the second strategy explores the heterogeneous causal effect of inequality conditional on context with low/high employment or ethnic fractionalization. The results are used to validate the assumptions underlying the first and second frameworks, that the unemployed and ethnic groups are the channels of the causal mechanism. Employing the measure of within-group inequality configured by the channels, the third strategy identifies the effect of within-group inequality, which is proxied by the unemployment rate, on the group's tendency to incite civil conflict. The key aspect of this strategy lies in the merged data of three different datasets. With two sets of ethnic-level data of each group's conflict history and socioeconomic status, this study merges the microlevel dataset from IPUMS, international census data, covering 114,860,614 individuals from 221 ethnic groups in 44 countries. Merging this microlevel data with ethnic-level conflict records yields a unique data containing the most intensive collection of within-ethnic group demographic characteristics and the group's conflict history observations used to date, enabling this study to make a direct examination of the conflict mobilizing effect of within-group inequality.

The remainder of this paper proceeds as follows. Section II presents the conceptual frameworks for the motivating and mobilizing effects of inequality on civil conflict. Based on the frameworks, this paper describes a different identification strategy for each of inequality effects on conflict in Section III. Section IV and section V present the data of two levels of analyses with descriptive statistics and explains the results of the motivating and mobilizing estimations. Section VI offers concluding remarks with policy implications.

## II Conceptual Frameworks

### A Motivating Effect of Inequality

The Heckscher-Ohlin and Stolper-Samuelson theorems provide a theoretical foundation for the ways in which income distribution is systematically determined by factor endowments and trade (Ahlquist & Wibbels, 2012; Stolper & Samuelson, 1941). The most critical element of the theorems to predict inequality is the change of relative factor prices after international trade because it creates winners and losers along the factor ownership structure within the country. Generally, the ownership of land tends to be easily concentrated among very few people because of no upward limit to their accumulation per capita, whereas labor is endowed to one unit to every individual from birth to death; therefore, if the land-rich country specializes in exporting land-intensive commodities and subsequently the trade raises the relative price of land to labor, the wealth of this country becomes concentrated in the hands of a few landowners. However, if a country is labor-rich and expands trade, trade returns are distributed across almost the whole population, which leads to a more egalitarian society (Ahlquist & Wibbels, 2012; Spilimbergo et al., 1999). Schematically, the systemic effect of trade on income distribution can be presented as the following equation (1).

$$\left( \frac{R}{L} \times \frac{1}{tariff} \right) \propto \Delta \frac{P_R^t}{P_L^t} \propto Inequality \quad (1)$$

where  $1/tariff$  captures the level of trade openness, and  $R$  and  $L$  denote the total physical amount of land and the total number of workers in a country. Thus  $R/L$  indicates the ratio of relative factor abundance of land to labor of the country.  $P_R$  and  $P_L$  denote the factor price of land and that of labor respectively, and  $\Delta(P_R^t/P_L^t)$  is the change of the relative price of land to labor after international trade. As all components are connected with proportionate relationship, equation (1) describes that inequality is positively correlated with relative factor abundance of land to labor and trade openness.

Having identified the relationship between trade and inequality, this study incorporates this into the theory of the opportunity cost of insurrection. The general equilibrium model of social conflict (Dal Bó & Dal Bó, 2011) explains how price shocks to productive sectors generate civil

conflict by lowering the opportunity cost of fighting. This study substitutes price shocks in the model with the effect of trade on relative factor prices and explains how inequality driven by trade and factor endowments causes conflict in terms of the opportunity cost.

The conflict model (Dal Bó & Dal Bó, 2011) considers an economy that has productive sectors and one appropriation sector (i.e., rebellion). It is assumed that productive sectors use labor and land as inputs and have technologies characterized by constant returns to scale.<sup>1</sup> The firms are assumed to exhaust the value of production and clear factor market while appropriation sector uses only labor and redistributes outputs of the productive sectors. Given the technology, output prices ( $p_1$  and  $p_2$ ), and factor endowments (R and L), the equilibrium model determines the output production level ( $q_1$  and  $q_2$ ) and the rental prices of factors before specialization by trade ( $P_R$  and  $P_L$ ).

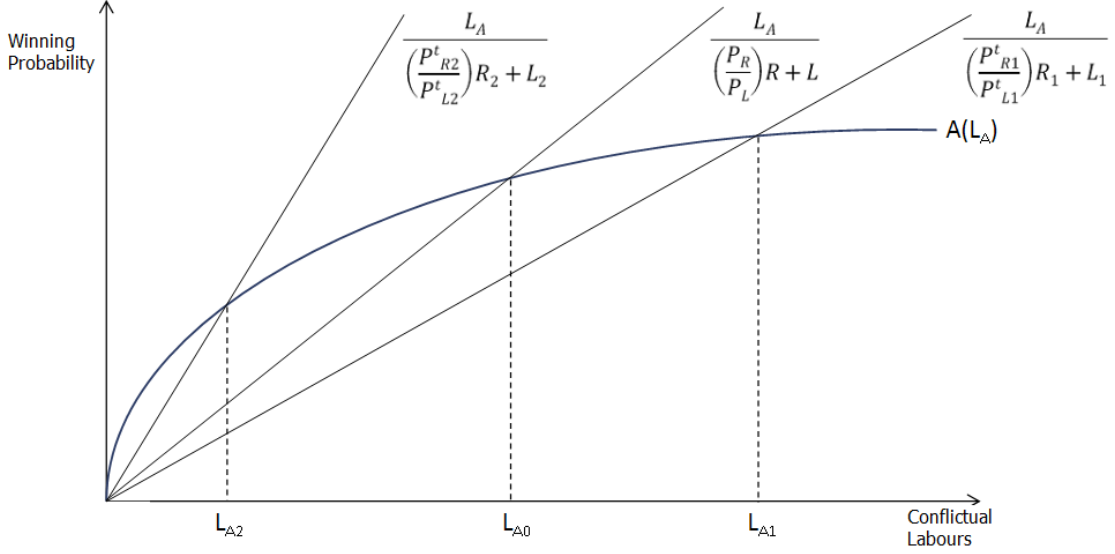
$$A(L_A)[p_1q_1 + p_2q_2] = A(L_A)[P_RR + P_L(L - L_A)] \quad (2)$$

where the function of  $A(L_A)$  specifies the fraction of the total value of production ( $p_1q_1 + p_2q_2$ ) that is obtained when  $L_A$  units of labor are participated in rebellion as combatants. For convenience, the model assumes the production function of appropriation ( $A(L_A)$ ) is concave, which reflects diminishing returns to labor.<sup>2</sup> As the expected total benefits are determined by the function of supplied labor  $A(L_A)$ ,  $A(L_A)$  can be regarded as the winning probability of civil conflict. Thus,  $A(L_A)[p_1q_1 + p_2q_2]$  indicates the expected total looting benefit when  $L_A$  units of labor are devoted in the conflict. Under the assumptions that the factor market is clear and firms have zero profits, the expected benefits of civil conflict can be rewritten as the right side of equation (2).

To obtain the returns of an individual who engages in insurrection, equation (3) divides the total looting benefit with the number of workers participating in conflict ( $L_A$ ). At equilibrium, this is equal to the returns when the individual is employed by the productive sectors – the wage ( $P_L$ ) net of conflict losses,  $[1 - A(L_A)]P_L$ . In other words, the left-hand side of equation (3) indicates the individual's expected benefit from looting, and the right hand side is the opportunity cost of engaging in insurrection. Equation (4) rearranges equation (3) in terms of the production function of the appropriation sector,  $A(L_A)$ . Given the concave function of  $A(L_A)$  and fixed factor

<sup>1</sup>To connect the theory of trade, this study modifies the model of Dal Bó et al (2011) by replacing capital with land.

<sup>2</sup> $A(L_A)$  represents a concave function with  $A(0) \geq 0$  and  $A(L) \leq 1$ . The assumption of concavity is for convenience, so a similar result will be obtained even when assuming a linear function (Dal Bó & Dal Bó, 2011).



**Figure 1:** Relative Factor Prices and Supply of Labor to Conflict

endowments, equation (4) indicates that the number of workers devoted to the appropriation sector is determined by the relative price of land to labor.

$$\frac{A(L_A)}{L_A} [P_R R + P_L (L - L_A)] = [1 - A(L_A)] P_L \quad (3)$$

$$A(L_A) = \frac{L_A}{\left(\frac{P_R}{P_L}\right) R + L} \quad (4)$$

As presented in equation (1), the relative factor price of land to labor can be regarded as the parameter of inequality. This implies that the amount of labor in appropriation sector ( $L_A$ ) determined by the relative factor prices are also affected by inequality. Figure 1 summarizes this relationship. The intersection of the concave function,  $A(L_A)$ , and the linear function of  $L_A / ((P_R / P_L) R + L)$  indicates the units of laborers who choose to join the rebellion instead of working in the productive sectors. Since the initial relative factor prices reflect the price before specialization by trade, the relative price land to labor ( $P_{R1}^t / P_{L1}^t$ ) increases when a land-abundant country (Country 1) expands its trade, thus generating a more gradual slope of linear function than before the trade; consequently, trade in land-rich countries increases the amount of labor engaging in internal strife ( $L_{A1} > L_{A0}$ ). However, if the labor-abundant country (Country 2)

opens trade, the relative price of land to labor decreases, making the slope steeper and ultimately lowering the amount of labor engaging in conflict ( $L_{A2} < L_{A0}$ ).

$$\left( \frac{R}{L} \times \frac{1}{tariff} \right) \propto \Delta \frac{P_R^t}{P_L^t} \propto Inequality \propto L_A \quad (5)$$

As equation (5) shows, from the finding that the relative factor price of land to labor after trade ( $P_R^t/P_L^t$ ) is proportionally related to inequality, inequality would raise the probability of conflict by increasing the number of workers engaged in rebellion ( $L_A$ ).

In a more practical interpretation, as the land-intensive sectors have very limited capacity to absorb workers, the fewer job opportunities land-rich countries provide, the more they reduce tariff rates; as a result, the unemployed workers tend to choose to join rebellions of which the expected benefits outweigh the returns of working in the productive sectors. For better understanding, I describe the case of Nigeria, which has experienced this causal chain. Nigeria was integrated into the global economy in late 1980s by lowering its tariff rate. As a land-rich country, Nigeria developed land-intensive sectors to promote exports. However, access to land ownership is restricted and the creation of quality jobs in the agricultural sector cannot keep up with the increase in the young population (Adesugba & Mavrotas, 2016). As a result, Nigeria's structural change driven by international trade has failed to provide a sufficient source of income to working age labourers while trade benefits disproportionately accrue to the limited numbers of the land owners, exacerbating uneven distribution of individual wealth; consequently, these unemployed youths marginalized in labour market were appeared to participate in militarized struggles (Oyefusi, 2010). From the preceding logic, the first hypothesis can be derived as follows:

**Hypothesis 1** Trade-induced inequality, which lowers the opportunity cost of fighting for workers, causes conflict by raising the supply of combatants.

## **B Mobilizing Effect of Inequality**

The first framework elaborates how inequality motivates individuals to fight, especially if they have been marginalized in the labor market. The increase in the supply of combatants, however, can be a necessary but not a sufficient condition for conflict. If the poverty concentration in certain groups necessarily leads to the deprived group igniting political unrest, economic class

divisions should be the main cause of internal conflict; yet, the cleavage in many conflicts is ethnic in nature (Esteban & Ray, 2008, 2011b; Esteban, Mayoral, & Ray, 2012; Fearon & Laitin, 2000).<sup>3</sup> Thus, the second framework focuses on the role of inequality through the models of interactions among heterogeneous members of the group and between their counterparts in other groups.

Within a group, the collective action dilemma is inevitable when mobilizing rebels, which entails a high risk with uncertain future benefits. Rationality requires inaction, because the benefits derived from the conflict redound to all members, while the costs of participation are paid only by those who join the collective violence (Lichbach, 1998). The classic literature on collective action argues that within-group heterogeneity, not homogeneity, resolves the dilemma because heterogeneity increases the likelihood that a critical mass of large contributors will emerge to initiate the action (Bergstrom, Blume, & Varian, 1986; Heckathorn, 1993; Oliver, 1993). Here, heterogeneity encompasses such factors as diverse interests in public goods, with different types or amounts of resources to contribute. Thus, larger heterogeneity increases the number of those who deviate from the average, such as highly motivated or highly resourceful individuals, who become a critical mass paying all start-up costs and inducing widespread collective action, even though most people pay little or nothing (Heckathorn, 1993).

These accounts focusing on intra-group interaction explains how within-group inequality generates more feasible conditions for voluntary contributions. Competition theory, meanwhile, elucidates why individuals contribute resources for the pursuit of aggressive collective violence, rather than the promotion of inter-ethnic cooperation. From the theoretical perspective, the existence and the level of overlapping niches between groups are the main determinants of inter-ethnic group competition (Barth, 1998; Olzak & Shanahan, 1996). Once a within-group hierarchy is established, the wealthy elites compete against elites in different ethnic groups, rather than against their own group-members, to obtain more political domains shared with the same-rank elites from other groups (Gavrilets & Fortunato, 2014). Similarly, the poor laborers compete against the same-skilled laborers in other groups over shared niches, such as job markets for manual labor. In this context of inter-group conflicts, Esteban and Ray (2011a) further clarify the

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<sup>3</sup>There is considerable evidence to counter the deprivation theory, in that smaller, rather than larger, wealth differences across groups have greater potential for generating conflict since a larger economic disparity between groups limits the amount of material resources available to the poor group, and consequently diminishes its belief in the likelihood of success of collective violence (Jenkins & Perrow, 1977; Mitra & Ray, 2014; Muller, 1985; Olzak & Shanahan, 1996; Ray & Esteban, 2017).



within-group heterogeneity dynamics. The authors argue that "effectiveness in conflict requires various inputs, most notably bodies as well as financial resources" (p.497). The interdependence of money and body provides the insight that inequality may create a synergy by reducing both types of opportunity costs – human and financial – that are to be incurred for inciting conflict. This is because disequalizing income changes within a group put more money in the hands of potential financial contributors, enabling the richer members to mobilize combatants at lower cost: thus, they induce larger financial contributions from the rich and increased labor contributions from the poor. For this reason, greater within-group inequality facilitates the mobilization of resources for conflict.

Applying the group-level dynamics of resource mobilization (i.e., within-group inequality) to the condition that motivates individuals to engage in conflict, the coherent mechanisms of inequality can be revealed by focusing on the situation of shrinking labor market due to trade. As shown in the first framework, the reduction of job opportunities after opening trade in land-rich countries increases the supply of labor devoted to conflict by lowering their opportunity costs of fighting. As the shrinking job market also intensified inter-group competition among same-skilled labor, ethnic group's political elites exploit these heightened inter-group antagonisms and lower costs of recruiting combatants to provoke the rebellion as a means of grabbing power or defending their political positions from their rivals (Fearon & Laitin, 2000; Esteban & Ray, 2011a; Olzak & Shanahan, 1996).

Therefore, from the models of within-group heterogeneity dynamics in the inter-group competition context, this study postulates that greater inequality within the ethnic group facilitates the mobilization of resources for collective action and the collective action becomes violent against other groups when the inter-group competition over the shared niches is intensified. Focusing on high unemployment as a consequence of the shrinking labor market due to trade, this study can derive the hypothesis about the group-level mobilization coherently connected to the first conceptual framework.

**Hypothesis 2** The rise in within-ethnic group inequality, driven by the higher unemployment rate, increases the ethnic group's propensity for conflict.

### III Identification Strategy

#### A Identifying Motivating Effect and Causal Relations

Anchoring the first conceptual framework, this section presents empirical strategies that can address endogeneity issues to identify the causal effect of inequality on civil conflict. The first empirical specification exploits spatial variation in inequality driven from factor endowments across countries and time variation in inequality from changes in tariff rates from 1989 to 2016. Using these two sources of exogenous variation together, this analysis constructs an instrument – the interaction term of factor endowments and tariff rates. Equations (6) to (7) present each stage of 2SLS estimation.

$$Inequality_{ct} = \alpha \left( Factor_{ct} \times \frac{1}{Tariff_{ct}} \right) + X'_{ct}\Pi + \delta_c + \theta_t + \lambda_{ct} + v_{ct} \quad (6)$$

$$Conflict_{ct} = \beta Inequality_{ct} + X'_{ct}\Pi + \delta_c + \theta_t + \lambda_{ct} + \epsilon_{ct} \quad (7)$$

where index  $c$  denotes countries and  $t$  denotes years.  $Inequality_{ct}$  is the endogenous variable of interest, the level of income inequality measured by the Gini coefficient in country  $c$  in year  $t$ .  $Conflict_{ct}$  is the primary outcome of interest, the onset of civil conflict. The interaction term of  $Factor_{ct}$  and  $Tariff_{ct}$  jointly constructs the instrument, which denotes factor endowments (i.e., relative abundance of land to labor) and a tariff rate in country  $c$  in year  $t$  respectively. The tariff rate,  $Tariff_{ct}$ , is changed to an inverse fraction form, and multiplied by the factor endowments to have a positive correlation with inequality.  $X_{ct}$  is a vector of country-year covariates that are importantly considered as possible determinants of conflict in the previous studies.  $\delta_c$  and  $\theta_t$  are country-fixed effects and year-fixed effects which control the time-invariant characteristics of a country and the global time trend that commonly affects all countries respectively.  $\lambda_{ct}$  denotes country-specific time trends that capture trend differences across countries.

To validate the first hypothesis in the motivating effect's conceptual framework, both  $\alpha$  and  $\beta$  should be positive and statistically significant. The first-stage estimate,  $\alpha$  in equation (6), should be greater than zero, indicating that land-rich countries with lower tariffs are more likely to have greater inequality. The coefficient of interest,  $\beta$ , indicates the magnitude of the local average treatment effect – the causal impact of inequality on the onset of civil conflict for compliers whose

trade policies are in line with the comparative advantage theory.<sup>4</sup> Hence, specifying the features of compliant sub-populations through the instrument contributes to capturing the inequality relevant to conflict– the inequality driven by the shrinking labor market due to trade–, which in turn indicates the attributes of those who engage in rebellion.

## **B Identifying Mobilizing Effect and Channels of Causality**

To evaluate the mobilizing effect of inequality, the validity of the hypothesized channels – the unemployed as the attribute of motivated individual, and ethnic group as the mobilizing unit of the collective violence – is first investigated by undertaking sub-group analysis on the previous IV estimation. Having validated the channels, the ethnic-level analysis using the OLS estimation of equation (8) examines whether within-group inequality is associated with the group’s propensity to initiate civil conflict. Complementarily, the sub-group analysis gives a flavor of causal inference to the OLS estimates of the ethnic-level specifications, which support the findings of the sub-group analysis with specific evidence from direct examination of within-group characteristics.

From the conceptual frameworks, the channels of conflict should be the unemployed and the ethnic group: the unemployed may participate in civil conflict only if accompanied by mobilization of financial resources from co-ethnic members (Barth, 1998; Gavrilets & Fortunato, 2014; Olzak & Shanahan, 1996). To document whether the hypothesized channels exist in the causal mechanism, I divide the samples into two groups using the median value of each channel. Using the sub-samples of each category, the causal effect of inequality is estimated by equations (6) and (7). If the unemployed are the main participants in collective violence, the 2SLS estimates of inequality should be significant in countries with high unemployment rates whereas its causal effect should disappear in low unemployment rate countries. Likewise, if the ethnic group is the unit that mobilizes intra-state conflict, countries highly fractionalized by ethnicities should suffer more conflict break-outs than ethnically homogeneous countries. Based on the proven channels of conflict mobilization, this study then examines the explicit relationship between within- ethnic group inequality driven by unemployment and the group’s inclination for war using the follow-

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<sup>4</sup>The term "compliers" comes from an analogy to randomized trials. In randomized trial models, experimental subjects who comply with assigned treatment protocol are called "compliers".

ing model:

$$Conflict_{ec} = \beta Unemployment_{ec} + \gamma Wealth_{ec} + X_{ec}^I \Theta + X_{ec}^E \psi + \eta_c + \varepsilon_{ec} \quad (8)$$

where  $e$  denotes ethnic group defined by the EPR dataset,  $c$  denotes country.  $Unemployment_{ec}$  is the mean of the unemployment rate within the ethnic group from 1989 to 2016.  $Wealth_{ec}$  is the average of the ethnic group's total wealth, and  $\eta_c$  denotes country fixed effects.  $X_{ec}^I$  is a vector of mean value of demographic characteristics of ethnic members including age, gender, education attainment, literacy and rural residency, and religion.  $X_{ec}^E$  is a vector of ethnic-group characteristics, which contains the size of regional area, average level of elevation, total population of the ethnic group and proportion of its population in the country.

As the model controls the country-fixed effects,  $\eta_c$ ,  $\beta$  is estimated using only the variation in the onset of conflicts observed among ethnic groups with different unemployment rates, residing in the same country. Controlling the variation in the total wealth of ethnic group, this study assumes that  $\beta$  represents within-ethnic group inequality attributable to the shrinking job market. The level of inequality is defined by how far the income distribution deviates from the total equality line. Due to unavailability of data, however, in this study, unemployment is assumed to be caused by a negative shift in the distribution of labor, which results the least competent – and thus, the most marginalized – people to lose their jobs. In equation (8), an increase in the number of unemployed people, while holding aggregated ethnic group wealth constant, implies that wealth losses from the unemployed are offset by the gains from capital or land owners, indicating higher within-group inequality. Although it is not a standard inequality measure, it has the flavor of a causal inference from the IV estimation by reflecting the features of the compliant sub-population extracted by the instrument - workers who have been marginalized by trade-induced inequality.

## IV Descriptive statistics

### A Country-level Data and Measures

The main outcome of interest, the onset of intra-state conflict, is constructed using the Uppsala Conflict Data Program (UCDP)/Peace Research Institute Oslo (PRIO) Armed Conflict Data (ACD) and Battle-Related Deaths Datasets version 18-2018. Based on the description of UCDP, this study defines civil conflict as the use of armed force between the government and intra-state opponents that results in at least 25 battle-related deaths in a year. The onset of civil conflict is coded 1 for country  $c$  in year  $t$  when the government becomes involved in the conflict and 0 for other cases including the persistent preceding year's conflict. As reported in Table 1, approximately 18 percent of observations in a sample of 3,794 country years is in a state of conflict; 178 conflicts were initiated during the period, 4.7 per 100. These armed clashes generate an average of 204 casualties.

The measure of the primary explanatory variable, inequality, is the Gini coefficient index from the Standardized World Income Inequality Database (SWIID) version 7.1, consisting of 5,266 observations in 192 countries from 1960 to 2017. Despite its substantial coverage, the SWIID dataset contains imputed indexes constructed by various data sources and methodologies (Dorsch & Maarek, 2019). However, given that the incomparability occurs across, rather than within, countries and years, the estimates remain unaffected since all specifications of this study used fixed effects that exploit only within-country, and within-year variation.<sup>5</sup>

With respect to the IV, this analysis adopts estimation techniques that maximize its exogenous properties. Following the definition of Heckscher-Ohlin theory, I define relative factor abundance in physical terms – the ratio of physical units of land to labor. The total agricultural land area (in thousands of hectares) obtained from the Food and Agriculture Organization's (FAO) FAOSTAT database is used to measure land endowment. The FAO defines agricultural land as including not only arable land but also potentially cultivable area regardless of its temporary use. This measure can eliminate the land supply's endogeneity, which can be adjusted by market demand.

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<sup>5</sup>Multiple imputation (MI) regressions are recommended to take account the uncertainty of the SWIID estimates (Solt, 2016). However, 2SLS estimation cannot be conducted by MI regression tools. For this reason, this article takes one index from the imputed series, the most similar to the index used by Bartusevicius (2014) who examines the relationship between inequality and conflicts using SWIID data and proves that the inequality index generates results consistent with those of imputation analysis (p.43).

Similarly, total working age population (15-64 years) is used instead of employed labor population as a measure of labor endowment to eliminate the influences of labor market conditions. The instrument's last component, the tariff rate, is estimated from the World Bank's open database as a simple average tariff applied to all traded products. This unweighted tariff more accurately captures the effect of external shocks – the general trend of the tariffs exogenously driven by the wave of global economic liberalization– because it minimizes the influence of domestic pressure politics better than the weighted one which reflects the relative political strength between export and import-competing industries (Cassing, McKeown, & Ochs, 1986).

**Table 1: Descriptive Statistics of Country-level Data**

	Observations (1)	Mean (2)	SD (3)	Min (4)	Max (5)
A. Civil Conflict Measures (1989-2016)					
Onset of civil conflict	3,794	.047	.211	0	1
Fatalities	3,794	204.372	1927.751	0	69,089
ln (Death +1)/ ln (Population)	3,781	.059	.132	0	.663
Ongoing conflicts	3,794	.180	.384	0	1
B. Inequality Measures					
Gross Gini Coefficient (SWIID)	3,859	.384	.084	.175	.670
C. Instrument Measures					
Tariff rate (simple mean)	2,968	8.957	7.368	0.04	105.36
Tariff rate (weighted mean)	2,899	7.383	10.781	.01	421.5
Agricultural land (1000 ha)	4,986	25,839.25	67,531.63	.3	528,634.7
Population 15-64 years	4,756	2.28e+07	8.85e+07	39,812	9.96e+08
Factor endowments x (1/ tariff)	2,868	.001	.034	5.46e-07	1.811
D. Covariates					
Gross capital formation (percent GDP)	4,121	23.247	8.444	-2.424	67.911
ln (GDP pc)	4,727	8.027	1.640	4.546	11.689
GDP growth rate (annual percent)	4,664	2.131	6.472	-64.996	140.501
Fuel export (percent of merchandise exports)	3,506	15.263	25.979	0	99.987
Total natural resource rent (percent of GDP)	4,742	7.608	11.735	0	82.589
Net foreign direct investment	3,917	-4.22e+08	1.84e+10	-2.32e+11	1.77e+11
Polity Score	4,517	3.018	6.663	-10	10
ln Population	5,497	15.422	2.197	9.099	21.044
Population density	4,978	170.779	499.178	.136	7908.721

*Notes:* The observation unit level is a country and a year. As shown in panel D, this study includes all covariates which are prominently cited in the existing literature as material determinants of conflict. However, grievance-related covariates are excluded because their variations, which originate from time-constant cultural factors such as ethnic and religious fractionalization, are absorbed by the fixed effects, which are employed in all specifications in this study.

## B Ethnic-level Data and Measures

This study constructs novel data by merging three datasets to identify the mobilizing effect of within-group inequality on civil conflict: the UCDP/PRIO ACD, which has been previously used, the Ethnic Power Relations (EPR) dataset, and census data from IPUMS International. The first two are obtained from the International Conflict Research Center of ETH Zurich.

The first step in combining the data is to link the two ethnic-level datasets through ACD2EPR, which specifies the ethnic group names by linking the list of ethnicities from the EPR dataset to the rebel groups in the ACD (Vogt et al., 2015). From the civil conflicts listed in the ACD, I extract the rebel groups that initiate civil conflicts against their government, and identify the ethnic affiliation of the rebel group through ACD2EPR.<sup>6</sup> Then, I combine this dataset with the EPR, which provides the socioeconomic status of the ethnic group.

The next step is to connect the IPUMS censuses to the ethnic-level conflict dataset. IPUMS International provides 365 pieces of censuses conducted in 94 countries from the 1960s to the 2010s, at 10-year intervals on average. As the data contain individual demographic information, including ethnicity, I use the individual ethnic affiliation to link the two datasets. If the census does not provide ethnicity information, other demographic characteristics, such as mother tongue, religion, race, and residential area, are jointly used to impute individual's ethnic affiliation. To enhance precision, the ethnic group's population proportion is checked to confirm whether each coded ethnic group comprises a similar proportion to that in the EPR record. Due to data availability, censuses from 44 of 95 countries are included, covering 221 ethnic groups and 114,860,614 individuals.<sup>7</sup>

As there is no time variation in the EPR and the census data, all variables in the novel dataset are mean values of the years from 1989 to 2016. Aligned with the data structure, the onset of civil conflict is measured as the annual average numbers of intra-state conflict incited by an ethnic group during the observation period. If the ethnic group initiated two conflicts over 28 years (from 1989 to 2016), the outcome variable is coded 0.071 (2/28).

As described in the identification strategy of ethnic-level analysis, to use the unemployment

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<sup>6</sup>The ACD data divide conflict participants into two groups: the state force that tries to maintain the status quo and a rebel group that challenges the incumbent government. I exclude conflicts between rebel groups because it is impossible to identify from the information in the ACD dataset which ethnic group started the conflict.

<sup>7</sup>The number of ethnic groups included is reduced to 144 because of missing values for employment status.

**Table 2: Descriptive Statistics of Ethnic-level Data**

	Observation (1)	Mean (2)	SD (3)	Min (4)	Max (5)
A. Conflict Measures (Source: ACD)					
Average of civil conflict onset 1989-2016	221	0.004	0.014	0	0.107
B. Ethnic-level Features (Source: EPR)					
log (Aggregated night light)	190	9.997	2.762	1.610	16.790
log (Average of ethnic-level GDP 1990-2005)	190	2.054	1.749	0.006	8.055
log (Average of ethnic population 1990-2010)	191	14.457	1.904	6.855	20.936
Residential area (km)	191	300,414.8	1,165,603	17.025	9,369,185
Elevation of area	191	355.444	333.371	0	1921.283
Ethnic group's population portion	197	0.178	0.284	1.12e-05	0.981
C. Demographic Features (Source: IPUMS International)					
(Average value of ethnic group)					
Unemployment rate	197 (114,860,614)	.089	.112	0	0.544
Ownership of dwelling	153 (97,159,884)	0.726	.157	.148	.977
Access to electricity	141 (92,903,412)	.558	0.355	0.007	1
Rural residence	183 (110,763,595)	.602	.269	.021	0.991
Education attainment	195 (113,046,175)	1.911	0.530	1.049	3.348
Literacy	163 (100,529,823)	1.718	.232	1.110	1.999
Age	197 (114,996,254)	33.355	2.739	29.078	42.218
Gender	197 (114,996,254)	.503	.035	.169	0.566
Proportion of Christian	131 (93,236,532)	0.557	0.391	0	1
Proportion of Muslim	131 (93,236,532)	0.237	0.375	0	1
Proportion of Hindu	131 (93,236,532)	0.0140	0.0989	0	1
Proportion of Buddhist	131 (93,236,532)	0.0444	0.190	0	1
Proportion of other religions	131 (93,236,532)	0.0575	0.160	0	1

Notes: The unit of observation is the ethnic group. On observations in parentheses in panel C are the total observations from the raw data, IPUMS International. These individual observations from censuses are collapsed at the ethnic level to represent the ethnic group's demographics using the mean value.

rate within the ethnic group as a proxy variable for within-group inequality, the total wealth of the ethnic group should be controlled. An ethnic group's total wealth is measured by averaging its income in 1990, 1995, 2000 and 2005. Since coverage of ethnic GDP was concentrated in the years before 2005, the night light emissions of the ethnic residential polygon are used as an alternative proxy for the ethnic group's total wealth. To compensate for the indirect measure of ethnic wealth, the average level of dwelling ownership or of access to electricity from 1989 to 2016 are used as additional proxy variables for the ethnic group's total wealth.



## V Results

### A Causality Estimates of the Motivating Effect

#### A.1 OLS Estimates

Panel A in Table 3 reports the OLS estimates of equation (7) without isolating the exogenous variation in inequality. Column 1 in panel A represents a specification identical to existing literature's analysis including full covariates but without employing fixed effects. Consistent with previous findings, the effect of inequality on the onset of civil conflict is nearly zero and statistically insignificant. Column (2) presents the OLS estimates with fixed effects, improving the explanatory power of the model ( $R^2$ ) by 8 times and making the magnitude much larger (-0.007 to 0.0467). This implies that omitted variables, which are time constant and common across countries, render the estimate negatively biased in previous literature – contrary to the first hypothesis prediction. Despite the improvement, the OLS estimate remains insignificant.

#### A.2 Second-stage Estimates

The 2SLS estimates of equation (7) are presented in panel B of Table 3. The 2SLS estimate under the baseline specification in column (3) remains stable across alternative specifications as reported in columns (4) to (7). All 2SLS estimates are statistically significant and much larger in magnitude than the OLS estimates, implying that IV approaches can resolve not only endogeneity issues but also attenuation biases in the OLS estimates.

Using different measures of conflict, the findings of columns (3) to (5) in panel B of Table 3 show that inequality raises the probability of outbreaks of civil conflict, intensifies the violence and prolongs it. According to the baseline estimate in column (3), a 1 percentage point increase in inequality raises the probability of the onset of civil conflict by 1.8 percentage points, a statistically significant effect at the 5 percent level. To assess the implication of the magnitude further, I use the sample mean of each variable: 0.384 for inequality and 0.047 percent for onset of civil conflict. For a country at the mean value of inequality, a 1 percent increase in inequality causes a 0.69 percentage points ( $0.00384 \times 1.807$ ) increase in the onset of civil conflict, 15 percent of the sample mean ( $0.0069/0.047$ ). Likewise, a 1 percent increase in inequality raises the number of

**Table 3: The Causal Effect of Inequality on Civil Conflict**

	OLS specifications		IV baseline	IV alternative specifications			
	Onset of conflict (1)	Onset of conflict (2)	Onset of conflict (3)	ln(deaths+1)/population (4)	Ongoing conflict (5)	Weighted tariff (6)	Excluded 1989-1992 (7)
	Panel A. OLS estimates			Panel B. 2SLS estimates			
Inequality	-0.007 (0.045)	0.467 (0.369)	1.806** (0.784)	0.704** (0.337)	1.795* (0.994)	1.859** (0.845)	1.884** (0.809)
R <sup>2</sup>	0.021	0.172	0.172	0.834	0.792	0.172	0.183
KP-F statistics			190.1	190.1	190.1	80.52	213.2
Observations	1,736	1,736	1,736	1,736	1,736	1,736	1,663
	Panel C. Reduced-form estimates						
Factor endowment x (1/tariff)			0.031** (0.015)	0.001* (0.0005)	0.027* (0.016)	0.054** (0.027)	0.032** (0.015)
R <sup>2</sup>			0.171	0.834	0.792	0.171	0.182
Observations			1,736	1,735	1,736	1,736	1,663
	Panel D. First stage estimates (DV: Inequality)						
Factor endowment x (1/tariff)			0.017*** (0.001)	0.017*** (0.001)	0.029*** (0.003)	0.029*** (0.003)	0.017*** (0.001)
R <sup>2</sup>			0.989	0.989	0.989	0.989	0.989
Observations (All panels)			1,736	1,736	1,736	1,736	1,663
Gross capital Controls	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	YES	YES	YES	YES	YES	YES
Country specific trend	NO	YES	YES	YES	YES	YES	YES

Notes: The observation unit level is a country and a year. The sample includes 111 countries for years 1989 - 2016. Gross capital (percent of GDP) is included in all specifications to control the effect of the remaining factor endowment. Kleibergen-Paap F-statistics of the first-stage estimation are reported in panel A. All specifications in all panels include the same set of control variables that are presented in the Table 1. Coefficients are reported with robust standard errors clustered at the country level in parentheses. \*p<.1; \*\*p<.05; \*\*\*p<0.01

conflict fatalities by 7 percent of the sample mean, and the probability that the conflict persists in succeeding year by 6 percent of sample mean.

To assess the plausibility that the causal impact of inequality is of this magnitude, I compare the magnitude to estimates in other literature. Miguel et al. (2004) explores the economic causes of conflict using an IV approach, finding that a 1 percentage point decline in GDP growth rate leads to a 3.15 percentage point increase in civil conflict onset, 45 percent of the sample mean.<sup>8</sup> The comparison shows the magnitude of this study's estimates is smaller, but within the range

<sup>8</sup>This result is reported in Table 6 (p.744). Since the authors do not provide a detailed interpretation of the magnitude, I interpret the coefficient by referring to the descriptive statistics (p.732).

of other causal estimates in the literature.

To examine the robustness of the causal effect of inequality on conflict, the specifications in columns (6) and (7) use a modified instrument or time periods. Column (6) of Table 3 explores whether a similar result would be generated by the alternative measure of tariff that is weighted by the product import shares. Although the simple mean tariff is used in this study because it is more likely to reflect exogenous variations derived from international system changes, concern could arise that the unweighted tariff might not accurately capture the domestic political decision-making process of trade since the extent to which a country lowers its tariff barriers partially depends on the relative strengths of political actors. If import-competing industries are more politically influential than exporters, a weighted tariff proportionally increases with the size and strength of the importing sectors. The opposite occurs if exporters outweigh importers (Cassing et al., 1986). However, the similar estimate in column (6) with that of baseline in column (3) clearly show that the simple mean tariff can sufficiently reflect the country's trade patterns.

The specification in column (7) of Table 3 explores whether the causal effect of inequality is generated by unobserved biases associated with high leverage points during the transition period (1989-1992). Since the Second World War, the annual incidence of civil war shows a steady and linear upward trend with a 0.7 average change rate until the end of the Cold War (Esteban et al., 2012; Ray & Esteban, 2017). During the transition period of the international system from 1989 to 1992, however, the incidence of conflicts skyrocketed with a 3 change rate on average, almost four times larger (Fearon & Laitin, 2003). I re-estimate the model by excluding the transition period observations and find no evidence that high leverage points excessively influence the fitted regression.

### **A.3 Reduced-form and First-stage Estimates**

Panels C and D in Table 3 explore the validity of the instrument – the interaction term of factor endowment and the reversed tariff rate. The reduced-form specifications presented in panel C examine whether the instrument affects the onset of civil conflict only through inequality. The condition necessary to satisfy the assumption of exclusion restriction, the correlation between the instrument and the civil conflict onset, should be positive and statistically significant. As reported in columns (3) to (7), the reduced-form estimate of the baseline satisfies the condition

and the reduce-form estimates remain constant across all alternative specifications.<sup>9</sup>

Panel D in Table 3 presents the first-stage estimates of equation (6). This estimation examines the relevance of the instrument, another necessary condition for a valid instrument. The estimates in columns (3) to (7) present a strong correlation between the instrument and inequality and statistically significant at the 1 percent level. Moreover, the first-stage Kleibergen-Paap F-statistics for the excluded instrument are 80.52 to 213.2, which are much larger than 10 – the rule of thumb cutoff indicating a strong instrument (Stock & Yogo, 2005), implying that the 2SLS estimates in panel B are unlikely to be biased.

## **B Estimates of the Mobilizing Effect of Inequality**

### **B.1 Identifying Channels of Civil Conflict**

The aim of sub-group analysis is to provide circumstantial evidence that civil conflict is mobilized by the marginalized workers in the labor market, whose conflictual aims are financially supported and politically legitimized by co-ethnic members, meaning that the unemployed and the ethnic group are the channels through which inequality leads to civil conflict. For this purpose, the identification strategy explores whether the causal effect of inequality is heterogeneous across countries where the channels are prominently embedded and ones where they are less embedded. If positive and statistically significant 2SLS estimates appear only in the former context, the findings would document the validity of the hypothesized channels – the unemployed and ethnic group – suggested in conceptual frameworks.

The 2SLS estimates in different contexts are reported in panel A of Table 4, where the baseline estimates are reproduced for comparison in column (1). As indicated in column (2), the size of the 2SLS estimate in countries with low employment rates increases by 56 percent compared to the baseline (from 1.806 to 2.822). However, the effect of inequality with high employment rates is not significant at the standard level, and its magnitude is close to zero, as reported in column (3). To assess the magnitude of the contrasting estimates, I take as examples of two countries at the mean level of inequality (i.e., both countries' inequality level is 0.384) with different employment rate categories. A 1 percent increase in inequality in the country with a low employment rate raises

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<sup>9</sup>In the Appendix A, a falsification test is conducted to reassure that the instrument satisfies the exclusion restriction assumption.

the civil conflict onset by 23 percent of the sample mean with the statistical significance at the 1 percent level, whereas the same change in inequality increases civil conflict only by 6 percent of the sample mean and statistically insignificant for the country with a high employment rate. This result indicates that even if countries have the same level of inequality, those whose inequality generates greater supply of unemployed labor are much more likely to face internal conflict than countries whose inequality rarely affects labor market.

**Table 4: Sub-group Analysis**

Intensity (Low < Median < High)	Baseline specification	Employment rate (15-64 years)		Ethnic Fractionalization	
	(1) All	(2) Low	(3) High	(4) Low	(5) High
Dependent variable: Civil Conflict Onset					
Panel A: 2SLS estimates					
Inequality	1.806** (0.784)	2.822*** (1.067)	0.738 (2.752)	-1.528 (1.498)	2.364* (1.243)
KP F-Stat	190.1	86.59	1.166	2.243	73.70
Panel B: Reduced form					
Factor Endowments x (1/tariff)	0.031** (0.015)	0.063* (0.034)	-1.865 (6.709)	6.186 (7.334)	0.042 (0.026)
Observations	1,736	821	855	1,024	709
R <sup>2</sup>	0.171	0.224	0.262	0.186	0.230
Gross capital	YES	YES	YES	YES	YES
Other controls	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Country specific time trend	YES	YES	YES	YES	YES
Sample: Non-high Income Countries					
Panel C: 2SLS estimates					
Inequality	1.979** (0.802)	3.989** (1.735)	0.176 (4.885)	-0.838 (1.763)	3.225** (1.353)
KP F-Stat	155.7	71.42	0.873	4.829	53.07
Panel D: Reduced form					
Factor Endowments x (1/tariff)	0.037** (0.017)	0.099* (0.050)	-0.338 (10.595)	16.846 (39.952)	0.059** (0.029)
Observations	1,187	573	597	587	597
R <sup>2</sup>	0.187	0.260	0.287	0.251	0.240
Gross capital	YES	YES	YES	YES	YES
Other controls	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Country specific trend	YES	YES	YES	YES	YES

*Notes:* Coefficients are reported with robust standard errors clustered at the country level in parentheses. Following the definition of World Bank, this study classifies countries whose GDP per capita are lower than 12,056 USD as non high-income countries and includes them as a sample in panels C and D. \*p<.1; \*\*p<.05; \*\*\*p<0.01

Anecdotally, there are many accounts of the unemployed as the main participants of rebellions. Amarasuriya (2009) notes that the Marxist Janatha Vimukthi Peramuna (JVP), that led considerable-sized insurgences from 1970s to 80s in Sri Lanka, made up largely of impoverished and unemployed youths who chose to be combatants as an employment opportunity (Amarasuriya, Gündüz, & Mayer, 2009). This pattern of recruitment was repeated in major arm forces of 27-year Sri Lankan civil war (1983-2009), the GoSL and LTTE : both of them were largely comprised of jobless youths from low caste communities (Esteban & Ray, 2011b). More recent cases of Boko Haram Nigeria and Al Shabab in Kenya recruited combatants mainly from the unemployed as 'unemployment constitutes a clear grievance while it lowers the opportunity cost of joining a rebellion (Stewart, 2015, p.4)'. The anecdotal evidence as well as the conceptual framework of mobilizing effect, however, suggest that the large pool of combatants is not sufficient to cause a conflict: such an labor market condition is only likely to lead to conflict when combined with financial and political support from the co-ethnic members (Esteban & Ray, 2011b; Gavrilets & Fortunato, 2014; Olzak & Shanahan, 1996; Stewart, 2015). Thus, this study further examines the validity of ethnic group channels.

The estimates in columns (4) and (5) of Table 4 present the heterogeneous effects of inequality conditional on the level of ethnic fractionalization. As reported in column (5), if a country has highly fractionalized ethnic groups, the causal effect of inequality is larger than that of the baseline (from 1.806 to 2.364). In countries with low ethnic diversity, the inequality exerts neither a statistically nor substantively significant effect on civil conflict. The findings suggest that, like those of employment status, inequality leads to conflict through the ethnic group, although the effect is nearly significant (p-value is 0.057).

The sub-group analysis further examines the robustness of the 2SLS estimates as shown in panel C of Table 4. If the estimates under the two channels are confounded by the common features of less-wealthy countries, their statistical significance should disappear when the channels within developing countries are compared. As reported in panel C from columns (2) to (5), however, the causal effects of inequality are consistent and even more remarkable, supporting the validity of the hypothesized channels of causal mechanism.

## B.2 Within-ethnic Group Inequality and the Conflict Initiation

Having identified traits of the channels – the unemployed and ethnic group – that facilitate internal conflict as trade-induced inequality increases, this study now explores whether the within-group inequality configured by the channels is associated with the group’s propensity to precipitate civil conflict.

The OLS estimates of equation (8) are shown in panel A of Table 5. Column (1) reports estimates of the correlation between the ethnic group’s unemployment rate and civil conflict initiated by the group for a specification that includes only demographic covariates. In the remaining columns of baseline specifications in columns (2) to (3), I include additional covariates to control for other factors that may be correlated with the group’s unemployment rate and its propensity to initiate conflict. As reported in panel A under baseline specifications of Table 5, the effects of unemployment rate on the group’s propensity for conflict, while controlling the aggregated income of ethnic group, are positive and statistically significant at the 1 to 5 percent level. The estimates are consistent and unaffected by the inclusion of covariates, suggesting that the correlation is robust to omitted variable biases.

To compensate the incomplete data of the ethnic group’s GDP covering only 1995 to 2005, columns (4) to (7) present the estimates under alternative specifications using different measures of the ethnic group’s total wealth. As shown in these columns, the positive and statistically significant coefficient of unemployment remains robust across all alternative measures of ethnic group’s wealth.

In terms of magnitude, for the ethnic group at the mean level, the estimated coefficient in column (3) suggests that a 1 percent increase in the unemployment rate (0.00089) increases the probability of the onset of conflict by 6.6 percent of the sample mean and the magnitude of the unemployment rate’s effect slightly increases in column (7), which amount to 7.9 percent of the sample mean. As assumed that the unemployment rate while controlling the absolute wealth of ethnic group represents the within-group inequality, the findings suggest that 1 percent increase in within-group inequality approximately raise the group’s propensity to precipitate conflict by 7 percent with 99 percent of statistical confidence level.

A natural concern over the validity of the findings is that the estimates of the unemployment

**Table 5: Effect of Within-group Inequality on Civil Conflict**

Dependent variable	Annual average of the initiation of civil conflict						
	Baseline specifications			Alternative specifications			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. OLS Estimates of Within-group Inequality							
Unemployment rate	0.131** (0.062)	0.154*** (0.052)	0.297*** (0.067)	0.262*** (0.079)	0.270*** (0.084)	0.322*** (0.091)	0.354*** (0.092)
Log GDP of ethnic group	0.002 (0.001)	0.005 (0.004)	0.009 (0.010)				0.025 (0.020)
Log (Night light)				-0.004 (0.004)			-0.001 (0.006)
Ownership of dwelling					0.043 (0.036)		-0.019 (0.078)
Access to electricity						-0.097 (0.056)	-0.143 (0.087)
Country FE	YES	YES	YES	YES	YES	YES	YES
Demographics	YES	YES	YES	YES	YES	YES	YES
Ethnic features	NO	YES	YES	YES	YES	YES	YES
Religion dummies	NO	NO	YES	YES	YES	YES	YES
Observations	144	144	85	84	85	82	81
R <sup>2</sup>	0.435	0.445	0.507	0.506	0.504	0.537	0.582
Panel B. OLS Estimates of Deprivation Theory							
Log GDP of ethnic group	0.002 (0.001)	0.001 (0.004)	0.001 (0.010)				0.019 (0.019)
Log (Night light)				-0.005 (0.004)			-0.003 (0.006)
Ownership of dwelling					0.046 (0.035)		-0.036 (0.070)
Access to electricity						-0.074 (0.061)	-0.110 (0.088)
Country FE	YES	YES	YES	YES	YES	YES	YES
Demographics	YES	YES	YES	YES	YES	YES	YES
Ethnic features	NO	YES	YES	YES	YES	YES	YES
Religion dummies	NO	NO	YES	YES	YES	YES	YES
Observations	144	144	85	84	85	82	81
R <sup>2</sup>	0.399	0.402	0.410	0.426	0.417	0.434	0.463

Notes: The unit of observation is the ethnic group. Coefficients are reported with robust standard errors clustered at the country level in parentheses. \*p<.1; \*\*p<.05; \*\*\*p<.01

rate might not represent only the within-group inequality, but also relate to the aggregated wealth of the group. It has been found in many cases that an ethnic group with a high unemployment rate tends to be the country's most impoverished group, such as Tamils in Sri Lanka, Catholics in Northern Ireland, and Uighurs in China (Manogaran, 1987; Shan, 2017; Stewart, 2015). To address this concern, additional specifications are included solely to estimate the effect of ethnic-level wealth on the group's propensity for conflict. The estimates in panel B of Table 5 report that the effect of the group's total wealth on civil conflict is indiscernible from zero.



These non-findings have two implications: First, the positive and statistically significant effect of the ethnic group's unemployment rate on its conflict propensity is not spuriously driven by the group's relative deprivation, compared to other groups in the same country. Similarly, the findings suggest that the horizontal inequality theory might not be valid for explaining the internal conflict initiated by the ethnic group. Considering grievances originating from large economic disparities between ethnic groups as the central cause of ethnic conflict, the horizontal inequality theory suggests that a relatively more deprived ethnic group – whose sense of grievance has reached an intolerable level – is more likely to precipitate conflict. However, all estimates that represent the ethnic group's wealth position within the country do not come close to either statistical or substantive significance.

Overall, the ethnic-level analysis documents a statistically significant and positive correlation between within-ethnic group inequality and the group's propensity for internal conflict. The polarization of wealth within the ethnic group, particularly when the inequality is driven by a shrinking labor market due to trade, can easily transform the inter-group competition into violent conflict. Therefore, inequality is more likely to be determinant of internal conflict when it increases heterogeneity of income within the ethnic group, rather than between groups.

## **VI Conclusion**

This study examines the causal effects of income inequality on the motivation and mobilization of civil conflict, focusing on the changes in labor market. In terms of inequality's motivating effect, this article suggests that the opportunity costs of fighting for workers are lowered by inequality if that inequality is driven by the changes in relative factor prices due to lower tariffs and relative abundance of land to labor. Furthermore, confining the range of inequality within the ethnic group, this study extends its effect to the mobilization of resources for collective violence, particularly when inter-group competition is intensified due to the shrinking labor market. Focusing on inequality induced by the labor market, this study employs the IV approach by exploiting exogenous sources of variation in inequality resulting from trade and factor endowments, and documents the causal effect of inequality on the motivation of conflict. Likewise, by configuring within-group inequality through unemployment rates, the ethnic-level analysis finds that

disequalizing income changes within the ethnic group are strongly associated with the groups propensity for conflict.

This study has several important implications. First, it clarifies the robust and significant causal effect of economic inequality on political conflict, which has long been alleged as a non-effect. Second, it validates the inequality's effect on mobilizing conflict derived from intra-group heterogeneity, instead of relative deprivation between ethnic groups. While the theoretical analysis of within-group inequality theory has been placed at the center of attention, to the best of my knowledge, this research is the first to empirically prove the cogency of this theory. Third, the study substantiates causal mechanisms that specify the demographic characteristics of combatants and the channel mobilizing the resources for conflict. Unlike previous literature, which applies the same behavior logic regardless of the unit of agent, this study explains why unemployed workers are motivated to fight when trade-induced inequality rises, and identifies who supports the motivated poor workers in initiating organized political violence, and explains why co-ethnic members voluntarily contribute their resources, particularly in the presence of inter-group competition over the shared niches. The mechanisms identified in this study will guide policy discussions and future studies on the determinants of civil conflict.

Considering the adverse effect of inequality is prominent in land-rich developing countries implementing the most efficient economic reform as a response to global liberalization – the external shocks –, future work might need to extend the analysis to dynamic settings where unintentional consequences from exogenous conditions and their externality spill-overs to other socio-political sectors can be examined. Particularly given the current parallel crisis – the pandemic-induced high rate of unemployment –, the study's findings suggest that the welfare returns of development strategies and international agreements should be reassessed from the vantage point of deterring political violence. Although there might be no panacea that universally applies across countries, future work could identify the various forms of national market interventions that optimally coordinate internal stability.

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# Appendix

## Chapter 1

The Motivating and Mobilizing Effects of Inequality on Civil Conflict

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## A Falsification Test

A falsification test is performed to examine whether the instrument satisfies the exclusion restriction condition. Although, as reported in panel C of Table 3 (in the submitted manuscript), the reduced-form estimates present a strong correlation between the instrument and civil conflict onset, this might not be sufficient evidence that inequality is the only channel through which the instrument affects civil conflict due to potential confounding factors leading to false significance effects in the reduced-form estimates of the instrument on conflict.

Table A.1 Falsification Test

	Placebo (Leads)			Baseline	Placebo (Lags)		
	tariff, t-3 (1)	tariff, t-2 (2)	tariff, t-1 (3)	tariff, t (4)	tariff, t+1 (5)	tariff, t+2 (6)	tariff, t+3 (7)
Dependent variable:	The onset of civil conflict						
Panel A: Reduced form estimates							
Factor endowment $\times$ (1/tariff)	-0.031 (0.022)	-0.019 (0.023)	-0.010 (0.016)	0.031** (0.015)	0.014 (0.024)	0.041 (0.034)	0.045 (0.048)
R-squared	0.278	0.224	0.234	0.171	0.217	0.244	0.233
Panel B: 2SLS estimates							
Inequality	-3.373 (2.051)	-1.575 (1.766)	-0.952 (1.374)	1.806** (0.784)	1.928 (2.940)	-4.410 (3.503)	-6.192 (6.945)
KP F-Stat	17.65	57.64	66.15	190.1	22.18	18.30	5.747
Gross capital	YES	YES	YES	YES	YES	YES	YES
Other controls							
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Country Specific Time Trend	YES	YES	YES	YES	YES	YES	YES
Observations (all panels)	1,672	1,707	1,730	1,736	1,610	1,548	1,471

Note: Robust standard errors that are clustered at country level are reported in parentheses. \*\*\*p<.01; \*\*p<.05; \*p<.1

The most critical confounding factors are the late 1980's democratic transitions of regimes in the developing world following the collapse of the Soviet Bloc. As these democratic changes occurred together with economic liberalization, the positive correlation between a tariff and civil conflict onset might be spuriously driven by coincidental political transitions. To analyze whether the instrument affects civil conflict only through inequality, a positive and strong correlation should not exist in the periods when inequality is not caused by tariffs. Thus, placebo instruments using tariffs in preceding and succeeding years are created to examine the correlations between fake instruments and the outcome of interest.

As reported in Table A.1, there are no statistically significant associations between the placebo instruments and the onset of conflict. Accordingly, the 2SLS estimates of inequality driven by placebo tariffs show no causal effect on conflict, as presented in panel B of Table A.1. These results provide evidence that inequality is the only channel through which tariffs affect civil conflict.



## B Additional Robustness Checks

As shown in Table B.1, this study conducts an additional analysis to examine robustness of the causal effect of inequality on civil conflict. The comparison between the main effect under the baseline specification in column (1) of Table B.1 and all the other estimates under alternative specifications (columns (2) to (7)) should show no serious sensitivity.

Table B.1 Additional Robustness Check

	Baseline	Export Ratio	Non-Western countries	Ln_gross capital	Political factors	Economic Conditions	Poli-Econ conditions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. 2SLS estimates							
Inequality	1.806** (0.784)	1.769** (0.728)	2.198*** (0.828)	1.721** (0.759)	1.857** (0.774)	1.957** (0.824)	1.924** (0.817)
KP F-Stat	190.1	149.5	173.2	195.1	192.7	139	134.7
(Additional Controls)							
Log_Gross capital				-0.0345 (0.0338)			
Executive recruitment					0.087 (0.082)		0.165*** (0.062)
Executive constraints					0.048 (0.088)		0.124* (0.068)
Competitive participation					0.021 (0.042)		0.060* (0.036)
Regime durability					0.002 (0.002)		0.002 (0.002)
Log_Remittance						-0.008 (0.008)	-0.010 (0.007)
Net_ODA						-4.24e-12 (1.23e-11)	-1.51e-11 (9.55e-12)
Panel B. First-stage estimates (Dependent variable: Inequality)							
Factor endowment x (1/tariff) (Agriculture/Manufacture) x (1/tariff)	0.017*** (0.001)		0.018*** (0.001)	0.017*** (0.001)	0.017*** (0.001)	0.018*** (0.001)	0.018*** (0.001)
Observations	1,736	1,735	1,295	1,724	1,721	1,148	1,134
R-squared	0.989	0.989	0.986	0.989	0.989	0.986	0.987
Capital (% of GDP)	YES	YES	YES	NO	YES	YES	YES
All Controls	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Country Specific Time Trend	YES	YES	YES	YES	YES	YES	YES

Note: Robust standard errors that are clustered at country level are reported in parentheses. \*\*\*p<.01; \*\*p<.05; \*p<.1

Column (2) of Table B.1 use a modified instrument. The factor endowment ratio can be a valid instrument only if comparative advantage theory reflects the actual trade pattern of the country; thus, it should export products that utilizes their relatively abundant factor of production. Directly employing the export ratio of agricultural to manufactured products as an instrument, this study examines the assumption and proves that it is correct by showing a consistent estimate in column (2). Column (3) includes only non-Western countries where approximately 94 percent of civil conflicts have occurred. As shown in column (3), the causal estimate is consistently significant at the 1% level, and its magnitude becomes larger as predicted. In column (4), the analysis uses an alternative measure of capital – the log form of gross capital formation instead of gross capital formation as the percentage of gross domestic product. The consistent causal estimate of column (4) proves that the causal impact of inequality driven by relative factor abundance of land to labor is robust to different measures of capital (the remaining factor of production). Columns (5) to (7) of Table B.1 test the robustness of estimates by including additional controls of social context. Besides the general level of democracy measured by the polity score, other specified dimensions of political mechanism could influence the causal effect of inequality. First, the level of tariff may be affected by the extent to which alternative opinions for policy formation can be pursued in the decision-making process because the optimal tariff that maximizes national interest is not always the most preferable trade policy owing to its distributional effect. Second, the system of checks and balances on the chief executive’s authority, which guarantees freedom of expression and non-violent procedures for exercising political power, may be correlated with tariff rates as well as civil conflicts. Lastly, the regime duration index is added to control the counter-insurgency capability of the autocratic regime, since this kind of regime’s military strength is based on the monopolization of state coercive and administration power, rather than democratic institutions. Thus, by adding the indexes of competitiveness of political participation, executive recruitment, constraints, and regime duration, I can check the effect of omitted variable bias in the baseline

specification. As presented in column (5), the causal estimates of inequality remain constant after addressing all of these political mechanism, indicating that the causal effect of inequality is robust to other political conditions. In addition to political factors, column (6) further examines the effect of possible economic determinants related particularly to developing countries. Remittances are one of the most significant factors determining the severity of poverty in the developing world. Moreover, international foreign aid makes up a large portion of external finance for less-developed countries. However, these two notably significant economic conditions related to developing countries do not change the estimate of the baseline.

## **C List of Included Ethnic Groups**

As described in the manuscript, the ethnic-level analysis includes 221 ethnic groups from 44 countries. Due to space limit, STATA codes for matching ethnic-group names in EPR to individual's ethnicity in IPUMS International will be provided upon request.

Table C.1 List of Ethnic Groups

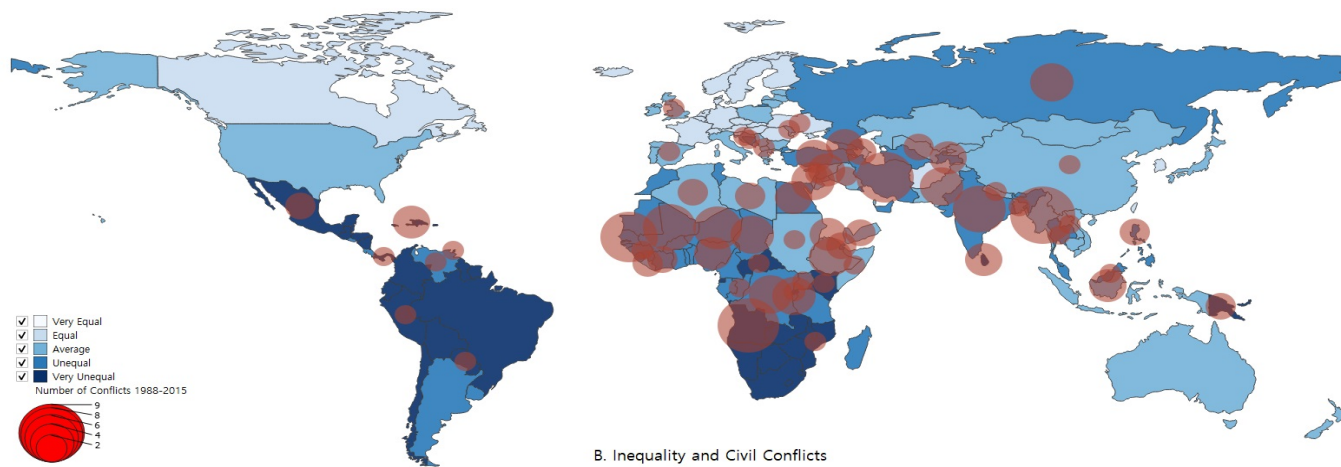
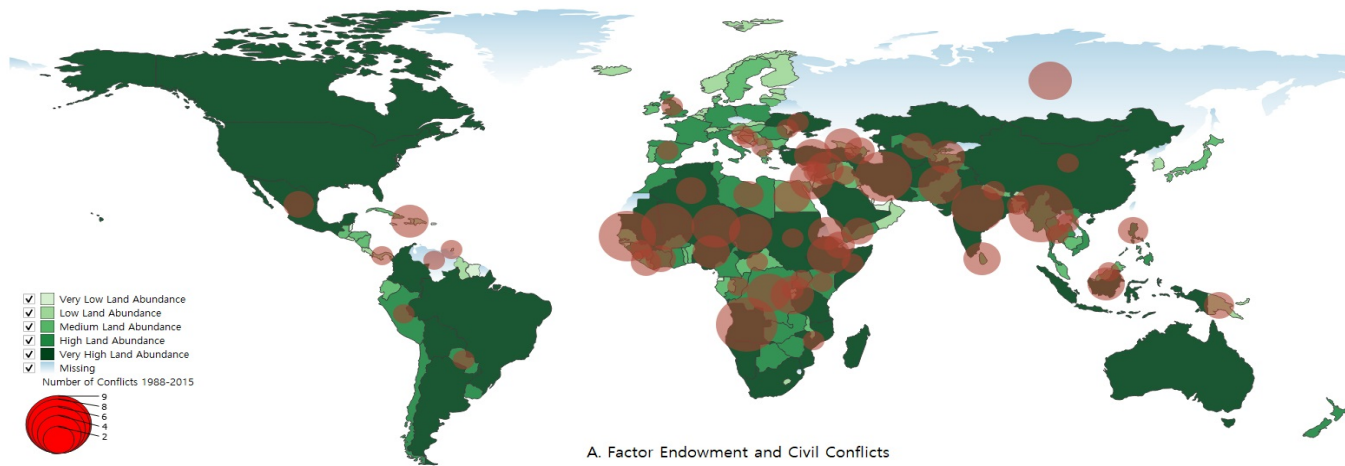
Country	Ethic group category	Country	Ethic group category
Armenia	Armenians	China	She
Armenia	Kurds/ Yezidis	China	Shui
Armenia	Assyrians	China	Tu
Austria	Austrians	China	Tujia
Austria	Slovenes	China	Wa
Bangladesh	Bengali Hindus	China	Gelao
Bangladesh	Bengali Muslims	China	Xibe
Bangladesh	Tribal-Buddhists	China	Blang
Bangladesh	Biharis (Urdu-Speaker)	China	Maonan
Belarus	Byelorussians	China	Kazakh
Belarus	Russians	China	Uyghur
Belarus	Poles	China	Hui (proper)
Benin	South/Central (Fon)	Costa Rica	Whites/mestizos
Benin	Southeastern (Yoruba/Nagot and Goun)	Costa Rica	Afro-Costa Ricans
Benin	Northern (Bariba, Peul, Ottamari, Yoa-Lokpa, Dendi, Gourmanchéma)	Costa Rica	Indigenous peoples
Benin	Southwestern (Adja)	Cuba	Whites
Bolivia	Quechua	Cuba	Blacks
Bolivia	Whites/mestizos	Ecuador	Whites/mestizos
Bolivia	Aymara	Ecuador	Kichwa
Bolivia	Guaraní	Ecuador	Indigenous lowland peoples (Shuar, Achuar etc.)
Brazil	Whites	Ecuador	Afro-Ecuadorians
Brazil	Afrobrazilians	Egypt	Arab Muslims
Brazil	Indigenous peoples	Egypt	Coptic Christians
Cambodia	Cham and Malays	Egypt	Jews
Cambodia	Chinese	El Salvador	Whites/mestizos
Cambodia	Khmer	El Salvador	Indigenous peoples
Cambodia	Vietnamese	Ethiopia	Afar
Cambodia	Khmer Loeu	Ethiopia	Amhara
Cambodia	Thai-Lao	Ethiopia	Beni-Shugal-Gumez
Canada	English speakers	Ethiopia	Harari
Canada	French speakers	Ethiopia	Oroma
Canada	Aboriginal peoples	Ethiopia	Other Southern Nations
Chile	Whites/mestizos	Ethiopia	Somali (Ogaden)
Chile	Mapuche	Ethiopia	Tigry
Chile	Other indigenous groups	Ethiopia	Christian Eritreans
China	Bai	Ethiopia	Muslim Eritreans
China	Bouyei	Ethiopia	Anuak
China	Chinese (Han)	Fiji	Fijians
China	Dong	Fiji	Indians
China	Hui	Ghana	Asante (Akan)
China	Dongxiang	Ghana	Ewe
China	Kirghiz	Ghana	Ga-Adangbe
China	Salar	Ghana	Northern Groups (Mole-Dagbani, Gurma, Grusi)
China	Koreans	Ghana	Other Akans
China	Manchu	Honduras	Whites/mestizos
China	Miao	Honduras	Indigenous (Lenca, Maya-Chorti, Miskito, Tawahka/Sumu, Xicaque, Pech, Nahua)
China	Mongolians	Honduras	Garifuna
China	Tibetans	Hungary	Hungarians
China	Yao	Hungary	Roma
China	Yi	Iran	Arabs
China	Zhuang	Iran	Armenians
China	Dai	Iran	Assyrians
China	Daur	Iran	Azeri
China	Hani	Iran	Baloch
China	Jingpo	Iran	Kurds
China	Lahu		

(Continued)

Country	Ethnic group category	Country	Ethnic group category
China	Li	Iran	Zoroastrians
China	Lisu	Iran	Bahais
China	Mulam	Iran	Jews
China	Naxi	Iran	Persians
China	Qiang	Iran	Turkmen
Israel	Israeli Arabs	Sierra Leone	Limba
Israel	Palestinian Arabs	Sierra Leone	Temne
Israel	Ashkenazim (Jewish)	South Africa	Afrikaners
Israel	Mizrahim (Jewish)	South Africa	Asians
Israel	Russians (Jewish)	South Africa	Coloreds
Kyrgyzstan	Kyrgyz	South Africa	English Speakers
Kyrgyzstan	Russians	South Africa	Blacks
Kyrgyzstan	Uyghur	South Africa	Zulu
Kyrgyzstan	Uzbeks	South Africa	Xhosa
Liberia	Gio	South Africa	Pedi (North Sotho)
Liberia	Krahn (Guere)	South Africa	South Sotho
Liberia	Mandingo	South Africa	Tswana
Liberia	Mano	South Africa	Tsonga
Liberia	Americo-Liberians	South Africa	Swazi
Liberia	Indigenous Peoples	South Africa	Venda
Malawi	Southerners	South Africa	Ndebele
	(Lomwe, Mang'anja, Nyanja, Yao)	South Africa	San
Malawi	Central (Chewa)	Switzerland	Swiss Germans
Malawi	Northerners (Tumbuka, Tonga, Ngonde)	Switzerland	Swiss French
Mali	Blacks (Mande, Peul, Voltaic etc.)	Switzerland	Swiss Italians
Mali	Tuareg	Uganda	Asians
Mali	Arabs/Moors	Uganda	Baganda
Mongolia	Kazakh	Uganda	Basoga
Mongolia	Mongols	Uganda	Karamojong
Mozambique	Makonde-Yao	Uganda	Far North-West Nile
Mozambique	Shona-Ndau		(Kakwa-Nubian, Madi, Lugbara, Alur)
Mozambique	Tsonga-Chopi	Uganda	Langi/Acholi
Netherlands	Dutch	Uganda	Teso
Nigeria	Hausa-Fulani and Muslim Middle Belt	Uganda	South-Westeners
Nigeria	Igbo	Uganda	(Ankole, Banyoro, Toro, Banyarwanda)
Nigeria	Ijaw	Uganda	Banyarwanda
Nigeria	Ogoni	Uganda	Northerners (Langi, Acholi, Teso,
Nigeria	Yoruba	Uganda	Madi, Kakwa-Nubian, Lugbara, Alur)
Nigeria	Tiv	Uganda	Far North-West Nilers
Papua New Guinea	Papua New Guineans		(Madi, Lugbara, Alur)
Papua New Guinea	Bougainvilleans	Uganda	Kakwa-Nubian
Philippines	Christian lowlanders	Uganda	Northerners (Langi, Acholi, Teso)
Philippines	Indigenous	Uganda	South-Westeners
Philippines	Moro		(Ankole, Banyoro, Toro)
Philippines	Fil-Chinese	United Kingdom	English
Portugal	Portuguese	United Kingdom	Asians
Romania	Romanians	United Kingdom	Afro-Caribbeans
Romania	Hungarians	United Kingdom	Catholics In N. Ireland
Romania	Roma	United Kingdom	Protestants In N. Ireland
Romania	Germans	United Kingdom	Scots
Senegal	Wolof	United Kingdom	Welsh
Senegal	Pulaar (Peul, Toucouleur)	Zambia	Bemba speakers
Senegal	Serer	Zambia	Kaonde (NW Province)
Senegal	Mandingue (and other eastern groups)	Zambia	Lozi (Barotse)
Senegal	Diola	Zambia	Lunda (NW Province)
Sierra Leone	Creole	Zambia	Luvale (NW Province)
Sierra Leone	Kono	Zambia	Nyanja speakers (Easterners)
Sierra Leone	Mende	Zambia	Tonga-Ila-Lenje (Southerners)

## D Geographical Distribution

Figure D.1 visually illustrates that areas with high frequency of civil conflict are concentrated in countries with larger land endowment and higher income disparity. About 80 percent of conflicts have occurred in Africa (44.4 percent) and Asia (38.9 percent) and these two regions have the largest land endowment relative to labor: sub-Saharan Africa (0.0045) followed by Asia (0.0035). In terms of inequality, the Gini coefficients in Africa (0.42) and Asia (0.39) are well above that of Western countries (0.29). Although existing studies have discussed the reasons for temporal clustering driven by the wave of global liberalization and the salience of internal conflicts (Blattman and Miguel 2010; Skrede Gleditsch and Ruggeri 2010), spatial clustering has not received enough attention. The obvious pattern of civil conflicts in time and spatial dimensions indicates that the outbreak of civil conflict is not random but the consequence of social choices interacted with geographical conditions.



**Figure 1:** Geographical Distribution of Factor Endowments, Inequality and Civil Conflicts 1989-2016



# Chapter 2

## The Dual Causal Effects of Social Capital on Political Violence: Evidence from Africa

HYE-RYOUNG JUNG

November 18, 2020

### Abstract

*This study analyzes the causal effect of social capital on political violence in Africa. To isolate the exogenous variation of social capital, I use the mode of production of an ethnic group in the precolonial period determined by the proportion of common resources – lakes or river – of its historical homeland. As common-pool resources require collective management that can lead to the emergence of solidarity within the group, it exogenously extends the level of individual trust from the family to the extrafamilial community. Combining the value survey data covering 1,921 districts in 24 African countries from 2005 to 2018 with the data of water bodies of the ethnic homeland, this article finds the dual causal effect of local social capital on political violence – internally at peace but externally at war. Its adverse effect is more pronounced in the district exposed to heterogeneous group interactions, but is moderated in the district with a well-functioning local government council.*

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## I Introduction

What are the causes of repeated political violence in contemporary Africa? Scholars have attempted to answer the question with two types of arguments. Economic explanations of conflict focuses on risk versus returns trade-off in asymmetrical features of strategic games between state and insurgent groups (Collier & Hoeffler, 2004; Cramer, 2002; Fearon & Laitin, 2003; Grossman, 1991). Meanwhile, sociological theories of conflict emphasize the historical origin of cleavages that provoke psychological causes of fight for collective action (Cederman, Weidmann, & Gleditsch, 2011; Gurr, 1970; Østby, 2008; Stewart, 2005). The main argument of this article is aligned with the second strand that focuses on non-material sources of violence. The sociological literature places group grievance at the center and describes how emotional ties mobilize violent collective action against common adversaries (Buhaug, Cederman, & Gleditsch, 2014; Cederman et al., 2011; Gurr, 1970; Østby, 2008). Despite the improved methodology in recent studies, however, the ambiguity in measuring grievance and endogeneity issues in identification strategies constitute an area for further investigations.

To overcome these limitations, this study sheds light on locally shared trust as a source of group solidarity that determines the level of violent mobilization. Finding the exogenous origin of local trust through a network approach of social capital, this article addresses methodological flaws that have plagued previous research and identifies the causal relationship between social capital and violence. Furthermore, this study examines the dual effects of locally shared trust on political violence by focusing on the bonding facet of social capital, and explores the influence of sub-national contexts that moderate or intensify the effects of local trust on violence. The investigation identifies how local trust exerts contrasting causal effects on political violence conditional on the target's affiliation, and which district-level contexts are related to the channel of local trust that exerts its influence on violence.

To provide the causal mechanism of local social capital on violence that is both theoretically coherent and empirically plausible, this article begins with conceptual frameworks that exploit the structural features of social capital. The network approach of social capital clarifies the constructing process of a relational structure over time, which contributes to finding the structural origin of locally shared trust. In network terms, social capital consists of social assets such as

shared norms or trust embedded in dense networks constructed by reciprocal and intensive interactions. Focusing on these assets' social capital driven by dense networks, this study uses the terms trust and social capital interchangeably. These collective assets are available to all members of the network, promoting them the formation of network ties in the next round (Portes, 1998a; Pretty, 2003). To address the joint determination, this study uses common pool resources (CPRs) that precede relational networks as an exogenous origin of local trust. Due to their features – subtractive and open-access– CPRs lead people to collectively govern the natural resources; these dense networks that develop shared norms in a localized setting help to extend trust from the family to the local community (Ostrom, 1990). To complete the causal relationship between local trust originating from CPRs and contemporary violence, the frameworks rest on the premise of culture taken from evolutionary anthropology. This strand of research argues that owing to the costly and error-prone nature of new information, social norms persist through inter-generational transmission from parents to offspring, rather than continually updated (Bisin & Verdier, 2001; Bisin, Topa, & Verdier, 2004). Based on this persistence premise, conceptual frameworks delineate a causal process of local trust, constructed by CPRs of the ethnic homeland, on contemporary political violence.

Having established the frameworks, this paper applies them to Africa and generates falsifiable hypotheses. In Africa, given the sheer availability of land, desert climates, and thin population, inland water bodies such as inlets, lakes and rivers, offer an ideal condition of CPRs that exogenously creates local trust. Inhabitants in well-watered regions such as the Congo Basin or the Zimbabwe plateau could rely on intensive agriculture that cultivates crops year after year, leading the formation of sedentary community near the CPRs. The collective management of the shared and subtractive inland bodies of water helps social norms define proper behavior, such as trust or mutual respect, to evolve among communal members (Ostrom, 1990). Therefore, this study suggests that water bodies in historical homeland are at the origin of contemporary local trust in Africa, and inherited across generations.

After postulating the exogenous origin of local trust in Africa, this study explores the attributes of local trust that are formed in relations with external and heterogeneous groups. Due to Africa's sparsely populated vast hinterlands, local communities have being rarely been penetrated by higher political entities or other heterogeneous communities since precolonial times.

Thus, these dense but closed networks of local communities have a bonding facet of social capital. This bonding social capital is bounded solidarity – altruistic disposition is bounded within community. Its parochial and exclusive nature generates adverse effects of local trust by intensifying the hostility towards out-groups particularly when they compete over limited resources.

The exclusive nature of local trust and chief-centered governance helps to explain political violence in Africa. The lack of extensive administrative networks that cover externally demarcated national boundaries, independent Africa brought about a "bifurcated state" that institutionally and ideologically separate tribes from one another (Mamdani, 2018). Under the condition of internal anarchy, the state institutionalizes the political dominance of certified indigenous tribes over their settled areas. The chiefs of tribes collect taxes, assign propriety rights, resolves disputes in customary courts and mobilize communal militias (Michalopoulos & Papaioannou, 2015; Moleenaar, Tossell, Schmauder, Idrissa, & Lyammouri, 2019; Ubink, 2008). As the influence of chiefs whose authority comes from culture is based on trust of local members, charismatic traditional leaders backed with high local trust are more effectively preserving internal order and mobilizing collective action. Following the bonding facet of social capital, therefore, the local trust may exert contrasting effects on violence – internally pacifying and externally warring.

To test preceding hypotheses, this study merges the Afrobarometer survey covering 1,921 districts in 24 African countries, the geographical features of the historical homelands of 132 ethnic groups and the district-level conflict data. I use the bodies of water in historical homeland as an instrument to isolate exogenous variations of local trust and estimate its causal effect by exploiting within-province variation. These province fixed effects eliminate direct effects of geographical characteristics of homeland on political violence, which enhance the excludibility of instrument.

The results validate that bodies of water in ethnic homeland determine the extent of contemporary local trust, such as trust in traditional leader or their neighbors – whether the descendants live within or beyond the borders of the homeland. Moreover, the trust in local chief significantly reduces violence against civilians and increases violence against external adversaries. The warring effect of local trust is more pronounced in the sub-national jurisdiction where are geographically exposed to frequent interactions with heterogeneous groups, such as areas near national borders, with high road density and ethnic fractionalization. However, the adverse effect of trust in a local chief is alleviated by a local government council which may play a role of mediating

inter-community disputes.

This article complements studies that document the importance of social factors on political violence. The findings are closely related to literature that examines the effect of within-group solidarity on violent behaviors (Browning, Dietz, & Feinberg, 2004; Hansen-Nord et al., 2014; Kennedy, Kawachi, Prothrow-Stith, Lochner, & Gupta, 1998; McIlwaine & Moser, 2001; Portes, 1998b; Portes & Sensenbrenner, 1993). Given the mounting evidence of the correlation between social capital and violence, this article clarifies the direction of the causation and explain it in terms of Africa's state-building trajectories. Moreover, the emphasis of this study on the historical origin of local trust is linked to the literature that investigates precolonial or colonial causes of contemporary African development (Michalopoulos & Papaioannou, 2013, 2016; Nunn & Wantchekon, 2011). This article also belongs to political geography research which traces sub-national variations in political outcomes to strategic decisions of local ruling elites in response to the spatial reach of central power and inter-community relationships (Boone, 1998, 2003, 2019; Herbst, 2014; Mann, 1984).

The remainder of this article is organized as follows. The following section explains conceptual frameworks and their applications to African context. The conceptual frameworks describe the theoretical logic of the causal relationship among CPRs, local social capital and political violence. Based on the framework, the historical background of Africa is explained to suggest hypotheses. Section III describes data and identification strategies. Section IV presents empirical results from the analysis. Section V shows the results of falsification test. Section VI explores the heterogeneous effects of local trust across different contexts. The last section concludes.

## **II Conceptual Frameworks and Applications**

### **A CPRs and Local Social Capital**

#### **A.1 CPRs as the Origin of Social Capital**

This study focuses on the macro-level structural dimension of social capital that is configured by network to capture the causal process of local trust on political violence (Coleman, 1988, 1994; Lin, 1999; Lin, Castiglione, Van Deth, & Wolleb, 2008; Portes, 1998b; Putnam, 1995). Here, social



network represents the feature of relational structure through density or range of ties (Lin et al., 2008). A person forms ties with others through social interactions such as sharing resources or transferring information. Then these ties form social network structure reflecting its peculiar features of relationship at the aggregate level. For instance, dense networks is an indicative of reciprocal and intense interactions among people who are routinely contacted (Coleman, 1988, 1994; Putnam, 1995). This dense network structure is regarded to possess collective assets such as social norms or trust, which also refers to social capital (Adler & Kwon, 2000; Coleman, 1988; Fukuyama, 1995; Putnam, 1995). To explore the causal effects of social capital, I concentrate the assets of social capital embedded in dense networks which allows me to interchangeably use trust and social capital.

In terms of causality, the primary concern of this network-based social capital lies in its circular logic: dense social networks create an efficacious community with high trust; at the same time the social ties can be endogenously made among trustworthy individuals (Durlauf et al., 1999). To address the joint determination or reverse causality issues, this study uses CPRs, which are randomly distributed so that independent from any social outcomes, as the exogenous source of variation in trust within community. Here, CPRs indicate the subtractive resources that are subject to joint use by multiple appropriators, such as lakes, a groundwater basin, or fishing ground. If inhabitants reside for substantive time near CPRs, the chronic "crowding effects" and "overuse" problems in the limited resources induce them to collectively govern the CPRs. These repeated interactions in small close-knit groups engender self-enforcing cooperative behavior such as mutual trust or respect, through evolutionary learning process (Axelrod, 1986; Ostrom, 1990; Young, 2015). This is consistent with the network perspective of social capital in that "greater density enhance offering and sharing member's resources, so that the internal social capital is expected to enhance the collectivity's solidarity and cohesion" (Lin et al., 2008, 64). Therefore, the level of individual trust is extended from family to extrafamilial community through the small-scale CPRs that creates dense and intensive networks within a localized area (Ostrom, 1990; Pretty, 2003)

## **A.2 Persistence of Local Social Capital**

To provide a rationale for using the CPRs in an ethnic homeland hundreds of years ago as a predictor of descendants' trust today, this study takes the theoretical perspective of culture from the research in evolutionary anthropology. The literature views culture as a general belief about "right" things to do and rules of thumb in decision making that can apply to different situations (Nunn & Wantchekon, 2011). Using theoretical models, Bisin and Verdier (2001) and Boyd and Richerson (1995) show that natural selection favors the persistence of social norms as individuals who have inherited social norms from their parents, rather than the ones who continually update norms with changes incurred during their life time, are more likely to survive due to the cost of acquisition and fallibility of new knowledge (Bisin & Verdier, 2001; Bisin et al., 2004; Boyd & Richerson, 1995, 2005; Guiso, Sapienza, & Zingales, 2006).

The persistence of trust also has been empirically supported by a number of studies. Nunn and Wantchekon (2011) find that a culture of mistrust formed by the slave trade determines the current level of trust in Africa. Guiso et al. (2016) shows that contemporary differences in social capital between the north and south of Italy can be traced back to the medieval free city-state experience. Algan and Cahuc (2010) and Rice and Feldman (1997) find strong correlations between the level of trust among the U.S. immigrants and that of their origin countries no matter how far and how long ago they emigrated. All of these findings suggest that trust originated by historical legacies is passed through generations.

## **A.3 CPRs and Local Trust Building in Africa**

The natural and political environments in precolonial Africa – plentiful open land, thin population, and loose political ties between center and local – are ideal conditions to generate local social capital based on CPRs (Herbst, 2014). Endowed with sheer amount of land and low population density, the land in precolonial Africa is considered as a free good (Lancaster, 1979; Herbst, 2014).

Relying on rain-fed extensive farming, inhabitants of the dry region like the deserts of the Sahara or Botswana cultivate a certain selected piece of virgin land and then move to another area when most arable land in the vicinity is exhausted (Dore, 2001; Kusimba, Kusimba, & Agbaje-Williams, 2006). Hence, the inhabitants whose mode of production relies on land have little

**Table 1: The Mode of Production and Community Settlement in Precolonial Africa**

	Types of settlement				Mean Difference (1) -(3)
	Permanent community-based settlement		Nomadic family-based settlement		
	Mean (1)	SD (2)	Mean (3)	SD (4)	
<i>Panel A. Natural environment</i>					
Ln Water (km)	0.476	[0.406]	0.325	[0.350]	0.151***
<i>Panel B. Mode of production</i>					
Fishing	1.055	[0.836]	0.525	[0.791]	0.530***
Agriculture	6.221	[0.980]	5.564	[1.30]	0.656***
Animal Husbandry	1.576	[0.996]	2.617	[1.271]	-1.041***
Hunting	0.731	[0.726]	0.889	[0.610]	-0.158***
Observations (number of ethnic group)	40,670 (70)		28,140 (62)		68,810 (132)

Notes: The data is extracted from studies by Michalopoulos and Papaioannou (2013, 2016), which is originally from Ethnographic Atlas (Murdock, 1967).

incentive to make rules due to the perfectly elastic supply of the land and the dispersed nomadic settlement pattern.

The opposite occurs for communities living near inland bodies of water. The inhabitants in well-watered regions, such as the Great lakes region of East Africa or the West Africa forest zone, can manage the intensive agriculture by using inland water resources. This environment enables the indigenous people to maintain a sedentary community-based settlement pattern and to collectively control the limited joint-use resources which later contribute to the formation of trust within the community (Bennett, 1973; Dore, 2001; Kusimba et al., 2006).

The data from Ethnographic Atlas (Murdock, 1967) supports that bodies of water in the ethnic homeland determines the mode of production and, accordingly, the pattern of settlement. As shown in Table 1, if the mode of production is dependent on land such as animal husbandry or hunting, ethnic groups that largely consist of hunter-gatherers and mobile pastoralists tend to settle in family-based patterns. In contrast, if the ethnic homeland contains enough water resource that leads inhabitants to engage in intensive farming, these ethnic groups are more likely to have sedentary settlement patterns of permanent and compact communities. Applying to network approach of social capital, the inhabitants who form community due to the presence of water bodies in their localized areas, are more likely to have communal solidarity or trust than nomadic and family-based tribes, and this high trust within community that transmits across generations determines the current level of local trust.

## **B Local Social Capital to Political Violence**

### **B.1 Duality of Local Social Capital**

This section explores how local trust is related to intra-/inter- community violence. The attributes of local trust toward out-groups are determined by the local community's relations with heterogeneous groups beyond its communal boundary. If the community is isolated and rarely makes networks with out-groups, the CPRs-driven dense networks will have the bonding facet of social capital. Studies of social capital argue that bonding social capital has dual features. On the one hand, it creates thick trust and cohesion within group. On the other hand, it is inward looking, benefits only internal members and exclude out-groups (Jennings & Sanchez-Pages, 2017; Leonard, 2004; Portes, 1998b; Putnam, 2000).

These aspects of bonding social capital are pertinent to explain the violence. The trust within the local community facilitates collaborative actions in response to a hostile inter-community environment (Jennings & Sanchez-Pages, 2017). To mobilize combatants, the community should overcome public goods dilemma because the returns of battle go to everyone but the cost is incurred only by participants (Lichbach, 1998). Shared solidarity and emotional ties are potential sources that enable rational individuals to make self-sacrifice for communal benefits (Cederman et al., 2011). Empirically, it has been observed that local community-based militias were mobilized through young villagers, such as self-defense forces in villages against Taliban insurgency in Afghanistan or the civic forces of young students, farmers and hunters against political rebels of Revolutionary United Front (RUF) in Sierra Leone (Jennings & Sanchez-Pages, 2017).

Moreover, closed networks of bonding social capital make the inter-community relationship vulnerabel to armed clashes. Portes (1998b) captures this attribute with the concept of *bounded solidarity* - altruistic dispositions of individuals derived from mutual trust and solidarity within community is not universal but bounded by the community. Its parochial and exclusive nature generate negative outcomes by intensifying hostility towards out-group members. Sherif's (1961) experimental study finds that the competitive activities among groups of teenage boys promote group solidarity while producing hostility against members of out-group (Sherif, 1961). Thus, the parochial altruistic facet of social capital leads the region where heterogeneous communities with strong solidarity reside together over limited resources to be subjected to prevail hostile

inter-community relationships.

## **B.2 Local Trust and Political Violence in Africa**

Closed and dense networks that reflect bonding social capital are easily found in most African communities that higher political entities have rarely penetrated. Although centralized polities such as the Zulu empire and Kuba kingdom existed in precolonial Africa, their leaders lacked the infrastructure to project a formal authority beyond the center of polity (Herbst, 2014; Kusimba et al., 2006; Monroe, 2013). In colonial times, Europeans drew artificially national boundaries but did not establish national administrative networks because of sparsely populated vast hinterlands (Besley & Reynal-Querol, 2014; Boone, 2017; Herbst, 2014). With the inherited incomplete administration structure, post-independence Africa was unable to collect taxes. The lack of national revenue prohibited the development of state apparatus to impose its power on outlying areas and blocked African leaders from establishing a monopoly of violence over their own territories (Herbst, 2014). The result was a "bifurcated state" that institutionally and ideologically separates rural hinterlands from the central cities and ethnic groups from each other (Mamdani, 2018).

Under this domestic anarchy, contemporary African governments institutionalized the political autonomy of traditional leaders to govern their local areas. Local governance in Africa has three characteristics. First, the legitimacy of traditional leaders derives from tribal culture and from the recognition of the state (Boone, 2017; Ubink, 2008). Second, the jurisdiction of local chief is not communal but territorial. Although the basic layer of chiefdom is the village, territorial jurisdiction can be a district or a sub-district (Boone, 2017; Molenaar et al., 2019). In countries like Niger, a state-recognized chief governs other local communities that often have their own tribal chiefs within the district. In countries like Mali, the territorial jurisdiction is the sub-district but local chiefs compete to be elected head of the district office (Molenaar et al., 2019). Thus, district-level jurisdiction necessarily reflects inter-community interactions that fight for political power or economic benefits. Third, the *de facto* ruler of the sub-national level governance is traditional leader. The district-level local government council that chiefs often join as advisors may mediate inter-community disputes, but the role of local government is limited to the provision of public goods, such as education, health or sanitation (Michalopoulos & Papaioannou, 2015; Ubink,

2008). The local chiefs resolve communal disputes in customary courts, allocate propriety right of natural resources, collect taxes and make security decisions (Michalopoulos & Papaioannou, 2015; Molenaar et al., 2019; Ubink, 2008).

Due to the absence of a national monopoly of violence, the chief-centered governance in resolving security issues fit neatly into the dual effects of bonding social capital on political violence. As the authority of chief's rule derives from historically shared memory and culture, local trust is one of critical resources that chiefs exercise their influence in community. Charismatic chiefs who possess thick trust of their members may be effective in mediating disputes, controlling violent conflicts, or mobilizing communal militias.

In the domestic anarchic condition, chiefs have to confront security problems in their local environment where independent non-state armed forces or other communities militias may attack their civilians. These non-state militias invade the territory of others to loot properties, seize more lands or fulfill their political/religious goals. In the face of these external threats, the response of traditional leaders depends on their capacity to fend off the attacks. If a chief does not have the capacity, s/he leaves communal members exposed to unilateral assaults of militias. However, if a chief has the support of communal members, s/he intervenes as a credible mediator. At worst, the chief mobilizes communal defense militias. For instance, High Council for Azawad Unity, a military force, was founded by traditional leader to provide security for their community in Kidal regional of Mali, from the threats posed by Liberalization of Azawad (Molenaar et al., 2019; Raleigh, Linke, Hegre, & Karlsen, 2010).

Thus, the community with high local trust whose leaders control the disputes have fewer civilian deaths from political violence. Using the non-violent channel, the chiefs may mediate conflictual issues, such as access to natural resources or trafficking routes, and find mutually negotiable positions. If they fail to negotiate an end to the conflict, the chief can call on community militias to protect their civilians from external threats. Therefore, no matter whether the channel is violent or not, the civilians with a high trust are more secure than those in a community with low trust. By the same token, this means that a community with high trust in their chiefs may have more battles against out groups as described in the negative effects of bonding social capital. Without a monopoly of violence, inter-community competitions over limited resources may end in armed conflict if both sides can easily rally their militias. Therefore, bonding social capital in

African communities may have a pacifying effect on internal violence – violence against civilians –; but, it exerts a warring effect – battle with other militias.

### **III Data and Methodology**

#### **A Data and Measurement**

This study uses trust in traditional leader and trust in neighbors as proxy variables for local social capital driven by bodies of water in historical homeland. Particularly for capturing the relationship between local trust and violence, the trust in chief may be an appropriate proxy variable as traditional leaders play a central role in making decisions for security issues at the sub-national level. Table 2 provides descriptive statistics for the key variables used in the analyses. The trust reported in panel A of Table 2 is from Afrobarometer survey version 3 to 7, conducted from March 2005 to September 2018. The surveys have a potential sample of 10,651 to 53,374 respondents from 132 ethnic groups in 1,921 districts of 24 African countries. The respondents are asked how much they trust their traditional leader (i.e., local chief), neighbors, elected local government council and the president. Each of level of trust is measured by four point Likert scale: 0 corresponds to "not at all"; 1 to "just a little"; 2 to "somewhat" and 3 to "a lot." The trust in local government council or the president is used as a placebo to validate the causal estimates of the interest.

Different types of political violence are explored to examine the dual effects of local social capital on violence. The data of violence is obtained from the Armed Conflict Location and Event Data Project (ACLED). This data set includes dates and locations of events, fatalities, types of political violence and affiliations of participating actors. Six types of violent events are included in ACLED: 1) battles, 2) remote violence, 3) protests, 4) riots, 5) strategic developments and 6) violence against civilians. This study includes types 1 and 6, and identifies two groups – internal violence or external violence – according to whether the targets of violence are inside or outside of the community. Internal violence is defined as the violence against communal members; external violence includes battles between non-state militias, or between militias and state military or foreign forces. The violence is measured by the log of the mean value of fatalities/or incidences for the years matched with the survey periods for respective countries.

**Table 2: Descriptive Statistics**

	Obs.(N of samples)	Mean	SD	Min	Max
Panel A. Trust					
Trust in traditional leader	1,921 (36,776)	1.730	0.665	0	3
Trust in neighbors	1,036 (10,651)	1.740	0.552	0	3
Trust in local government council	1,671 (36,621)	1.487	0.617	0	3
Trust in president	1,706 (53,374)	1.716	0.599	0	3
Panel B. Instrument					
Community settlement	1,901 (132)	0.605	0.456	0	1
log (area under water + 1 in $km^2$ )	1,921 (132)	0.415	0.394	0	1.826
Panel C. Violence					
log (fatalities of violence against civilians (vac) by militias + 1)	1,921	0.105	0.39	0	4.813
log (fatalities of vac by state forces + 1)	1,921	0.025	0.163	0	3.911
log (fatalities of battles between militias + 1)	1,921	0.037	0.21	0	2.918
log (fatalities of battles between militias and state + 1)	1,921	0.074	0.352	0	4.855
log (incidences of vac by militias + 1)	1,921	0.090	0.252	0	3.597
log (incidences of vac by state + 1)	1,921	0.028	0.125	0	3.175
log (incidence of battels between militias + 1)	1,921	0.016	0.070	0	1.224
log (incidence of battelsbetween militias and state + 1)	1,921	0.038	0.152	0	2.236

*Notes:* The descriptive statistics in this table are computed at the district level. The number of raw samples is reported in parentheses in the observation column. The sample includes approximately 10,000 to 53,000 individuals from 132 ethnic groups in 24 African countries, and covers 14 years time periods (2005 to 2018). The fatalities (or incidences) of violent events are measured by the log of the mean of fatalities (incidences) for the years matched with the survey periods for respective countries. In Appendix A1, the descriptive statistics of all 16 covariates are reported.

Ethnic-level data are extracted from studies by Michalopoulos and Papaioannou (2013, 2016). The data are originally from Murdock's ethnolinguistic map (1959) that records spatial distribution of African ethnic groups and *Ethnographic Atlas* describes cultural and institutional traits of ethnic groups in precolonial era (Murdock, 1959, 1967). Michalopoulos and Papaioannou (2013, 2016) compile these data and provide a richer country and ethnic-level data set by adding geographic and ecological endowments of ethnic homeland. As reported in panel B of Table 2, the instrument variable, bodies of water, is estimated by log form of total number of square kilometers under water. The community settlement of ethnic group equals 1 if the precolonial settlement pattern of the group is compact and permanent community-based and 0 if the types of settlement are nomadic, dispersed family homes or separate hamlets. As shown in panel B of Table 2, almost 61% of ethnic groups formed sedentary communities in the precolonial period. This study includes 16 controls that are related to the geographical features, political characteristics of precolonial ethnic groups, colonial legacies, and demographics of survey respondents to address statistical concerns related to confounding factors. The detailed descriptions on the covariates are followed in the next section and the summary statistics for 16 covariates are reported



in Appendix Table A1.

## B Estimation strategy

Established hypotheses can be schematically summarized as "(a) Bodies of water in ethnic homeland  $\Rightarrow$  (b) community settlement of ethnic group in precolonial era  $\Rightarrow$  (c) ancestor's trust within local community  $\Rightarrow$  (d) current level of local trust  $\Rightarrow$  (e) political violence." To reflect these causal processes, this study uses two levels of 2SLS equations. The individual-level causal chains from (a) to (d) are examined by equations (1) and (2). Building on the reduced form of preceding estimations, the district-level causal chains from (a), (d) and (e) are identified by equations (4) and (5).

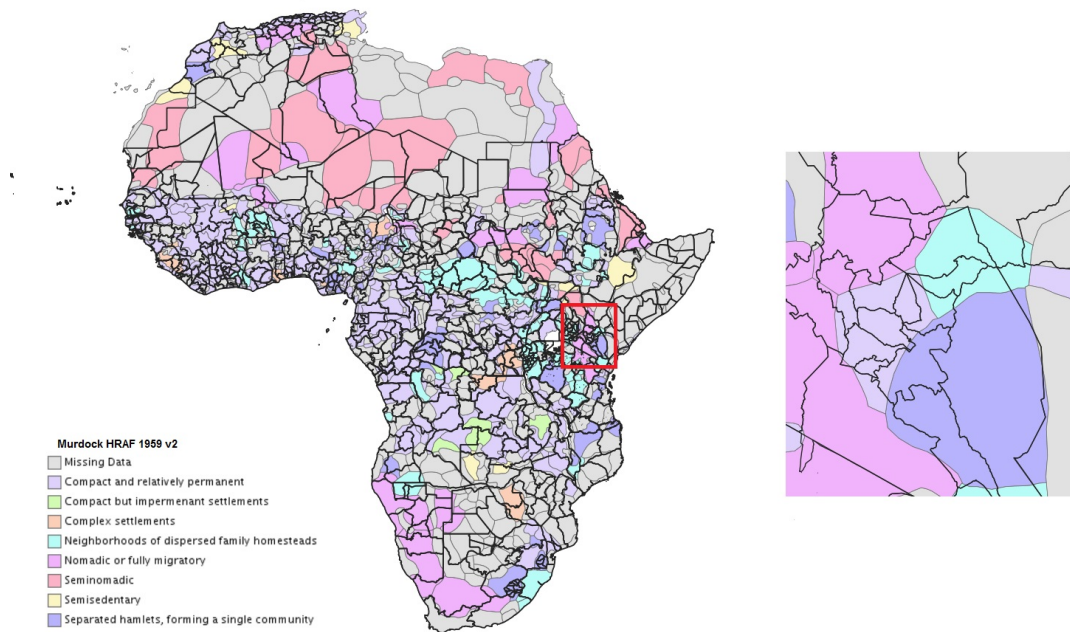
Equation (1) is the first-stage estimation that measures correlation between bodies of water in the ethnic homeland and the community-based settlement of ethnic group. Equation (2) is the second stage estimation that identifies the causal effect of community settlement on the current level of individual's trust in his/her local chief or neighbors.

$$Settlement_{iedpc} = \alpha Z_{ec}^{Water} + X_{ec}^G \Gamma + X_{ec}^E \Omega + X_{iedpc}^C \Phi + X_{iedpc}^D \Pi + \lambda_p + \varepsilon_{iedpc} \quad (1)$$

$$Trust_{iedpc} = \beta Z_{iedpc}^{Settlement} + X_{ec}^G \Gamma + X_{ec}^E \Omega + X_{iedpc}^C \Phi + X_{iedpc}^D \Pi + \lambda_p + v_{iedpc} \quad (2)$$

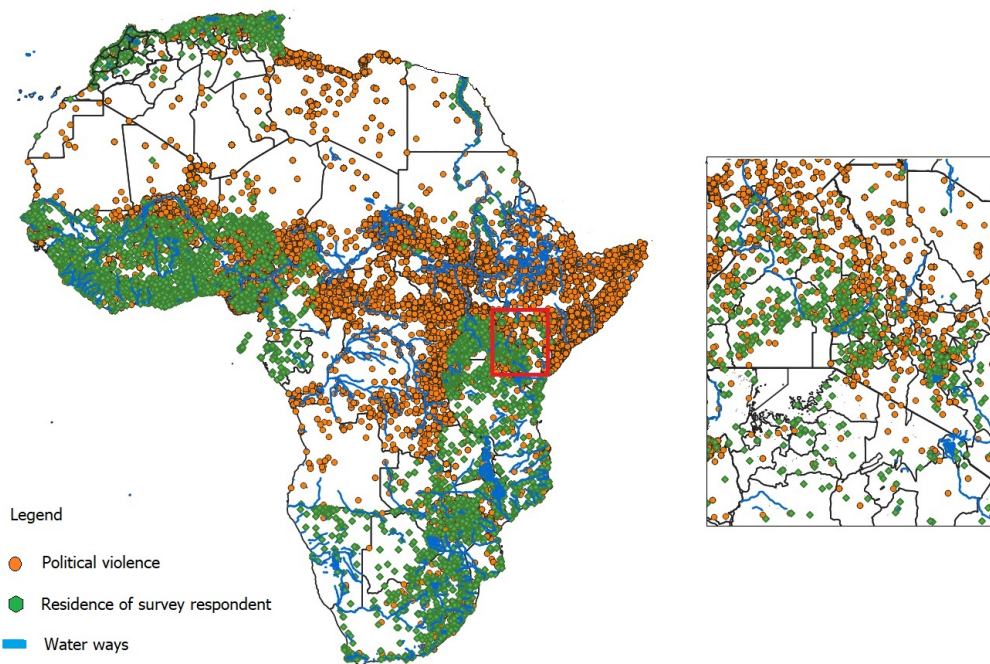
where  $i$  indexes individuals,  $e$  ethnic group,  $d$  district,  $p$  province and  $c$  country.  $Settlement_{iedpc}$  indicates the precolonial settlement pattern of ethnic group.  $Trust_{iedpc}$  denotes the level of individual's trust.  $Z_{ec}^{Water}$  denotes areas under water in historical homeland and  $X_{ec}^G$  denotes the historical ethnic homeland characteristics such as the mean level of elevation or the soil suitability for agriculture. These features are included to address potential confounding factors that might affect to the construction of local trust beside inland water bodies in the precolonial era.  $X_{ec}^E$  is the ethnic characteristics, which might affect the descendant's trust, including the level of jurisdictional hierarchy or the types of hereditary succession.  $X_{iedpc}^C$  indicate historical legacies of colonial period to address the influence of historical experience besides community settlement on local trust.  $X_{iedpc}^D$  is the demographic characteristics that may be related to the trust within community, such as education or employment status.  $\lambda_p$  denotes province fixed effects.

The level of analysis in the second causal chain is a district to examine the causal effects of



**Figure 1:** *The Ethnic Homeland of Precolonial era and Contemporary Boundary of Province*

Notes: Figure 1 shows the geographical boundaries of ethnic homelands with colored clusters, while the borders of provinces are partitioned by black line. As shown in the extended image of panel B, the territorial size of historical ethnic homeland is much larger than the province, offering the rationale why province-fixed effects can address the direct effects of geographical features of homeland on political violence (Sources: Murdock's Human Area Relational File 1959 v.2 and Open Street Map from United Nations Offices for the Coordination of Humanitarian Affairs (UNOCHA)).



**Figure 2:** *Violence and Trust Respondents*

*Notes: Figure 2 depicts the geographical distributions of survey respondents in green dots, the incidences of political violence with orange dots and main water ways with blue lines. The rectangle on the right is the extended image of confined areas on the map of Africa (Sources: ACLED, Afrobarometer Survey (Round 6) and Open Street Map from UNOCHA).*

bonding social capital on political violence. This paper employs a district as the unit of analysis for three reasons. First, the jurisdiction of local chief is territorial, rather than communal in contemporary Africa. After the independence of Africa in 1960s, the internal migration including rural-to-rural and rural-to-urban has become a common trend in most of African countries. Nearly 50-60% of population now live in the place out of the boundaries of historical ethnic homeland, and almost 50% of all domestic migration consist of the flows across ethnic groups (Boone, 2017; Nunn & Wantchekon, 2011). As the jurisdiction of chiefdom is territorial, the immigrants who belong to different tribes are governed by the chief of the newly settled area (Boone, 2017). Therefore, it is district, rather than tribe, that captures the influence of local chiefs on violence. Second, the district-level jurisdiction may reflect inter-community relationships. The parochial nature of local trust may be emerged in relational structure when a community is exposed to interaction with heterogeneous groups. The district is the arena of the competition among local chiefs – they compete to be appointed a chief of leading tribe in the sub-national governance since the position grants advantageous access to resources within the district (Molenaar et al., 2019). Thus, the district-level average of local trust captures well the relationship between the bonding social capital and political violence. Third, the centralization of traditional authority is diverse in Africa. Some communities traditionally are loosely connected without chiefs, which are later governed by state-recognized chiefs. Thus, if disaggregated at the community (or village) level, battles between sub-districts where belong to same local chiefs cannot capture the effects of local trust on violence.

Accordingly, local trust is estimated as the average of trust in the local chief of the respondents who live in the same district from 2005 to 2018. Similarly, the outcome variable is measured as the mean number of fatalities of political violence within the district during the observation periods. The ethnically originated variables including the instrument – bodies of water in historical homeland– are measured by ethnic population-weighted average as denoted in equation (3).

$$X_{dpc}^E = \sum \left\{ \frac{N_{iedpc}}{N_{dpc}} \right\} X_e^E \quad (3)$$

where  $N_{iedpc}$  denotes the number of individual  $i$  of ethnicity  $e$  living in district  $d$  located in province  $p$  in country  $c$ .  $N_{dpc}$  indicates the total number of respondents living in district  $d$ ,

province  $p$  in country  $c$ .  $X_e^E$  indicates the ethnic group's features of precolonial era. Thus, the district average of ethnic characteristics,  $X_{dpc}^E$ , is weighted by the proportion of ethnic-population,  $N_{iedpc}$ , to the total population  $N_{dpc}$ . This weighted average of ethnic population is applied to all ethnically originated variables, which are denoted as  $X_{drc}^G$ ,  $X_{drc}^C$  and instrument,  $Z_{dpc}^{Water}$ , in the following equations (4) and (5).

Using the reduced form of the first causal chain that water bodies in ethnic homeland determines the current level of individual's trust in his/her local chief as the first-stage in equation (4), this study identifies the causal relationship between local trust and political violence by equations (5). The first-stage estimation in equation (4) isolates the exogenous variation in local social capital through ethnic-population weighted average of water bodies in historical homeland, and then, using the extracted local social capital, the equation (5) estimates the causal effect of the local trust on political violence at the district level.

$$Trust_{dpc} = \gamma Z_{dpc}^{Water} + X_{dpc}^G \Theta + X_{dpc}^E \Lambda + X_{dpc}^D \Pi + X_{dpc}^D \Psi + \lambda_p + \zeta_{dpc} \quad (4)$$

$$Violence_{dpc} = \delta Trust_{dpc} + X_{dpc}^G \Theta + X_{dpc}^E \Lambda + X_{dpc}^C \Pi + X_{dpc}^D \Psi + \lambda_p + \zeta_{dpc} \quad (5)$$

where all variables are estimated as district-level average values. All control variables in the vector of  $X^G$ ,  $X^E$ ,  $X^C$  and  $X^D$  are the same except the unit of measurement. The province fixed effects,  $\lambda_p$  are included to control all common characteristics across districts within the same province. As shown in Figure 2, the province is smaller than the ethnic homeland; thus, exploiting within-province variation accounts for differences in the physical and natural endowments of homelands as well as omitted variables at national level including the nationality of colonizer, differences in national policies and other national wide factors.

## IV Results

### A Community Settlement and the Formation of Local Trust

Table 3 presents the results of the first causal chain that individual's trust in local community is originated from the bodies of inland water resources of his/her ancestor's homeland. The

parsimonious specifications in columns (1) to (3) gradually include covariates to access the bias from unobservables; and, the baseline specification in columns (4) to (7) contains all sets of covariates but uses different types of trust. I describe the rationals for the inclusion of each set of covariates before presenting the results.

The geographical features of ethnic homeland are included to strengthen the excludibility of the instrument – inland water bodies. Possessing the water resources are not only related to the pattern of settlement, but also other geographically endowed conditions that are correlated with the formation of local trust and political violence. Specifically, the low level of elevation and the fertile soil may be correlated with water bodies, which are also related to the incidence of armed conflicts. Moreover, the well-watered regions in Africa are mostly located in climatically favorable areas where the centralized polities are emerged, which can affect political stability as well as trust in their leaders. To control these possible paths beside the community settlement (or local trust), which water bodies affect political violence, I include the suitability level of soil and climate for agriculture, the level of elevation, the ecological vulnerability of malaria, and latitude of ethnic homeland as covariates.

In addition, I control the characteristics of precolonial ethnic institutions which are correlated with community settlement, local trust or political violence to address omitted variable bias. For instance, a centralized institutional structure reflects a high degree of accountability and capability of leaders who can exert political clout beyond villages. The presence of centralized polities in ethnic homeland above chiefdom may lead to shape extended political identity as well as it affects internal stability within the community. Moreover, as Michalopoulos and Papaioannou (2013) suggest, the quality of precolonial ethnic institution determines current regional development, which may be associated with contemporary political violence. To address spurious correlations driven by these possible confounding variables, this study controls the proxy variables for institutional development and social hierarchy of precolonial ethnic groups, such as the level of jurisdictional hierarchy beyond local community, the size of precolonial community, the types of hereditary succession and the type of domestic organization.

Besides the features of precolonial Africa, historical legacies of the colonial period are controlled to address omitted variable bias. Nunn and Wantchekon (2011) argue that slave trade from 1400 to 1900 creates the culture of mistrust in Africa, which in turn makes the continent

prone to armed conflicts through regional underdevelopment. Moreover, the concentric political structure of colonial Africa generates different trajectories of development conditional on the distance to political core. Thus, geographical proximity to respective capital city might be correlated with the trust in political leaders and internal stability since the areas around city has higher likelihood of modernization by adopting the Western institutions or technologies. To control all of these potential confounding factors, I include variables indicating the severity of slavery and the distance to the nearest sea as proxies for slave trade, and indicator for the presence of main city in 1400 as covariates. The baseline specification also controls the level of urbanization of current location and the individual controls for age, gender, the level of education and the employment status. All of these demographic characteristics are included to minimize the other influences on individual's trust except the norms inherited from their parents.

Panel A of Table 3 reports 2SLS estimates of equation (2). The estimates from columns (1) to (3) presents the causal effect of precolonial community settlement on the current level of trust for a specification that progressively adds a set of covariates. All of the 2SLS estimates in parsimonious specification are statistically and economically significant, and are unaffected by the inclusion of covariates. Comparing these estimates, the estimate for a baseline specification with the full set of covariates in column (4) remain unchanged, indicating that the estimates are unlikely to be biased by unobservables. In panel B, the OLS estimates of equation (2), in contrast, are very close to zero and generally insignificant. The findings imply that the instrumental variable approach addresses endogeneity that may be attenuating the OLS estimates.

The results in panel A validate that water bodies in homeland where ancestor inhabited during precolonial era determines the type of settlement, and the high local trust driven by community settlement transmits to descendants. According to point estimate in baseline specification reported in column (4), individual whose ancestors constructed a sedentary community has 0.36 higher trust in his or her local chief, which amounts 21% of sample mean, than those whose ancestor's precolonial settlement is nomadic or dispersed family based. The community settlement also increases the trust in neighbors, another measure of local trust, by 37.5% of sample mean, an effect that is statistically significant at the five percent level. There are non effect in between precolonial community settlement and the trust in other types of political leaders beyond the local community– the placebo outcomes–, providing a confirmation of the validity of

**Table 3: Community Settlement and the Formation of Trust**

Dependent variable (panels A, B and C)	Parsimonious specifications			Baseline specification			
	Trust in traditional leader (1)	Trust in traditional leader (2)	Trust in traditional leader (3)	Trust in traditional leader (4)	Trust in neighbors (5)	Trust in local govt council (6)	Trust in national president (7)
<i>Panel A. 2SLS estimates</i>							
Community settlement	0.426*** (0.131)	0.555** (0.226)	0.366** (0.179)	0.359** (0.171)	0.652** (0.329)	0.217 (0.194)	0.247 (0.241)
<i>Panel B. OLS estimates</i>							
Ln (Bodies of water)	0.058* (0.031)	0.033 (0.035)	0.046 (0.036)	0.041 (0.034)	0.103* (0.061)	-0.044 (0.033)	0.041 (0.040)
R <sup>2</sup>	0.163	0.167	0.168	0.185	0.263	0.140	0.138
<i>Panel C. Reduced-form estimates</i>							
Ln (Bodies of water)	0.140*** (0.041)	0.114** (0.046)	0.100** (0.050)	0.098** (0.048)	0.158** (0.068)	0.055 (0.047)	0.063 (0.063)
R <sup>2</sup>	0.163	0.167	0.168	0.185	0.264	0.140	0.138
Dependent variable (panel D):				Community settlement			
<i>Panel D. First-stage estimates</i>							
Ln (Bodies of water)	0.324*** (0.062)	0.301*** (0.045)	0.318*** (0.046)	0.318*** (0.046)	0.246*** (0.071)	0.293*** (0.050)	0.289*** (0.047)
KP F-Stat	32.64	24.70	36.51	36.61	10.63	22.12	28.56
Controls (for all panels):							
Geographical features	YES	YES	YES	YES	YES	YES	YES
Ethnic features	NO	YES	YES	YES	YES	YES	YES
Colonial features	NO	NO	YES	YES	YES	YES	YES
Demographics	NO	NO	NO	YES	YES	YES	YES
Province fixed effects	YES	YES	YES	YES	YES	YES	YES
R <sup>2</sup>	0.815	0.854	0.869	0.869	0.885	0.866	0.864
Observations (for all panels):	37,891	37,076	37,076	36,776	10,651	36,621	53,374

*Notes:* The unit of observation is an individual. The standard errors are clustered at the district level. Kleibergen-Paap F-statistics are reported in panel D. The geographic features of ethnic homeland are 1) the distance from the centroid of ethnic homeland to the nearest sea, 2) latitude, 3) ecological vulnerability of malaria, 4) the mean level of elevation, and 5) the climate and soil suitability for agriculture. The controls for ethnicity characteristics include 6) the jurisdictional hierarchy beyond the community, 7) the type of hereditary succession, 8) the size of community and 9) domestic organization. The colonial historical legacy controls are 10) the presence of a major city around 1400 in the homeland and 11) the severity of slavery. The demographic features are 12) the level of urbanization, 13) the respondent's age, 14) gender, 15) the level of education and 16) employment status.



the causal relationship between community settlement and local trust – trust in local chief and their neighbors.

The panel C reports the reduced-form effects of bodies of water on the current level of trust in traditional leader. The effect of instrument on the trust in traditional leader and trust in neighbors are positive and statistically significant at the five percent level, while there is no effect of water bodies on the trust in other types of political leaders beyond local communities. As internal norms are emerged among people who are tied together in a network of interdependence, inhabitants who share the small scale CPRs in precolonial era can build mutual trust only within localized setting. The first-stage estimates of equation (1) is shown in panel D of Table 3. The estimates of correlation between bodies of water in ethnic homeland and the precolonial community settlement are positive and highly significant in all specifications. The first-stage Kleibergen-Paap F-statistic for the excluded instrument is 36.61 in the baseline specification in column (4), suggesting that the 2SLS estimate is unlikely to be biased by weak instrument.

## **B Dual Causal Effects of Local Trust**

### **B.1 Pacifying Effect of Local Trust on Internal Violence**

Having validated the historical origin of local trust, I investigate the causal effects of bonding social capital on political violence. To examine the dual effects of bounded solidarity nature of local trust, this study categorizes political violence into two – internal violence towards civilians and external battle against armed forces, according to the subject (victims) of violence. Then, each category of violence is again divided into two to specify the agent of violence – the violence by non-state militias, or state force like military or police.

The militias refer to paramilitary organizations that are mobilized by warlords, who may belong to other local communities or international terrorists such as Boko Haram or Islamic State. Their members are nonprofessional soldiers mostly recruited from civilians like farmers, pastoralists, students or Christian/Muslim groups. The identified militias are mainly affiliated to ethnic or religion group such as Igbo Ethnic Group in Nigeria, Islamic state in West Africa, or Ansaroul Islam in Burkina Faso. The estimations in Table 4 and 5 focus particularly on non-state militias-led internal and external violence. Given the fact that the economic and political

**Table 4: The Effect of Local Trust on Violence against Civilians**

Dependent variable: Violence against civilians	Parsimonious specifications			Baseline specification			
	Fatalities			Fatalities		Incidences	
	Non-state militias (1)	Non-state militias (2)	Non-state militias (3)	Non-state militias (4)	State forces (5)	Non-state militias (6)	State forces (7)
<i>Panel A. 2SLS estimates</i>							
Trust in traditional leader	-0.171** (0.081)	-0.223** (0.088)	-0.244** (0.114)	-0.261** (0.121)	0.139 (0.100)	-0.232** (0.093)	-0.003 (0.017)
<i>Panel B. OLS estimates</i>							
Trust in traditional leader	-0.002 (0.007)	-0.002 (0.007)	-0.003 (0.009)	0.001 (0.009)	-0.003 (0.007)	-0.003 (0.006)	-0.005 (0.004)
	0.525	0.531	0.534	0.538	0.265	0.424	0.350
<i>Panel C. Reduced-form estimates</i>							
Ln (Bodies of water)	-0.085*** (0.033)	-0.110*** (0.040)	-0.120** (0.049)	-0.121** (0.049)	0.064* (0.037)	-0.107*** (0.035)	-0.002 (0.008)
R <sup>2</sup>	0.526	0.532	0.535	0.539	0.267	0.426	0.349
Dependent variable (panel D):			Trust in traditional leader				
<i>Panel D. First-stage estimates</i>							
Ln (Bodies of water)	0.498*** (0.120)	0.493*** (0.124)	0.491*** (0.117)	0.464*** (0.125)	0.464*** (0.125)	0.464*** (0.125)	0.464*** (0.125)
F-statistics (All panels)	14.19	13.07	14.54	11.28	11.28	11.28	11.28
Geographical features	YES	YES	YES	YES	YES	YES	YES
Precolonial ethnic features	NO	YES	YES	YES	YES	YES	YES
Colonial features	NO	NO	YES	YES	YES	YES	YES
Demographic features	NO	NO	NO	YES	YES	YES	YES
Province fixed effects	YES	YES	YES	YES	YES	YES	YES
R <sup>2</sup>	0.445	0.448	0.451	0.464	0.464	0.464	0.464
Observations (all panels)	1,921	1,921	1,921	1,921	1,921	1,921	1,921

*Notes:* The unit of observation is a district. The standard errors are clustered at the country level. Dependent variables are the average of civilian fatalities from 2005 to 2018 that are caused by actors indicated in each column. All categories of controls are the same as those in Table 3. Kleibergen-Paap F-statistics are reported in panel D. In Appendix A2, the estimates of the effect of trust in neighbor on violence against civilians are reported, which are consistent with those of trust in traditional leader.

dominance of local chiefs are assigned by state, the realm of local chiefs to preserve internal orders is limited to non-state militias within their sub-national jurisdiction.

Panel A of Table 4 reports 2SLS estimates of equation (5). The estimates remain stable in columns (1) to (4), regardless of additional inclusion of covariates, implying that these estimates are unlikely to be biased by unobservables. Comparing to the OLS estimates reported in panel B, which is indistinguishable from zero, the instrument variable approach successfully addresses the endogeneity problems that attenuate the causal relationship between local trust and violence. The 2SLS estimates in column (4) of panel A, the estimate for a baseline specification with the full set of controls, show that one standard deviation increase in trust in local chief reduces civilian fatalities by 0.45 standard deviations, which is economically substantial in magnitude and statistically significant at the five percent level. In terms of incidence of violence, the effect of trust in traditional leader is even more remarkable, which reduces the violence by 0.61 standard deviations as reported in column (6). The findings support that strong solidarity transmitted from their ancestors play a role of buffer from violent acts against their neighbors and helps their local chief to preserve internal stability. Columns 5 and 7 show that the pacifying effect of local trust on violence against civilians is driven by its influence on non-state militias, not on the central government's military or police force. The findings are consistent with the description accounts that emphasize the confined authority of traditional leaders that exerts their controls over militias in the vicinity of their district-level jurisdiction.

The reduced-form estimates are presented in panel C. The effect of instrument on violence against civilians are negative and statistically significant at the one percent level. The findings provide counter-evidence against the possibility that the bodies of water directly affects the current political violence. If militias attack civilians due to their interest in water bodies of the homeland, the instrument should have a positive correlation with the violence. However, the sign of effect is the opposite, suggesting that the effect of water resources in ancestor's homeland on contemporary political violence is channeled through their influence on building local trust, which may generate dual causal effects on violence.

Panel D of Table 4 reports the first stage estimates of equation (4) that show a strong positive correlation between the instrument and local trust. These estimates are parallel with the reduced-form estimates of the individual-level specification examining the effect of bodies of water in

ethnic homeland on the descendant's trust in his/her traditional leader or neighbors, reported in in panel C of Table 3. The first-stage estimates are consistent with the results of reduced-form estimates in panel C of Table 3 and are robust across different specifications.

## **B.2 Warring Effect of Local Trust on External Violence**

Table 5 reports 2SLS estimates of the effect of trust in traditional leader on arm clashes. The results reported in Panel A of Table 5 are in accord with the prediction that emphasize the role of bonding social capital in creating conflictual group relationships. The strong and positive 2SLS estimates in Panel A remain unchanged by the inclusion of additional covariates in columns (1) to (4), implying the robustness of estimates. The OLS estimates that are statistically and economically indistinguishable from zero in panel B provide an additional evidence that the 2SLS estimates gauge precisely the causal effect of local trust on external violence unbiased by endogenous factors.

The estimate in column (4) for a baseline specification with the full set of controls shows that one standard deviation increase in trust in their chief increases the battle deaths by 0.84 standard deviations, an effect that is economically substantial and statistically significant at the five percent level. The positive and significant coefficient of 2SLS estimates does not indicate the propensity of community to inflict violence against external groups, but the inter-community relationship in district with a high level of bonding social capital is apt to fall into more severe armed clashes rather than one-sided assaults. Given limited information in ACLED, it is not possible to identify the initiators of battle who first transgress some interest of others. Thus, the combatants' fatalities may reflect damages received while protecting their civilians from external threats as well as offending the counterpart. In a similar line with the previous finding on internal violence, this account is consistently connected to the rationale why trust in local chief reduces the civilian fatalities but increases battle fatalities.

The 2SLS estimate in column (5) reports the effect of trust in local chief on the militias' battles against state forces. The magnitude of the estimate is similar to that of estimates for non-state militias, but the effect is statistically insignificant. Aligned with the result in column (5) of Table 4 – insignificant effect of local trust on internal violence by state forces –, the trust in local chiefs do nothing with the invasion from state military as their legitimacy is based on state's recognition.

**Table 5: The Effect of Local Trust on Battles of Non-state Militias**

Dependent variable: Battles of non-state militias	Parsimonious specifications			Baseline specification			
	Fatalities			Fatalities		Incidences	
Type of counterparts:	Non-state militias (1)	Non-state militias (2)	Non-state militias (3)	Non-state militias (4)	State forces (5)	Non-state militias (6)	State forces (7)
<i>Panel A. 2SLS estimates</i>							
Trust in traditional leader	0.215* (0.122)	0.229** (0.107)	0.243** (0.101)	0.267** (0.124)	0.273 (0.377)	0.016 (0.019)	0.025 (0.073)
<i>Panel B. OLS estimates</i>							
Trust in traditional leader	0.008 (0.007)	0.008 (0.007)	0.009 (0.007)	0.011* (0.006)	0.004 (0.019)	0.001 (0.002)	-0.000 (0.008)
R <sup>2</sup>	0.354	0.359	0.363	0.368	0.482	0.388	0.437
<i>Panel C. Reduced-form estimates</i>							
Ln (Bodies of water)	0.124*** (0.046)	0.118** (0.048)	0.124*** (0.046)	0.124*** (0.046)	0.127 (0.165)	0.007 (0.009)	0.012 (0.033)
R <sup>2</sup>	0.371	0.371	0.371	0.371	0.483	0.388	0.437
Dependent variable (panel D):				Trust in traditional leader			
<i>Panel D. First-stage estimates</i>							
Ln (Bodies of water)	0.464*** (0.125)	0.464*** (0.125)	0.464*** (0.125)	0.464*** (0.125)	0.464*** (0.125)	0.464*** (0.125)	0.464*** (0.125)
F-statistics	14.19	13.07	14.54	11.28	11.28	11.28	11.28
(All panels)							
Geographical features	YES	YES	YES	YES	YES	YES	YES
Precolonial ethnic features	NO	YES	YES	YES	YES	YES	YES
Colonial features	NO	NO	YES	YES	YES	YES	YES
Demographic features	NO	NO	NO	YES	YES	YES	YES
R <sup>2</sup>	0.464	0.464	0.464	0.464	0.464	0.464	0.464
Observations (all panels)	1,921	1,921	1,921	1,921	1,921	1,921	1,921

*Notes:* The unit of observation is a district. The standard errors are clustered at the country level. Dependent variables are the average of battle fatalities from 2005 to 2018 that non-state militias fought against the actors indicated in each column. All categories of controls are the same as those in Table 3. In Appendix A2, the estimates of the effect of trust in neighbor on battle are reported. Kleibergen-Paap F-statistics are reported in panel D.

The non-effect of local trust in terms of incidence of battle, reported in column (6) of Table 5, also supports that district with a high level of local trust is not necessarily exposed to more frequent conflicts. However, when it happens, the severity of conflict is much larger because the both sides of local chiefs easily mobilize their combatants, which leads towards a big-sized battle than the district with a low level of local trust.

The reduced-form estimates and the first-stage estimates are reported in panel C and D of Table 5. The estimates of the correlation between water bodies and battles between militias are positive and statistically significant at the one percent level. The first-stage Kleibergen-Paap F-statistics for the excluded instrument is robust across different specifications and above the rule of thumb for weak instrument (F-statistics is 11.28 in baseline specification), indicating that the 2SLS estimates are precisely estimated (Stock & Yogo, 2002).

In Appendix A2 and A3, I present 2SLS estimates for the effect of trust in neighbors, local government council, president or police on political violence. The estimates of trust in neighbors are consistent with those of trust in traditional leader because both measures indicate the local trust historically emerged from community settlement patterns. The effect of trust in neighbors on internal violence is economically large and statistically significant at the one percent level, although its F-statistic is below the rule of thumb for the sample of trust in neighbors since its sample covers only the half of districts compared to other types of trust (Stock & Yogo, 2002). The effect of trust in neighbors on battles between militias is not economically and statistically substantial, which makes sense because the mobilization of labor for conflict are mostly driven by their local leaders. For the trust in other types of leaders, the estimates are not distinguishable from zero. As the local government council and the president are elected positions whose legitimacy is not originated from the shared norms or social capital among communal members, non-findings of the effect of trust in leaders beyond local chief on violence validate the preceding arguments of this paper.

## **C Falsification test**

This subsection provides evidence for the excludability of instrumental variable by undertaking falsification tests. To prove the validity of the instrument variable strategy, the analysis should demonstrate that the positive and statistically significant correlation between the ethnic-

population weighed average of water-bodies of the district (i.e., local community) and political violence occurred within the community is driven only by communal members' trust in local chief, not by the direct effect of water bodies or by any other channels.

Before presenting the results of falsification, I note three points in identification strategies that are used to satisfy the exclusion restriction condition of instrument. First, I recalculate ethnic homeland features, which used to be based on ethnic group, to be based on the current location where the individual lives now, as shown in equation (3). Almost 50-60% of the population in contemporary Africa has migrated to a new place beyond the boundaries of their ethnic homeland (Nunn & Wantchekon, 2011; Michalopoulos & Papaioannou, 2013). Accordingly, unless inhabitants resided the same place across generations since precolonial era, the district-level average of homeland features mostly eliminate their direct influences on violence. Second, all specifications in this paper exploit within province variations, controlling the remaining direct effects of homeland that are derived by residents who stay within their ethnic homeland territories. As shown in Figure 2, the area of provinces are mostly smaller than the homeland – nearly three provinces are nested in one ethnic homeland on average. Therefore, province fixed effects that may absorb the variation of time-constant characteristics that are shared across districts can eliminate the direct influences of the features of ethnic homeland derived from inhabitants who have continually lived within the historical homeland boundaries. Third, this study controls natural characteristics of homeland that are related to water bodies and conflict. As described in the subsection that presents rationals for each set of covariates, geographically endowed conditions such as fertile soil, suitable climate for agriculture, latitude and the mean level of elevation are controlled to address other possible paths besides local trust that water bodies affect to violence.

I use reduced-form estimates of different specifications that reflect the aforementioned strategies and examine whether the direct effects of homeland characteristics are controlled. If the strategies fully address the direct effects, homeland features related to violence should not have the same relationship with the battle fatalities as bodies of water does. As placebo instruments, I include the geographical characteristics that were previously proven to be correlated with contemporary conflict (Besley & Reynal-Querol, 2014; Michalopoulos & Papaioannou, 2016). As shown in columns (2) and (3), diamond mines and petroleum site in the homeland are included, representing the effects of natural resources which allegedly make a society vulnerable to conflict

**Table 6: Falsification Test**

Homeland features used for Instrument:	Baseline	Placebo specifications				
	Bodies of water	Petroleum site	Diamond mine	Distance to precolonial war	Partitioned by border	Number of adjacent groups
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. The current location-based data + controls of homeland's geographical features</i>						
Instrument	0.072*** (0.025)	0.033 (0.022)	-0.024 (0.030)	0.017 (0.024)	-0.003 (0.028)	0.004 (0.003)
R <sup>2</sup>	0.053	0.043	0.043	0.042	0.041	0.045
<i>Panel B. Province-fixed effects + conditions of panel A</i>						
Instrument	0.107** (0.051)	0.049 (0.045)	-0.077 (0.055)	-0.112 (0.104)	-0.037 (0.030)	0.005 (0.006)
R <sup>2</sup>	0.357	0.354	0.356	0.354	0.355	0.355
<i>Panel C. The full set of covariates in baseline specification + conditions of panel B</i>						
Instrument	0.124*** (0.046)	0.030 (0.060)	-0.037 (0.070)	-0.175 (0.117)	-0.011 (0.021)	0.008 (0.006)
R <sup>2</sup>	0.371	0.367	0.368	0.368	0.367	0.368
Observation (for all panels)	1,921	1,921	1,921	1,921	1,921	1,921

*Notes:* The unit of observation is a district. The instruments used in the specifications in columns (1) to (6) are the ethnic population weighted average of district of the current residence. The instrument in column (5) – partitioned by border – means that the ethnic homeland has been partitioned due to contemporary national boundary and the 5 percent of their total surface area are belonging to more than one country. The ‘Number of adjacent groups’ in column (6) refers to the numbers of ethnic groups who share the borderline of homeland. The regressions in panel D include the full set of controls that are included in baseline specification in columns (4) - (7) of Table 4 and 5. The robust standard errors are clustered at the country level.



(Le Billon, 2008). The distance of precolonial conflicts from centroid of homeland is also included in column (4) because Besley and Reynal-Querol (2014) argue that present conflicts are correlated with having had more conflicts in precolonial period within the geographical location. The placebo instruments of columns (5) to (6) are related to national borders of Africa. The artificial demarcation of territories fuels conflicts, particularly the ethnic groups whose homelands have been divided (Michalopoulos & Papaioannou, 2016). Michalopoulos and Papaioannou (2016) argue that homeland partitioned by colonial borders is prone to political violence as the split ethnic groups that are politically and economically disadvantaged are more likely to incite internal conflicts. Thus, the distance to national border from the centroid of homeland, an indicator variable of 1 if the ethnic group's homeland has been partitioned by national boundary, and the number of adjacent groups that are partitioned the homeland contain, which capture spatial externalities of partitioning (Michalopoulos & Papaioannou, 2016) are included as placebo homeland features related to violence.

Panel A of Table 6 reports the reduced-form estimate with basic geographical covariates of homeland but without employing the province fixed effects. As the characteristics of ethnic homeland is restructured as ethnic-population weighted average of the district where individual currently resides, the data construction itself eliminates geographically-fixed effects of homeland on violence. The reduced-form estimate for the bodies of water on external violence is statistically significant at the one percent level; however, columns (2) to (6) show that direct effects of all conflict-relevant homeland features are addressed. The estimates in panel B are similar with those in panel A. After controlling common features across districts through province fixed effects, the effect of water bodies on violence remain stable in its magnitude and statistical significance. In contrast, all the other conflict-related homeland features do not have any statistically significant correlation with the contemporary violence. Panel C reports the reduced-form estimates for the baseline specification using the full set of covariates and province fixed effects. The estimates in panel C show that all of the placebo features do not have a positive and statistically significant correlation with violence, but water-bodies do. The findings provide a confirmation that the identification strategies fully control the direct effects of relevant homeland features; thus, the significant and positive effect of water bodies on violence is not directly driven but channelled through local trust that can internally inherit to descendants regardless where they live.

## D Heterogeneous Effect of Local Trust

This section examines whether the effects of local trust are heterogeneous across different contexts. Unlike the placebo features in the falsification test that is based on precolonial location of ethnic homeland, context characteristics is based on the district where individuals currently live. To access whether the causal effects of trust in local chief are moderated or intensified in the contexts that are related to conflict, I use six influential factors that emerge frequently in the literature: the presence of resources (mineral mining or petroleum sites), the proximity to national borders, ethnic fractionalization, road density, and the quality of local institution. Since the heterogeneous analysis allows to find the factors that intensify or moderate the adverse effects of local trust, the results help to lead discussions for policy implications.

To estimate the differential effects of local trust depending on the characteristics of context, the second-stage equation (6) includes interaction term of trust in traditional leader and context variable,  $(Trust_{dpc} \times I_{dpc})$ . Each context feature is coded as an indicator variable,  $I_{dpc}$ , that equals one if the district characteristic is greater than the median among the districts in the sample.<sup>1</sup> Trust in local chief and the interaction term of trust in local chief and indicator variable are instrumentalized with bodies of water, the interaction term of bodies of water and indicator variable, and indicator variable, as shown in the first-stage equation (7). In both equations,  $X'_{dpc}$  denotes the full set of covariates included in baseline specifications of Table 4 and  $\lambda_p$  is province fixed effects.

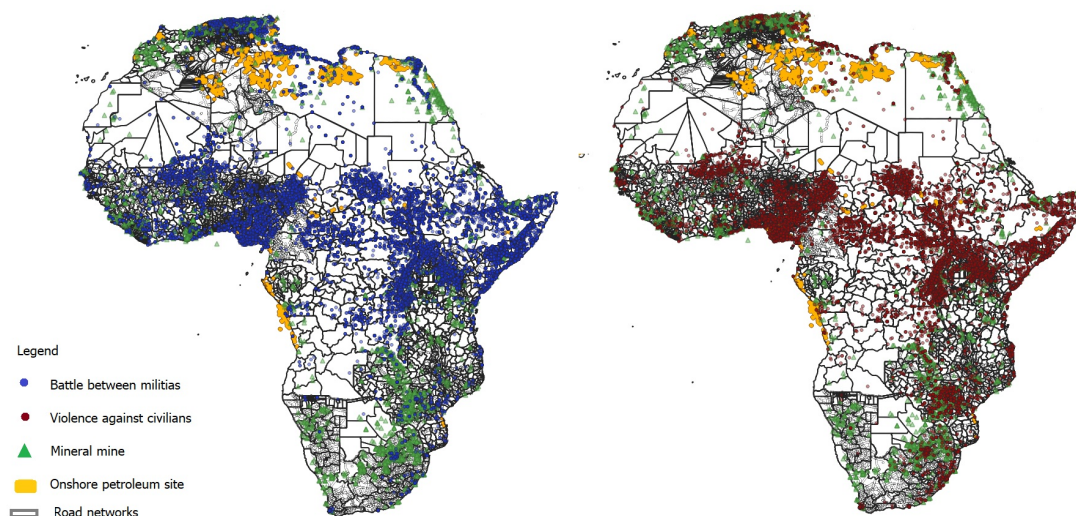
$$Violence_{dpc} = \delta_1 Trust_{dpc} + \delta_2(Trust_{dpc} \times I_{dpc}) + X'_{dpc}\Theta + \lambda_p + \zeta_{dpc} \quad (6)$$

$$Trust_{dpc} = \gamma_1 Z_{dpc}^{Water} + \gamma_2(Z_{dpc}^{Water} \times I_{dpc}) + \gamma_3 I_{dpc} + X'_{dpc}\Theta + \lambda_p + \zeta_{dpc} \quad (7)$$

Table 7 and 8 report 2SLS estimates for heterogeneous effects of local trust on external violence (Table 7), and internal violence (Table 8). The first and second rows are the estimates for local trust and the interaction term of trust and context indicator variable. The bottom row indicates the sum of the coefficients for  $Trust_{dpc}$  and  $Trust_{dpc} \times I_{dpc}$ , and its standard errors. This estimate captures the total effect of local trust when district's context characteristics is above median. Likewise, the

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<sup>1</sup>For the presence of mine, whose median value is zero, the indicator equals one if there is at least one mineral mine.



**Figure 3:** Contextual Features of District and Political Violence

*Notes: The figures depicts the geographical distribution of contextual characteristics – mine, petroleum, road networks – and political violence. The left figure shows the distribution of battles between non-state militias and the right figure is for the violence against civilians in red dots. The black clusters for 24 included African states indicates district boundaries (Sources ACLED, Open Street Map (UNOCHA), Afrobarometer surveys, U.S. Geological Survey and the Peace Research Institute).*

estimate of the first row indicates the total effect of local trust when district’s characteristics is below median, and the coefficient for the interaction term show the differential effect caused by the context characteristics. I reproduce the baseline estimate in column (1) for comparison.

The columns (2) and (3) of Table 7 and 8 report the results of the heterogeneous effect of trust in resource-rich districts. The geographic area data of mineral deposits and onshore petroleum deposits are from the U.S. Geological Survey and the Peace Research Institute Oslo, respectively. I intersect the resource deposits map with the geospatial vector data of African district that is taken from United Nations Offices for the Coordination of Humanitarian Affairs (UNOCHA) to identify the presence of resources within the district. A natural hypothesis is that district with the presence of natural resource will have larger effects of trust in local chief on violence. However, the results in columns (2) and (3) of Table 7 and Table 8 show that the influences of endowed resources are not case. The coefficient of the interaction term is not distinguishable from zero. The results imply that the effects of local chiefs on violence is not monotonically larger if the areas are more exposed to violence, but it will be only when the violence is related to the control of local chiefs.

**Table 7: Heterogeneous Effects of Local Trust on External Violence**

Dependent variable:	Battles between non-state militias						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Trust in traditional leader	0.267** (0.124)	0.311** (0.135)	0.336** (0.131)	0.382** (0.173)	0.264** (0.125)	0.304*** (0.107)	0.207** (0.095)
Trust in traditional leader x indicator for:							
The presence of mine		-0.005 (0.009)					
Distant to petroleum site			-0.018 (0.013)				
Distant border				-0.026** (0.011)			
High ethnic divisions					0.018* (0.010)		
High road density						0.015*** (0.006)	
High quality of institution							-0.014* (0.007)
Trust in traditional leader + (Trust x indicator)		0.307** (0.136)	0.318*** (0.124)	0.356** (0.166)	0.282** (0.134)	0.319*** (0.107)	0.194** (0.09)
F-statistics for trust in traditional leader	11.28	7.05	7.17	8.14	6.34	6.97	7.51
F-statistics for (trust x indicator)		415.01	23.95	31.14	27.94	189.95	24.30
Observations	1,921	1,488	1,541	1,450	1,906	1,443	1,706

*Notes:* 2SLS estimates are reported. The regressions include the full set of baseline controls and province fixed effects. The robust standard errors are clustered at the country level. The sample size varies across columns due to different coverage of available data for each context variable. Trust in traditional leader and the interaction term of trust in traditional leader and indicator variable are instrumented with bodies of water, and interaction term of bodies of water and indicator variable, and the indicator variable. The joint estimates for trust in traditional leader + trust in traditional leader x indicator variable are reported in the bottom of each panel. The first F-statistics is from the first-stage with trust in traditional leader as the dependent variable and the second from the first-stage with trust in traditional leader x indicator variable as the dependent variable.

**Table 8: Heterogeneous Effects of Local Trust on Internal Violence**

Dependent variable:	Violence against civilians by non-state militias						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Trust in traditional leader	-0.232** (0.093)	-0.255** (0.103)	-0.194*** (0.074)	-0.237** (0.106)	-0.229** (0.094)	-0.256** (0.102)	-0.159* (0.089)
Trust in traditional leader x indicator for:							
The presence of mine		0.025 (0.028)					
Distant to petroleum site			0.023 (0.017)				
Distant to border				0.018*** (0.007)			
High ethnic divisions					0.001 (0.013)		
High road density						0.012 (0.008)	
High quality of institution							-0.001 (0.009)
Trust in traditional leader + (Trust in traditional leader x indicator)		-0.231** (0.099)	-0.171*** (0.065)	-0.219** (0.102)	-0.227** (0.101)	-0.244** (0.099)	-0.160* (0.084)
F-statistics for trust in traditional leader	11.28	7.05	7.17	8.14	6.34	6.97	7.51
F-statistics for (trust x indicator)		415.01	23.95	31.14	27.94	189.95	24.30
Observations	1,921	1,488	1,541	1,450	1,906	1,443	1,706

*Notes:* 2SLS estimates are reported. The regressions include the full set of baseline controls and province fixed effects. The robust standard errors are clustered at the country level. The sample size varies across columns due to different coverage of available data for each context variable. Trust in traditional leader and the interaction term of trust in traditional leader and indicator variable are instrumented with bodies of water, and interaction term of bodies of water and indicator variable, and the indicator variable. The joint estimates for trust in traditional leader + trust in traditional leader x indicator variable are reported in the bottom of each panel. The first F-statistics is from the first-stage with trust in traditional leader as the dependent variable and the second from the first-stage with trust in traditional leader x indicator variable as the dependent variable.

In column (4), the heterogeneous effects of local trust depending on the distance to national borders are reported. Using the UNOCHA's geospatial data of African district and national borders, I calculate the nearest distance to national borders from centroid of each district. As documented by (Michalopoulos & Papaioannou, 2016), the externally assigned boundaries of African state may fuel internal conflicts because neighboring ethnic groups easily intervene the districts near borders. As reported in column (4) of Table 7, the differential effect of the distance to border is negative and statistically significant. That means, if the district is near to the border, the coefficient of total effect of local trust on external violence increases to 0.382, a 30% increase comparing to the effect of baseline. In terms of pacifying effect of local trust, the effect of local trust becomes stronger in near border district. The local trust reduces violence against civilians in near border districts by 0.018 log points more than the districts far from the borders, as reported in column (4) of Table 8. This is because autonomous power of rural elites in the hinterland, where the territorial reach of state power is largely limited, is larger than that of local chief in urban district (Herbst, 2014; Molenaar et al., 2019). Therefore, the coercive power of local chief to mobilize the combatants and to preserve internal order is greater in the periphery areas, which in turn trust in local chief has larger effects on both types of violence in those districts.

Column 5 examines whether ethnic fractionalization in district can affect the relationship between trust in local chief and political violence. Applying the fractionalization measure of Alesina et al.(2003), I estimate within-district ethnic fractionalization based on the demographic information in Afrobarometer survey. From the survey data, I extract the population share of the ethnic group  $i$  ( $i = 1, \dots, N$ ) in district  $j$ , which is denoted as  $S_{ij}^2$ . Then, the sum of all share of each ethnic group is subtracted from 1 to measure the index for district-level ethnic fractionalization ( $1 - \sum_{i=1}^N S_{ij}^2$ ). Ethnic fractionalization reflects the likelihood that one community interacts with heterogeneous group, which is associated with the exclusiveness of the bonding social capital. The results of column (5) are in line with this prediction. The effect of local trust is larger in ethnically fractionalized districts by 0.018 log points than other districts, of which differential effect is statistically significant. In terms of internal violence, the differential effect of ethnic fractionalization within district is ambiguous, as reported in column (5) of Table 8. The pacifying effect of local trust is nearly same across different contexts of ethnic fractionalization.

In column (6), I explore the influence of road density on the effect of local trust. Using

the geospatial data of road networks from the UNOCHA, I intersect it to the geospatial data of African district and measure the road density for each district. The effect of road density is a priori ambiguous. On the one hand, road density may decrease the influence of local trust on battles because the districts with high road density indicate that the community is more penetrated by the state power (Herbst, 2014; Kalyvas, 2006; Soifer & Vom Hau, 2008). On the other hand, districts with high road density increases the influence of local chief since the easier access to transgress other's domains raises the risks of conflicts between communities within the district. The estimates, reported in column (7), support the second hypothesis in that a district with loosely interacted communities has smaller effect of the local trust on battles. The coefficient of differential effect is positive and statistically significant at the one percent level. However, as column (6) of Table 8 shows, the effect of local trust on internal violence in the districts with high road density is nearly same with that of local trust in low road density districts.

Last, I examine the influence of local institution on the effect of local trust on political violence. To gauge the quality of district-level institutions, I use the Afrobarometer survey question about the performance of local government council. The column (8) of Table 7 show that well-functioning institution of local government council reduce the adverse effects of trust in traditional leader on violence. Compared to the estimate in baseline, the effect of local trust in district with good institutions is reduced to 0.194, a 27% decrease in magnitude of the effect of local trust on external violence. However, when it comes to internal violence, the attenuating influence of local institution disappears. The differential effect of trust in local chief between districts with high quality institution and district with low quality institution is very close to zero and is not statistically significant, reported in column (8) of Table 8. The findings imply that the warring effect of the trust in traditional leader on external violence can be moderated by the capacity of local government council that plays a role of mediator over inter-community disputes.

As reported in Table 7 and 8, the importance of trust in local chief on internal or external violence does not disappear in different contexts. The statistically significant effect of local trust on violence remain robust across heterogeneous features of district. In terms of differential effects, the findings consistently suggest that the adverse effect of trust in traditional leader are greater in the districts where the local community is exposed to larger risks of confronting heterogeneous groups – the districts located near borders, ethnically fractionalized and with high road density.

Moreover, the findings show that the well-functioning local government council might moderate the warring effects of local trust on external violence.

## V Conclusion

This study examines the importance of a psychological factor on political violence in the context of African statehood. Focusing on local social capital, the findings describe how historically originated trust within community exerts dual causal effects on political violence. The findings of this paper suggest that trust in traditional leader reduces the incidences or fatalities of non-state militias-led violence against their civilians, while it intensifies the acuteness of battles between non-state militias.

This article has several important implications. First, it disentangles causal chains from allegedly co-evolving process of social capital in conflictual group relationship. Previous literature argues that confronting common adversaries induces pro-social changes among affected communal members, which conversely reinforces out-group hostility (Jennings & Sanchez-Pages, 2017; Portes, 1998b). However, this paper clarifies the causal direction from local trust on political violence, using the network approach of social capital which allows to find its structural origin in Africa. Historical evidence documents that exogeneously endowed bodies of water in ethnic homeland that led to form community-based dense networks in precolonial era determine the current level of trust in local chief or neighbors. Moreover, the sub-national level analysis uncovers contextual features that moderate or intensify the adverse effect of local trust on violence. The heterogeneous analysis finds that inter-communal environment where exposed to more heterogeneous groups intensify the warring effect of local trust, while the well-functioning local institutions moderate the negative effects of local trust. Third, this study reveals the cruciality of the influence of local chiefs in explaining dynamics of violence of Africa. The findings suggest that unless there is the intervention of credible mediators such as local government council, the presence of chieftdom, which is exclusive and competitive against the others, may persist civil conflicts. The results throw doubt on the effectiveness of decentralization movement in Africa, particularly in terms of national security.

Finding the peaceful paths for changing the bonding social capital to bridging social capital



– which is inclusive and connected to out-groups– are beyond the scope of this paper, but are critical areas for further investigations. Future study needs to explore the channels that facilitates the radiation of state institutions over the hinterland of Africa, which would alleviate the hostility in inter-community relationships and lead to develop non-violent mechanisms to resolve inter-group conflicts.

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# Appendix

## Chapter 2

Dual Causal Effects of Social Capital on Political Violence:

Evidence from Africa

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November 15, 2020

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## **A Descriptive Statistics**



Table A1. Descriptive Statistics

	Observations	Mean	Std.dev	Min	Max
Panel A. Geographical features of homeland					
Distance of the centroid to the nearest sea	1,921 (132)	0.376	0.304	0.018	1.229
Latitude	1,921 (132)	-0.597	15.64	-32	36
Ecological suitability for malaria	1,921 (132)	0.725	0.299	0	1
Mean level of elevation	1,921 (132)	0.556	0.454	0.006	1.888
Soil and climate suitability for agriculture	1,921 (132)	0.463	0.189	0.0103	0.924
Panel B. Political features of ethnic group					
(Hereditary type fixed effects)					
Hereditary by son	1,921 (132)	0.231	0.384	0	1
Hereditary by other patrilineal heir	1,921 (132)	0.217	0.369	0	1
Hereditary by a sister's son	1,921 (132)	0.003	0.042	0	1
Hereditary by other matrilineal heir	1,921 (132)	0.059	0.215	0	1
Nonhereditary	1,921 (132)	0.213	0.371	0	1
Absence of any such office	1,921 (132)	0.086	0.253	0	1
Jurisdictional Hierarchy beyond local community	1,921 (132)	2.623	0.959	0	4
Domestic Organization	1,921 (132)	6.281	1.38	1	8
Mean Size of Local Communities	1,921 (132)	3.492	2.894	0	8
Panel C. Historical features of colonial period					
The presence of a major city around 1400 (Type of slavery fixed effects)	1,921 (132)	0.207	0.38	0	1
Absence or near absence	1,921 (132)	0.162	0.335	0	1
Nonhereditary	1,921 (132)	0.212	0.367	0	1
Reported but not significant	1,921 (132)	0.224	0.367	0	1
Socially significant	1,921 (132)	0.33	0.434	0	1
Panel D. Demographics					
Urbanization	1,921 (36,776)	1.62	0.402	1	2
Age	1,921 (36,776)	35.70	6.211	18	68
Gender	1,921 (36,776)	1.506	0.16	1	2
Level of education	1,921 (36,776)	3.491	1.380	0	9
Employment status	1,921 (36,776)	0.413	0.262	0	1
Panel E. Contemporary district-level features					
(Heterogeneous analysis)					
log (population + 1)	1,035	12.128	1.112	7.715	15.560
log (road density + 1 in km)	1,443	9.349	5.175	-3.361	16.793
Quality of local institutions	1,706	2.455	0.494	1	4
Ethnic fractionalization within district	1,906	0.274	0.241	0	0.896
Distance to petroleum site (onshore) in km	1,921	0.212	0.367	0	1
Number of mining	1,488	0.304	1.976	0	35
Distance to border in km	1,450	10.881	1.080	5.910	12.927

Notes: The descriptive statistics in this table are computed at the district level. The number of raw samples is reported in parentheses in the observation column. The sample includes 132 ethnic groups in 24 African countries, and covers 14 years time periods (2005 to 2018). Panels A to D are covariates included in baseline specification. Panel E presents summary statistics of district-level context characteristics that are used in heterogeneous analysis.

## B The Effect of Trust in Neighbors on Political Violence

Table A2. The Effect of Trust in Neighbors on Political Violence

Dependent variable:	Internal Violence (Violence against civilians)				External violence (Battles)			
	Fatalities		Incidences		Fatalities		Incidences	
Measures:								
Type of agent:	Non-state militias	State forces	Non-state militias	State forces	Non-state militias	State forces	Non-state militias	State forces
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A. 2SLS estimates</i>								
Trust in neighbors	-0.854*** (0.319)	0.284 (0.218)	-0.481** (0.197)	-0.020 (0.074)	0.348 (0.264)	-0.053 (0.213)	-0.096 (0.059)	-0.174* (0.092)
<i>Panel B. Reduced-form estimates</i>								
Ln (Bodies of water)	-0.314** (0.160)	0.078 (0.068)	-0.175** (0.086)	-0.001 (0.020)	0.140** (0.066)	-0.180* (0.104)	-0.011 (0.027)	-0.071 (0.044)
R-squared	0.614	0.305	0.488	0.602	0.419	0.678	0.387	0.650
Dependent variable: Trust in neighbors								
<i>Panel C. First-stage estimates</i>								
Ln (Bodies of water)	0.208* (0.111)	0.208* (0.111)	0.208* (0.111)	0.208* (0.111)	0.208* (0.111)	0.208* (0.111)	0.208* (0.111)	0.219** (0.112)
F-statistics (All panels)	2.611	2.611	2.611	2.611	2.611	2.611	2.611	2.611
All controls included	YES	YES	YES	YES	YES	YES	YES	YES
Province fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.729	0.729	0.729	0.729	0.729	0.729	0.729	0.732
Observations	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036

Notes: The unit of observation is a district. The standard errors are clustered at the country level. Dependent variables are the average of fatalities or incidences from 2005 to 2018. All control variables reported in Appendix A1 are included. Kleibergen-Paap F-statistics are reported in panel C.

## C The Effect of Other Types of Trust on Political Violence

Table A3. The Effect of Trust in State Ruling Elites on Political Violence

Dependent variable:	Internal Violence (Violence against civilians)				External violence (Battles)			
	Fatalities		Incidences		Fatalities		Incidences	
Measures:								
Type of agent:	Non-state militias	State forces	Non-state militias	State forces	Non-state militias	State forces	Non-state militias	State forces
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A. 2SLS estimates of trust in local government council</i>								
Trust in local government council	-0.599 (0.852)	0.417 (0.494)	-0.753 (0.892)	-0.002 (0.050)	0.856 (0.893)	0.534 (1.050)	0.021 (0.042)	0.014 (0.199)
F-statistics	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Observation	1,671	1,671	1,671	1,671	1,671	1,671	1,671	1,671
<i>Panel B. 2SLS estimates of trust in president</i>								
Trust in president	-1.127 (0.995)	0.493 (0.329)	-1.033 (0.795)	-0.014 (0.075)	0.782 (1.134)	1.143 (1.196)	0.021 (0.075)	0.022 (0.281)
F-statistics	2.265	2.265	2.265	2.265	2.265	2.265	2.265	2.265
Observation	1,706	1,706	1,706	1,706	1,706	1,706	1,706	1,706
<i>Panel C. 2SLS estimates of trust in police</i>								
Trust in police	-2.055 (2.195)	0.916 (1.019)	-1.879 (1.920)	-0.016 (0.133)	1.438 (2.699)	2.106 (3.191)	0.047 (0.154)	0.045 (0.528)
(All panels)								
All controls included	YES	YES	YES	YES	YES	YES	YES	YES
Province fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
F-statistics	1.047	1.047	1.047	1.047	1.047	1.047	1.047	1.047
Observation	1,710	1,710	1,710	1,710	1,710	1,710	1,710	1,710

Notes: The unit of observation is a district. The standard errors are clustered at the country level. Dependent variables are the average of fatalities or incidences from 2005 to 2018. All control variables reported in Appendix A1 are included. Kleibergen-Paap F-statistics are reported.

## D Additional Robustness checks

Table A4. Robustness Checks: Population Density

Dependent variable	Violence to civilians by non-state militias							
	Fatalities				Incidences			
	Baseline	Population density	Road density	All	Baseline	Population density	Road density	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trust in traditional leader	-0.261** (0.121)	-0.319 (0.224)	-0.311** (0.141)	-0.320 (0.251)	-0.232** (0.093)	-0.309** (0.139)	-0.251** (0.108)	-0.309** (0.135)
F-statistics	11.28	17.27	11.63	15.46	11.28	17.27	11.63	15.46
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Province fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,921	976	1,443	976	1,921	976	1,443	976
Dependent variable	Battle between non-state militias							
	Fatalities				Incidences			
	Baseline	Population density	Road density	All	Baseline	Population density	Road density	All
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Trust in traditional leader	0.267** (0.124)	0.591** (0.253)	0.332*** (0.125)	0.661** (0.271)	0.016 (0.019)	-0.022 (0.049)	0.011 (0.022)	-0.028 (0.055)
F-statistics	11.28	17.27	11.63	15.46	11.28	17.27	11.63	15.46
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Province fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,921	976	1,443	976	1,921	976	1,443	976

Notes: The unit of observation is a district. The standard errors are clustered at the country level. Dependent variables are the average of fatalities or incidences from 2005 to 2018. All control variables reported in Appendix A1 are included. Kleibergen-Paap F-statistics are reported. The sample observation varies due to data availability. The population density is the log form of district-level population divided by area of district. The columns (4), (8), (12) and (16) include both of the population density and road density. Here, the road density is used as a proxy for the population density whose observations covers only a half of observations in baseline specification.

# Chapter 3

## The Socio-Economic Effect of Community-Driven Development in Conflict-affected Communities: Evidence from Cambodia

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### Abstract

*This study evaluates the effect of the community-driven development on socio-economic changes in the conflict-affected villages of Cambodia using a sample of 60 villages and 5,170 households. We use the propensity score matching difference in difference to enhance the internal validity of imperfect randomized sampling process of the project. The program significantly improves the economic conditions: household's monthly income and assets increase by 0.33 and 0.65 standard deviations respectively. Moreover, the project strengthens villagers' capacity of self-governance, which increases the spirit of self-reliance by 0.51 standard deviations. However, the project decreases within-village trust, which is largely driven by the loss of the vulnerable groups' trust in their neighbours.*

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# I Introduction

The community-driven development is one of the fastest-growing strategies for channeling development assistance (Mansuri & Rao, 2004; Bennett & D’Onofrio, 2015). Since the Community-driven development (CDD) enables beneficiaries – members of communities – to actively involve in the management and implementation of the project, CDD is expected to empower the capacity of communal members to undertake development initiatives, and to consolidate the social cohesion within the community as well to improve socio-economic wellbeing at the local level (Mansuri & Rao, 2004).

The main objective of this study is to evaluate the effect of the CDD project, *Saemaul Undong*, on socio-economic outcomes in Cambodia. The participatory nature of CDD makes it particularly pertinent in conflict-affected Cambodian communities where state-imposed warfare and violence disrupted communal solidarity and the ability of self-governance. During the 1970s, Cambodians were exposed to allegedly the most intensive political violence throughout history (Islam, Ouch, Smyth, & Wang, 2016). Under the regime of Lon Nol (1970-1975), almost between 30 thousands and about half of a million Cambodians were killed as consequences of the 5 years of civil wars and external bombings caused by the U.S.-Vietnam war. The tragedy was followed by 4 years of genocide by Pol Pot, the leader of Khmer Rouge regime (1975-1979), which resulted in the death of 3.3 million people (Islam et al., 2016). The 10 years of violence prevailed all over the territories destroyed most forms of social capital in Cambodia (Colletta & Cullen, 2000). Lon Nol regime forced many villages to relocate or separate one another due to the warfare, military recruitment and bombing. The erosion of social capital became even severe under the Khmer Rouge regime that conducted extreme communistic experiment. The regime forced people who lived in cities to migrate into the countryside, and split families to assign them into different labour camps. The regime even encouraged neighbours, friends and family members to spy on and report one another to capture potential dissidents or opponents, which broke bonds of kinship networks and destructed communal solidarity (Colletta & Cullen, 2000). After the withdrawal of the Khmer Rouge regime, the recovery of social capital and other institutions has gradually began though the culture of mistrust still hinders the development of Cambodia.

In the post-conflict context where social capital is depleted, CDD can help rehabilitate solidar-

ity and empower the capacity of members to collectively promote communal development. As the Cambodia Saemaul Undong (SMU) is designed to encourage the participation of rural villagers, the exercise of making a voice in planning and implementing development projects contribute to creating within-group trust and building the capacity of citizens. Specifically, the project has three aims: i) to generate sustainable income and improve living environment, iii) to build the capacity of self-governance and iv) to strengthen trust. Under these objectives, villagers design yearly plan for development activities by incorporating local knowledge, and receive funds from donors to apply the plan. To encourage active participation in the project, Cambodia SMU uses competition and reward strategies. Based on evaluation of village's yearly performance, each village receives different amount of fund in the subsequent year to carry out another yearly plan. Along with these common aspects of CDD, Cambodia SMU uses a unique design by integrating top-down and bottom-up approaches. This different system is devised to alleviate trauma of Khmer Rouge regime and communal members' antagonism against ruling elites. Since central and local government assist the development activities by responding villagers' needs and guiding instructions, Cambodia SMU is expected to contribute to rebuilding trust between government officials and communal members.

In this paper, we examine whether the SMU achieve the three purposes. Due to imperfect randomization of assignment of treatment, we estimate the impact of the SMU on outcomes using propensity score matching difference in difference. Using the Cambodia Socio-Economic Survey from 2009 to 2015 that covers about 10 million individuals over the all communes of Cambodia, we extract the characteristics of communes and make the parallel time trend by matching the communes based on the propensity score. As the parallel pre-trend creates the counterfactual condition for difference in difference estimation, we can generate reliable estimates of the SMU impact on outcomes.

The results demonstrate that the SMU ameliorates the economic conditions by increasing the household incomes and improving the living environment of the village. The villagers in treated group can enjoy 0.4 standard deviations increase of income, production and assets and they live in a better community environment such as larger availability of housing and the coverage of electricity. Moreover, the SMU makes the community safer and more cohesive by encouraging the members to participate collective actions to solve community problems or help the members

who are in need. The members in treated villages are 0.3 standard deviations more likely to participate the collective actions. These active involvement helps the members to cultivate the spirit of self-reliance. In addition, the SMU contributes to building the villagers' trust in their government officials. This is particularly prominent for the people who are mentally affected by the Pol Pot regime. Moreover, the heterogeneous analysis finds that the economic benefits driven by the SMU are equally distributed among villagers, and the benefits are given to the appropriate recipients as the services supporting for the basic life management are provided more to the socially disadvantaged groups. However, surprisingly the SMU reduces the level of trust among village members, although the magnitude of the impact is not large. The analysis finds that the adverse effect of the SMU on local social capital is largely driven by the substantive reduction of the trust level of the vulnerable groups in their village members.

The rest of the paper is organized as follows. Section II describes institutional background of the SMU intervention and identification strategies. In Section III, we present the results for each outcome and explain the implication of the findings from heterogeneous analysis. Section IV concludes with a discussion of the policy relevant to the findings.

## **II Research Design**

### **A Sampling**

The three year project of Cambodia SMU (2016-2018) was implemented by the Cambodian Ministry of Rural Development (MRD) with the support of Korea International Cooperation Agency (KOICA). The impact evaluation team from Korea Development Institute conducted the baseline survey cooperating with the Royal University of Phnom Penh and Indochina Research Cambodia, local research teams, from February to April in 2017 by the time of the project implementation, and the endline survey from July to September in 2019 after completing the SMU project.

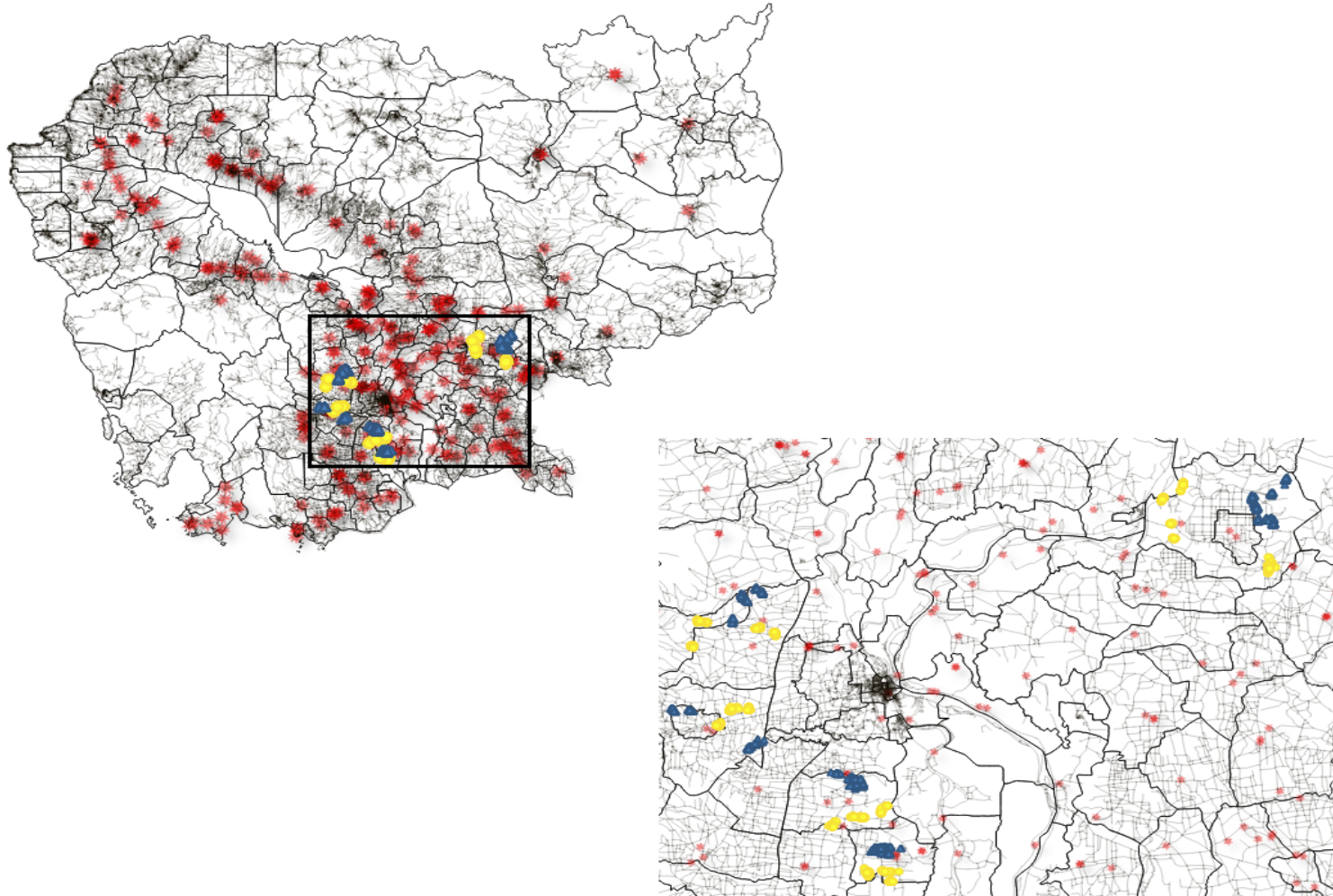
The two phrases of survey include 60 villages – 30 villages are assigned to treatment group and 30 villages to control group – from 22 communes and 3 provinces. In each village, 30 households in baseline survey and 60 households in the endline are selected using systematic sampling technique that allows each household to have an equal chance to be included from the ordered sampling frame. Figure 1 presents geographical information of treatment and control

villages, and the location of genocide burials. The black polygon indicates the boundary of district, the red dots are burial sites, the blue dots and yellow dots are the households belonging to treatment group and control group respectively. As shown in Cambodia map (left above), the SMU was implemented in the villages that were largely harmed by the genocide to assess the impact of Pol Pot experience on the results of SMU. The right below map that enlarges the site of intervention presents the locations of households of both groups. As shown in the right below map, to prevent contagion effect, households in the control village are selected to have at least over 5 km distance from those in treatment village.

## **B Survey Process**

To ensure reliability and credibility of survey, several steps were taken. First, enumerators were selected from the pool of competent applicants and trained in collecting and recording the required information. Then, the pilot-tests for the questionnaire were asked to thirty households not from the sampled villages. Using the feedback from the pre-tests, the questionnaires were improved their accuracy, word choices and comprehensiveness. To monitor interviewers during the fieldwork, we conducted quality control procedures to check the completion and consistency on the interview through listening audio-recorded interview or calling back to survey responders. Almost 15% of total completed questionnaires per interviewer was listened to confirm whether the answers coded in the dataset were aligned with the interview. Moreover, the researchers conducted spot checks for 10% of the interviews conducted per interviewer. The open ended responses were coded first by the local research teams with a code frame. The senior data manager oversaw the coding process. All the encoded survey cases were checked by senior research managers of three institutions of impact evaluation team.

**Figure 1:** *Burials of Genocide, Treatment and Control Groups*



Notes: Figure 1 presents geographical distribution of treatment and control villages, and the location of genocide burials. The black polygon indicates the boundary of district, the red dots are burial sites, the blue dots and yellow dots are the households belonging to treatment group and control group respectively. We selected control villages that are at least 5 km far from the treatment villages to prevent spill-over effects. The genocide data is from Cambodia Genocide Databases (<https://gsp.yale.edu/cambodian-genocide-databases-cgdb>).

The questionnaires of survey were asked to evaluate three main outcomes; i) the improvement of income and living environment, ii) empowerment of the capacity of self-governance and iii) consolidation of trust within communal members, and between members and ruling elites (government officials from central state and local office). Under the each outcome, there are 30 questionnaires on average. To increase the efficiency, we use factor-analysis to select most relevant 31 from 85 questionnaires in the survey and categorize selected 31 questionnaires into 8 components following the decision rule of the factor analysis. Due to space limit, some questions of the component are not reported, unless their results are inconsistent with other belonging ones, but the estimates of all questions are presented in Appendix Table A2 to A4.

The first outcome – income generation and improvement of living environment – are measured through three components – i) the increase in household income and communal production, ii) changes in communal environment, such as transportation or housing iii) the provision of institutions for sustainable income generation. To evaluate the empowerment of member’s capacity of self-help, three factors are used – i) the self-recognition of individual’s capability in making decision for their personal life and community development, ii) frequencies of participating into collective action, and iii) self-reported feeling on the communal stability against violence. The enhancement of trust is measured by i) trust within members and ii) trust between external actors including central and local government officials.

## **C Identification Strategies**

As the Cambodia SMU had already been started with the endogenous selection of 30 treatment villages before conducting the baseline survey, treatment allocation was not perfectly random. Even though the evaluation team selected control villages whose observable characteristics are similar with those of treated group, the balance test for covariates in Table 1 shows that treatment status is not orthogonal enough to other characteristics. As column (5) of Table 1 presents, the distribution of characteristics between treated and untreated subjects are unbalanced, particularly in cultural features (i.e., religion and ethnicity) and economic status (i.e., land and home ownership). These systematic differences might cause a bias in the effect of the intervention on outcomes because of confounding factors that influence both of treatment status and outcomes.

In this condition, the simple comparison of outcomes between treated and untreated subjects

**Table 1: Balance Test**

	Treatment		Control		Treatment-Control	
	Mean (1)	Observation (2)	Mean (3)	Observation (4)	Mean difference (5)	P-value of difference (6)
(Household Head)						
Age	52.112	911	51.599	904	0.513	0.414
Female	0.27	904	0.259	894	0.011	0.58
Buddhism	0.836	911	0.979	904	-0.143***	0
Khmer	0.838	911	0.985	904	-0.147***	0
Marital status	0.775	911	0.793	904	-0.018	0.347
Education year	3.049	911	3.299	904	-0.25*	0.091
Land ownership	0.936	911	0.904	904	0.033**	0.011
Home ownership	0.897	911	0.861	904	0.036**	0.018
Pol Pot trauma	4.792	911	5.022	904	-0.231	0.119

*Notes:* The sample includes total 1,805 households from 60 villages in Cambodia. The observation year of the baseline is 2017, one year after the intervention. The households whose geographical information of residence are different from the administrative boundary of village are included but the test that excluded these household generates the same results. The differences of household characteristics between treatment and control villages are measured by t-test. Robust standard errors clustered at the village level are presented in parentheses. Significantly different than zero is indicated at 99 (\*\*\*) , 95 (\*\*), and 90(\*) percent confidence. 'Physically (mentally) affected by the Pol Pot regimes' is coded by 6 likert scales: zero to five. For the ones with no exposure to the regime is coded zero while five is for the ones who were severely (physically or mentally) injured during the Pol Pot regime.

cannot be a valid estimate of SMU project's impact. To address the issues of the nonrandomized experiment, we use a propensity score matching difference in difference strategy. The difference in difference (DID) can control for the initial differences derived from time-consistent omitted variables between the treatment and control villages. Thus, it is effective to weed out time-invariant village specific compounding factors as well as to control for general time trend applying for the entire villages. Formally, we can write the following equation for DID estimation:

$$Outcome_{hvd} = \beta Treatment_{vd} \times Post_{dt} + \gamma Treatment_{vd} + \delta Post_{dt} + X_{hvd} \Theta + \varepsilon_{hvd} \quad (1)$$

where  $Outcome_{hvd}$  is an outcome of interest of household  $h$  in village  $v$  and district  $d$  at time  $t$ .  $Treatment$  is a dummy for SMU program participation and  $Post$  is a dummy that is equal to 1 for the year of endline.  $X_{hvd}$  is a set of vectors controlling for baseline demographic and socioeconomic characteristics.  $\varepsilon_{hvd}$  is an error term.

The treatment effect of  $\beta$  in equation (1) indicates the difference between treated and untreated subjects three years after Cambodia SMU, which adjust for the difference between two groups before implementing the project. Though the DD approach can address unbalanced distribution of pre-period and the time-invariant unobservables, it should satisfy the assumption that

treated and control group change over time at the same pace to generate a valid DID estimate. This is because the parallel trend in the pre-period allows us to infer that the gap between two groups would have been unchanged had the SMU not been implemented, which creates an ideal counterfactual to capture the causal effect of intervention.

To check the parallel time trend, I extract eight commune-level characteristics relevant socio-economic conditions from the Cambodia Socio-Economic Survey from 2009 to 2015 as reported in Appendix Table 1. The time trend between controlled and treated communes is not significantly different at the statistically conventional level as shown in Table 2. However, the commune-level trend is not perfectly parallel neither as depicted in Panel A of Figure 2. To make a better condition for a valid comparison, we use a propensity score matching DID. The propensity score is the probability of being assigned into treated group, which is estimated most often by a logistic regression model using observable covariates (Austin, 2011).<sup>1</sup> As illustrated in Panel B of Figure 2, the pre-trend in the matched sample become very similar that allows us to generate a valid DID estimate of Cambodia SMU effect on outcomes.

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<sup>1</sup>As the propensity score matching is only based on observable characteristics, it may not be the best strategies to addresses a non-parallel trend. However, it can be at least one of the possible ways to control the heterogeneous time trend in this paper’s experiment setting with two time periods – the pre and post of the SMU intervention.



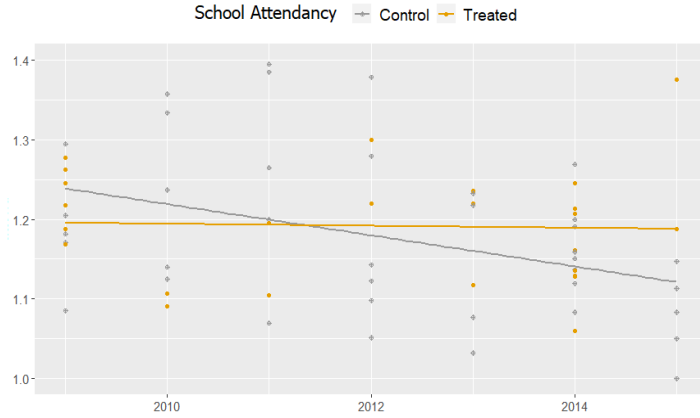
**Table 2: Test of Parallel Time Trend**

Dependent variable:	Employment status (1)	Reading ability (2)	Writing ability (3)	School attendance (4)	Log (Consumption) Food (5)	Non-food (6)	Log (In Riel) Income (7)	Expenditure (8)
Treatment	0.018 (0.083)	-0.000 (0.101)	0.120 (0.111)	0.081 (0.091)	0.019 (0.173)	0.121 (0.390)	0.599 (0.619)	0.733 (0.818)
Treatment x Year 2009	0.048 (0.101)	0.059 (0.124)	-0.068 (0.136)	-0.045 (0.111)	-0.021 (0.212)	-0.260 (0.477)	-0.671 (0.752)	-1.079 (0.993)
Treatment x Year 2010	-0.098 (0.119)	-0.103 (0.144)	-0.228 (0.159)	-0.221*** (0.130)	-0.280 (0.248)	-0.200 (0.558)		
Treatment x Year 2011	-0.118*** (0.119)	-0.135 (0.144)	-0.259* (0.159)	-0.194** (0.130)	0.029 (0.248)	-0.248 (0.558)	-0.265 (0.875)	0.056 (1.156)
Treatment x Year 2013	-0.219** (0.113)	0.045 (0.138)	-0.066 (0.152)	-0.030 (0.124)	-0.173 (0.237)	-0.267 (0.534)		
Treatment x Year 2014	-0.029 (0.096)	0.041 (0.116)	-0.075 (0.128)	-0.107 (0.105)	-0.063 (0.200)	-0.297 (0.450)	-0.011 (0.710)	-0.023 (0.938)
Treatment x Year 2015	0.123* (0.119)	0.135 (0.144)	0.029 (0.159)	0.121 (0.130)	0.265 (0.248)	-0.168 (0.558)		
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.401	0.469	0.148	0.210	0.250	0.290	0.265	0.289
Observations	66	66	66	66	66	66	44	44

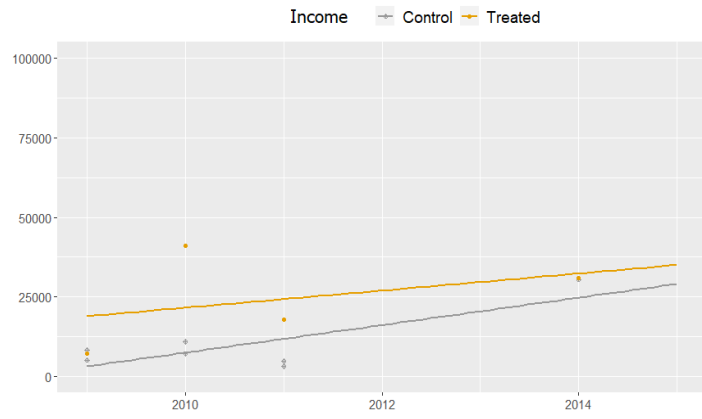
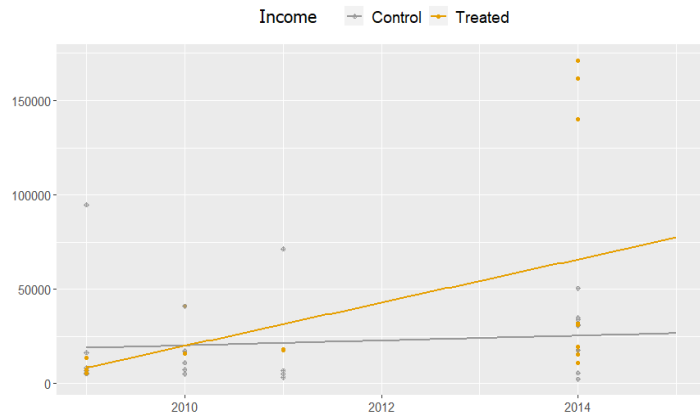
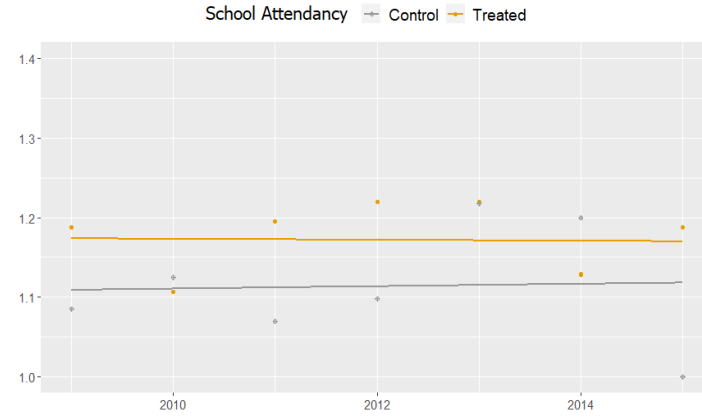
Notes: The unit of observations is commune. The data covers years from 2009 to 2015. All columns reports OLS estimates. Robust standard errors of the estimates are in the parentheses. The dependent variables are reported in each column. The interaction term of year of 2012 and treatment is used as a reference group. Year fixed effects are included. Significantly different than zero is indicated at 99 (\*\*\*) , 95 (\*\*), and 90(\*) percent confidence.

**Figure 2: Pre-trend Adjustment with Propensity Score Matching**

Panel A. Pre-trend without propensity score matching



Panel B. Pre-trend with propensity score matching



Notes: The communal-level data of school attendance and income are from Cambodia Socio-Economic Survey from 2009 to 2015. The trend of control villages is grey line and the that of treatment villages is orange line. In panel A, the plot includes all 20 communes while the plot in panel B includes only propensity score matched communes.

### III Results

#### A Treatment Effect of SMU on Outcomes

##### A.1 Income Generation

Table 3 reports results of estimated impact of Cambodia SMU on income generation. Under the components of the outcome as shown in each panel, the kernel distribution of propensity matching DID estimate and the simple DID estimate for comparison are presented in affiliated questions.<sup>2</sup>

To evaluate the improvement in income and other economic activities, we rely on the self-reported level of income and living environment changes. As it is hard to report the precise level of income, we additionally measure household income by the assets of households over the 11 items to reduce recall bias and under/over-reporting tendency.<sup>3</sup> Panel A of Table 3 reports the effect of SMU on the increase of household and communal income. All estimates are statistically and economically remarkable. The SMU intervention increases household income by 0.3 to 0.6 standard deviations and statistically significant at 99% confidence level. Considering the fact that 20,000 USD were given to each treatment village, the magnitude of changes in individual household income is very large. The reasons of the huge impact of SMU on household income are two. First, there are other sources for households that increase their incomes besides of the fund from SMU. After 2 years intervention of the project, households in the treated village have more chances to use better technologies to produce their agricultural goods, to obtain easier access to market to sell their productions, and to use job training center. Thus, the household income could be raised not only directly by the funds, but also indirectly by improved economic environment.

The preceding logic is supported by the following results about the impact of SMU on household's production and community's economic environment improvement. Its impact on the production and sales of agricultural, fishery or livestock in community are substantial, increasing the production or sales of economic activities by 0.54 standard deviations with 99% statistical confidence level. These large and positive impact of SMU are consistently found in the improve-

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<sup>2</sup>In this study, three different approaches of propensity score such as the nearest neighbour, stratification and radius matching are used to estimate DID. All the results under diverse methods of propensity score matching are consistent. The Appendix A3 to A5 present the estimates of DID using kernel and the nearest neighbour propensity matching.

<sup>3</sup>We use weighted average of assets that are estimated by inverse average of 11 household assets including car, mobile phone, wire phone, boat, bed, sofa, radio, television, refrigerator, bicycle, motor-bicycle and electricity.

ment of community environment. The treated villages improve its coverage of electricity service, compared to untreated villages, by 0.49 standard deviations; and extend the available housing by 0.14 standard deviation. The most remarkable change is found in the public transportation services. The SMU project makes the service of public transportation system better than control village by 0.73 standard deviations.

Lastly, we evaluate the economic impact of SMU from the sustainable development perspective. To maintain the pace of development after the project completed, it is important to equip the members with better knowledge on agricultural production by providing appropriate institutions. However, the impact of SMU on making institutions for sustainable income generation is mixed at most. The availability of job training center and technical assistance is increased by the intervention, but the magnitude of the impact is not large. The traditional community cooperative of agriculture, fishery or other types of economic activities are decreased after the intervention. The Table A2 presents more clearly the mixed findings. The nearest neighbour propensity score matching provides the evidence that the SMU significantly reduces the numbers of community cooperatives and the chances of technical assistance. The results imply the dark side of the reward-based SMU project. The competition-based design might be effective in generating changes that are seemingly apparent in a short-term such as monthly income or building a new institution, while it fell short of providing favourable environments for sustainable development.

## **A.2 Capacity Building for Self-Governance**

The channel of development assistance of the SMU is the beneficiary village members. As the villagers planned and implemented their own programs to improve socio-economic conditions of community, the active involvement of village members into collective activities strengthen their capacities to undertake self-initiative development project. In order to evaluate the impact of SMU on the capacity building, we use the changes in the participation of collective action, the level of self-empowerment and social cohesion.

As shown in panel A of Table 4, the SMU raises the likelihood of village-level collective actions to solve communal problems such as water-supply issues, and to help members who are in need though it rarely increases the number of individual participation in collective action. The SMU impact on self-empower is more obvious as the project leads villagers to have more

**Table 3: Treatment effect of SMU on Income Generation**

	Community production		Monthly income		Weighted household assets	
	DID	PS Matching+DID	DID	PS Matching+DID	DID	PS Matching+DID
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Income generation						
Treatment x Post	0.048 (0.129)	0.535*** (0.0400)	0.160* (0.091)	0.326*** (0.0444)	-0.174 (0.131)	0.654*** (0.0784)
Observations	5,149	5,171	4,330	5,171	5,148	5,171
R-squared	0.129		0.114		0.118	
	Electricity		Housing availability		Public transportation	
	(7)	(8)	(9)	(10)	(11)	(12)
Panel B. Community-level living environment						
Treatment x Post	-0.001 (0.112)	0.493*** (0.0344)	0.067 (0.130)	0.138*** (0.0399)	0.014 (0.165)	0.733*** (0.0371)
Observations	4,801	5,171	5,149	5,171	3,895	5,171
R-squared	0.156		0.047		0.314	
	Job training center		Technical assistance		Community cooperative	
	(13)	(14)	(15)	(16)	(17)	(18)
Panel C. Institutions for sustainable income generation						
Treatment x Post	0.081 (0.130)	0.196*** (0.0431)	-0.043 (0.125)	0.0941** (0.0402)	-0.164 (0.166)	-0.108*** (0.0398)
(All panels)						
Group fixed effects	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Observations	5,076	5,171	5,149	5,171	5,149	5,171
R-squared	0.093		0.058		0.034	

*Notes:* The unit of observations is household. The sample covers the years from 2017 to 2019. The dependent variables are all normalized with mean zero and standard deviation one in control villages. The included control variables are respondent's age, gender, and household head's age, gender, religion, ethnicity, marital status, education, land ownership and home ownership. All the following models include the same set of controls. The propensity score is measured by kernel distribution. The nearest neighbour propensity score matching is reported in Appendix, whose results are mostly consistent with those of kernel propensity score matching. Robust standard errors clustered at the village level is in parentheses for the simple DID. The bootstrapped standard errors are reported in the propensity score matching DID. Unreported results of included questionnaires in each panel are presented in Appendix Table A2. Significantly different than zero is indicated at 99 (\*\*\*), 95 (\*\*), and 90(\*) percent confidence.

control in making decisions that affect their everyday activities, and to feel them to have impact in making their village a better place to live. The estimates of panel B of Table 4 indicate that the SMU intervention increases the self-empowerment in their personal life and community decision making by 0.26 and 0.51 standard deviations with 99% confidence level, respectively.

These empowerment makes members to feel that community is more cohesive and safe as reported in the estimates of panel C of Table 4. The individuals in treated villages feel togetherness more than those in control village by 0.2 standard deviations. Moreover, they think that community become safer and more peaceful from violence, compared to the members in control villages. However, though SMU improves the image of village-level environment as a safe and cohesive environment, individual members in the treated village still feel unsafe from the crime and violence in their daily life, such as when they are alone at home or in the street after dark, as shown in column (18) of Table 4 and columns (26) and (27) in Table A3.

Overall, the results of Table 4 suggest that villagers could be empowered while they exercised their own voice in making key decisions of community development initiatives. Though the SMU does not directly increase the number of collective action participation, the social cohesion and self-reliance become stronger. As the stronger capacity provides better soil to make the persistent development, the SMU contributes to building positive spirit of village members for self-governance.

### **A.3 Enhancing Trust**

Another important pillar of the Cambodia SMU is to enhance trust within villagers and between community members and towards ruling elites. Since Cambodians experienced severe state-imposed violence that depleted social capital, the Cambodia SMU is designed to build and enhance the trust by offering the opportunities to cooperate each others. As the accumulated interactions within members and between ruling elites pursuing common interests for substantive time can make pro-social norms to be emerged (Ostrom, 1990), we expect that the collective actions driven by the SMU might consolidate the trust.

However, as reported in Table 5, the impact of SMU on building the trust is not perfectly in line with what is predicted. Regarding the trust in government officials, the statistically significant impacts of SMU can be found; however, trust within village members is significantly reduced

**Table 4: Treatment Effect of SMU on Capacity Building**

	Frequency of participation		Communal issues		Community member issues	
	DID	PS Matching+DID	DID	PS Matching+DID	DID	PS Matching+DID
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Participation of village-level collective action						
Treatment x Post	0.019 (0.147)	0.111 (0.0871)	-0.046 (0.121)	0.157*** (0.0384)	-0.126 (0.114)	0.439*** (0.0399)
Observations	3,449	5,171	5,149	5,171	5,149	5,171
R-squared	0.022		0.023		0.158	
	Having control in life		Important decisions in life		Impact to village development	
	(7)	(8)	(9)	(10)	(11)	(12)
Panel B. Self-empowerment						
Treatment x Post	-0.065 (0.104)	0.259*** (0.0461)	0.191 (0.133)	0.0523 (0.0505)	0.267** (0.106)	0.505*** (0.0435)
Observations	5,149	5,171	5,149	5,171	5,149	5,171
R-squared	0.064		0.032		0.068	
	Feeling togetherness		Safeness of community		Feeling safeness from crime	
	(13)	(14)	(15)	(16)	(17)	(18)
Panel C. Social cohesion and mutual protection						
Treatment x Post	0.129 (0.156)	0.199*** (0.0393)	-0.102 (0.080)	0.448*** (0.0499)	-0.185* (0.101)	-0.0523 (0.0627)
(All panels)						
Group fixed effects	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Observations	5,149	5,171	5,149	5,171	5,149	5,171
R-squared	0.026		0.069		0.023	

*Notes:* The unit of observations is household. The sample covers the years from 2017 to 2019. The dependent variables are all normalized with mean zero and standard deviation one in control villages. The included control variables are respondent's age, gender, and household head's age, gender, religion, ethnicity, marital status, education, land ownership and home ownership. All the following models include the same set of controls. The propensity score is measured by kernel distribution. The nearest neighbour propensity score matching is reported in Appendix, whose results are mostly consistent with those of kernel propensity score matching. Robust standard errors clustered at the village level is in parentheses for the simple DID. The bootstrapped standard errors are reported in the propensity score matching DID. Unreported results of included questionnaires in each panel are presented in Appendix Table A3. Significantly different than zero is indicated at 99 (\*\*\*) , 95 (\*\*), and 90(\*) percent confidence.

**Table 5: Treatment Effect of SMU on Enhancing Trust**

	Central government		Local government		Police	
	DID	PS Matching+DID	DID	PS Matching+DID	DID	PS Matching+DID
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Trust between communal members and government officials						
Treatment x Post	-0.023 (0.116)	0.185*** (0.0431)	0.125 (0.125)	0.0345 (0.0408)	0.002 (0.127)	0.160*** (0.0345)
Observations	5,149	5,171	5,149	5,171	5,149	5,171
R-squared	0.020		0.011		0.014	
	Help each other		Expect to receive help		Trustworthy	
	(7)	(8)	(9)	(10)	(11)	(12)
Panel B. Trust among communal members						
Treatment x Post	0.052 (0.201)	-0.120*** (0.0438)	-0.054 (0.108)	-0.0946** (0.0393)	-0.164* (0.088)	-0.111** (0.0433)
(All panels)						
Group fixed effects	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Observations	5,149	5,171	5,149	5,171	5,149	5,171
R-squared	0.013		0.019		0.005	

*Notes:* The unit of observations is household. The sample covers the years from 2017 to 2019. The dependent variables are all normalized with mean zero and standard deviation one in control villages. The included control variables are respondent's age, gender, and household head's age, gender, religion, ethnicity, marital status, education, land ownership and home ownership. All the following models include the same set of controls. The propensity score is measured by kernel distribution. The nearest neighbour propensity score matching is reported in Appendix, whose results are mostly consistent with those of kernel propensity score matching. Robust standard errors clustered at the village level is in parentheses for the simple DID. The bootstrapped standard errors are reported in the propensity score matching DID. Unreported results of included questionnaires in each panel are presented in Appendix Table A4. Significantly different than zero is indicated at 99 (\*\*\*) , 95 (\*\*), and 90(\*) percent confidence.



after the SMU intervention. Although the magnitude is not very large in both effects – from 0.09 to 0.16 standard deviations –, the adverse effects of the SMU on within-group trust are consistently significant across different specifications as reported in panel B of Table 5. To check the robustness in the effects of SMU on local social capital, we estimate the effect using the size of networks that individual can contact to call on help. According to Table A5, the propensity score matching DID estimates show consistently that the SMU project reduces the size of accessible networks, indicating the decrease of local social capital.

The reduction in within-group trust after the SMU intervention implies that the participation of villagers-driven development initiatives might not be inclusive. If villagers systematically exclude certain groups in making decisions, or exploit their labour to implement the activities, it could deplete trust while working together for common purposes. We explain the reason with more specific evidence in the following sections

## **B Effectiveness of the Impact of SMU**

### **B.1 Distribution of Economic Benefits**

Theoretically, community-driven development project which is driven by local demand and based on the participation of community members should improve the match between what a community needs and what it obtains (Mansuri & Rao, 2004). To check whether the SMU project distributes its benefits to people who need the most, we conduct heterogeneous analyses in three vulnerable groups: 1) ethnic minorities (non-Khmer), 2) the less educated and 3) the female head of household.

As shown in Table 6, positive economic impacts of SMU on economic benefits are equally distributed among villagers. The propensity score matching DID estimates in columns (1) to (4) present that the effects of SMU on the increase in the monthly income and assets of household are almost the same for the vulnerable groups compared to the non-vulnerable groups. The SMU impacts are both statistically significant at 99% confidential level and the differences of the magnitude between the groups are no more than 0.1 standard deviations. In addition to the equal distribution of economic benefits on income, the SMU impact satisfies the local demands as shown in the estimates in columns (5) to (12). The effects of SMU on the improvement on

community living environment are stronger for the ethnic minorities (non-Khmer), less educated or female household head groups. Moreover, the socially disadvantaged groups who are more prone to lose jobs and less techniques and knowledge on economic activities are more benefited by the intervention of SMU to receive the service of job-training and technical assistance. Though the average effect of SMU on creating community cooperative is negative as reported in panel C of Table 3, the reduction of cooperatives does not affect the vulnerable groups. As shown in column (12) of Table 6, the SMU actually increases the number of community cooperatives for the ethnic minorities, or no change for less educated or female household head groups at most.

In short, the estimates of Table 6 provide evidence that the SMU is appropriately designed to evenly distribute its benefits and to meet the local needs. The improvement in living conditions and technical assistance through job-training center or community cooperatives are more prominent for the people who are in need. Thus, we can conclude that the CDD-based SMU project was effective at targeting the appropriate recipients.

**Table 6: Distribution of the SMU Impact on Economic Benefits**

	Monthly income		Weighted assets		Housing		Transportation		Technical assistance		Cooperative	
	Khmer (1)	Non-Khmer (2)	Khmer (3)	Non-Khmer (4)	Khmer (5)	Non-Khmer (6)	Khmer (7)	Non-Khmer (8)	Khmer (9)	Non-Khmer (10)	Khmer (11)	Non-Khmer (12)
PSM+DID estimate	Panel A. Ethnic minorities											
Treatment x Post	0.397*** (0.0588)	0.443*** (0.101)	0.743*** (0.0954)	0.713*** (0.148)	0.0578 (0.0377)	0.726*** (0.0898)	0.721*** (0.0285)	1.350*** (0.0759)	0.0996* (0.0559)	0.251** (0.0989)	-0.113*** (0.0365)	0.340*** (0.0575)
	More (13)	Less (14)	More (15)	Less (16)	More (17)	Less (18)	More (19)	Less (20)	More (21)	Less (22)	More (23)	Less (24)
PSM+DID estimate	Panel B. Less educated group											
Treatment x Post	0.384*** (0.115)	0.305*** (0.0615)	0.675*** (0.165)	0.652*** (0.0958)	0.0423 (0.0607)	0.179*** (0.0407)	0.578*** (0.0592)	0.804*** (0.0542)	0.101 (0.0663)	0.0850** (0.0399)	-0.205*** (0.0729)	-0.0647 (0.0557)
	Male (25)	Female (26)	Male (27)	Female (28)	Male (29)	Female (30)	Male (31)	Female (32)	Male (33)	Female (34)	Male (35)	Female (36)
PSM+DID estimate	Panel C. Female Household											
Treatment x Post	0.333*** (0.0556)	0.348*** (0.0938)	0.713*** (0.108)	0.592*** (0.137)	0.132*** (0.0511)	0.129* (0.0718)	0.738*** (0.0346)	0.783*** (0.0542)	0.0643 (0.0475)	0.171** (0.0718)	-0.117* (0.0597)	-0.0544 (0.0823)
(All panels)												
Group fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171

*Notes:* The unit of observations is household. The sample covers the years from 2017 to 2019. The dependent variables are all normalized with mean zero and standard deviation one in control villages. The included control variables are respondent's age, gender, and household head's age, gender, religion, ethnicity, marital status, education, land ownership and home ownership. All the following models include the same set of controls. The propensity score is measured by kernel distribution. The nearest neighbour propensity score matching is reported in Appendix, whose results are mostly consistent with those of kernel propensity score matching. Robust standard errors clustered at the village level is in parentheses for the simple DID. The bootstrapped standard errors are reported in the propensity score matching DID. In panel A, if the household head is non Khmer, we consider it as vulnerable group as the major ethnicity in Cambodia is Khmer. In panel B, if the household head does not receive the primary education (the year of education is less than three), the household head is categorized as the less educated and categorized. All specifications include household demographic characteristics – household age, gender, religion, ethnicity, marital status, education, land ownership and home ownership. Significantly different than zero is indicated at 99 (\*\*\*) , 95 (\*\*), and 90(\*) percent confidence. The estimates of unreported questionnaires are presented in the Appendix Table 6A

## B.2 Capacity and Trust Building for the Vulnerable

The cornerstone of CDD is the participation of community members to implement self-initiative development activities. The active involvement in decision making process contributes to building the capacity of villagers and to enhance local social capital. However, empirical meta-analyses of CDD projects find that wealthier and better-networked individuals tend to dominate decision making while the vulnerable groups such as female or ethnic minorities could be systematically excluded (Bardhan, 2000; Ibanez & Rao, 2003; Katz & Sara, 1997). Since the average treatment effects of the SMU on within-group trust are negative as shown in Panel B of Table 5, the heterogeneous analysis that decomposes the treatment effects conditional on the groups may provide rationale for the cause of the adverse effect of the SMU.

To examine whether the SMU is conducted without any discriminations against the vulnerable groups, we compare the impact of SMU on building capacity and trust between non-vulnerable and vulnerable groups. Given the peculiar condition of Cambodia, the analysis includes the people who are mentally traumatized by Pol Pot regime as well as the vulnerable groups defined in previous subsection. As the Cambodia SMU is specially designed for the conflict-affected people to build trust toward government officials by integrating bottom-up and top to bottom approach, inclusion of Pol Pot affected groups would clarify the effect of SMU in post-conflict areas.

The estimates of Table 7 present different effects of the SMU on empowerment and trust conditional on the types of the groups. As reported in Panel B and C of Table 7, the SMU enhances the level of trust in governmental officials among the less-educated or female household head groups. The magnitude of the impact is slightly larger compared to non-vulnerable groups. Moreover, the less-educated and female household groups show consistently positive effects of SMU on collective action, cohesion and empowerment, which is the same as those for the non-vulnerable groups. The less educated or female household head groups actively participate into SMU project, and consequently, they could build the capacity of self-reliance and feel the togetherness of the village. However, in contrast, the non-Khmer ethnic groups and the group with Pol Pot trauma are less likely to participate into development projects as shown in columns (7) and (8) of panel A and D of Table 7. Their inactive involvement into collective actions may lead

them not to consolidate the social cohesion and the capacity of self-help even though they are belonging to treated group.

The positive implication in findings of Table 7 is that the SMU enhances the level of their trust in governmental officials for the group who are severely affected by state-imposed violence during the Khmer Rouge regime. The magnitude of the impact of the SMU on building trust for the mentally traumatized people is twice larger than that of the lowly affected villagers. As reported in Appendix Table 7A, the larger and significant effect of the SMU on building the trust in ruling elites are consistent across alternative specifications of propensity score matching methods and the types of the government officers. This finding suggest that the unique design of CDD that let the government officials work together with villagers effectively achieve its purpose.

Moreover, the findings of Table 7 provide clues why the SMU reduces within-village trust. There are no statistically significant changes in the level of within-group trust for non-vulnerable groups; however, the SMU depletes the trust within village for the ethnic minorities, less educated households, female households and the group with Pol Pot trauma. Particularly, ethnic minorities and Pol Pot affected group considerably lose their trust in community members by the SMU intervention, which decreases by 0.4 standard deviations on average. The finding suggests that the adverse effect of the SMU on within-group trust is driven by the considerable depletion of trust of vulnerable groups toward their village members. Though the less educated and female household head groups actively participate into the collective actions for common interest, the participation itself is not sufficient to enhance trust among the members. The results give the lessons that to promote within-group trust the CDD project should be monitored to check whether the privileged groups discriminate or exploit the socially disadvantaged ones.

**Table 7: Capacity and Trust Building for the Vulnerable**

	Trust in central govt		Villager's help		Trust in villagers		Collective action		Cohesion		Empowerment	
	Khmer (1)	Non-Khmer (2)	Khmer (3)	Non-Khmer (4)	Khmer (5)	Non-Khmer (6)	Khmer (7)	Non-Khmer (8)	Khmer (9)	Non-Khmer (10)	Khmer (11)	Non-Khmer (12)
Panel A. Ethnic minorities												
Treatment x Post	0.266*** (0.0509)	-0.0813 (0.0903)	0.0376 (0.0462)	-0.629*** (0.106)	-0.0312 (0.0470)	-0.436*** (0.0754)	0.201*** (0.0503)	0.0635 (0.0989)	0.295*** (0.0426)	-0.187* (0.0980)	0.121*** (0.0438)	-0.318** (0.130)
	Less (13)	More (14)	Less (15)	More (16)	Less (17)	More (18)	Less (19)	More (20)	Less (21)	More (22)	Less (23)	More (24)
Panel B. Less educated group												
Treatment x Post	0.159** (0.0732)	0.191*** (0.0416)	0.0625 (0.0777)	-0.203*** (0.0551)	-0.0528 (0.0919)	-0.132*** (0.0480)	0.204*** (0.0753)	0.140*** (0.0433)	0.341*** (0.103)	0.141*** (0.0500)	0.0435 (0.0823)	0.0659 (0.0642)
	Male (25)	Female (26)	Male (27)	Female (28)	Male (29)	Female (30)	Male (31)	Female (32)	Male (33)	Female (34)	Male (35)	Female (36)
Panel C. Female Household												
Treatment x Post	0.169*** (0.0522)	0.266*** (0.0784)	-0.100* (0.0586)	-0.168* (0.0928)	-0.0579 (0.0454)	-0.196** (0.0824)	0.0978* (0.0513)	0.249*** (0.0884)	0.172*** (0.0549)	0.245*** (0.0838)	-0.0422 (0.0648)	0.241*** (0.0895)
	Low (37)	High (38)	Low (39)	High (40)	Low (41)	High (42)	Low (43)	High (44)	Low (45)	High (46)	Low (47)	High (48)
Panel D. Pol Pot trauma												
Treatment x Post	0.104** (0.0514)	0.213*** (0.0625)	-0.0915 (0.0682)	-0.384*** (0.0739)	-0.0542 (0.0649)	-0.162** (0.0770)	0.209*** (0.0561)	-0.0486 (0.0693)	0.155** (0.0738)	0.0899 (0.0673)	0.146** (0.0605)	-0.136 (0.0961)
(All panels)												
Group fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171

Notes: The unit of observations is household. The sample covers the years from 2017 to 2019. The dependent variables are all normalized with mean zero and standard deviation one in control villages. The included control variables are respondent's age, gender, and household head's age, gender, religion, ethnicity, marital status, education, land ownership and home ownership. All the following models include the same set of controls. The propensity score is measured by kernel distribution. The nearest neighbour propensity score matching is reported in Appendix, whose results are mostly consistent with those of kernel propensity score matching. Robust standard errors clustered at the village level is in parentheses for the simple DID. The bootstrapped standard errors are reported in the propensity score matching DID. In panel D, the severity of the trauma caused by the Pol Pot regime is divided into two categories. The 'low' category of the trauma includes people who reports the likert scale less than 5 and the 'high' category whose likert scale is 5, saying that "The Pol Pot regime have great effect." All specifications include household demographic characteristics – household age, gender, religion, ethnicity, marital status, education, land ownership and home ownership. Significantly different than zero is indicated at 99 (\*\*\*) , 95 (\*\*), and 90(\*) percent confidence. The estimates of unreported questionnaires are presented in the Appendix Table 7A.

## IV Conclusion

This study examines the effect of the SMU on socio-economic development in post-conflict Cambodia. The CDD approach that the SMU takes is particularly important in conflict-affected communities as the active involvement of village members enables local community to regain sense of social cohesion as well as it improves socio-economic well-being.

The findings show that the SMU has significant effects on the increase of production and sales of agriculture, fishery or livestock by 0.5 standard deviations, which results in the increase of household's monthly income and assets by 0.33 and 0.65 standard deviations respectively. Moreover, the SMU's CDD approach motivates the villagers' participation in collective actions. The SMU increases the likelihood of villagers' involvement in development activities that leads the village members to have stronger spirit of self-help. The heterogeneous analysis finds that the economic benefits driven by the project are evenly distributed among the members. Particularly, the services that support the basic livelihood such as housing availability or job-training opportunities are provided for the socially disadvantaged groups.

As the SMU takes the integrated approach of CDD by allowing the government officials to take part in the implementation process of the project, the trust in government officials is increased, especially for the people who are greatly traumatized by the state-imposed violence in 1970s. However, the participation-based development project depletes the within-group trust. The heterogeneous analysis find that the adverse effect of the SMU is largely driven by the considerable decrease in within-group trust of vulnerable groups, such as ethnic minorities or less-educated households. The findings suggest that the CDD project in post conflict areas should be more delicately designed to inclusively manage the project. As the culture of mistrust is still prevailed among the members, externally-motivated collective actions might lead them to have another pessimistic perceptions toward their neighbours if the participation process is not democratic and inclusive enough.

However, given the harsh environment faced by villagers in rural areas in Cambodian, the significant improvements in economic conditions and the capacity of self-governance made by the SMU prove that the CDD is a viable strategy to bring positive changes in post-conflict Cambodia.

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# Appendix

## Chapter 3

The Socio-Economic Impact of Community-Driven Development  
in Conflict-affected Communities: Evidence from Cambodia

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## A Descriptive Statistics

*Table A1. Descriptive Statistics of Commune-level Characteristics*

	Observation	Mean	SD	Min	Max
Employment	20	1.317	0.118	1.033	1.563
Reading ability	20	1.295	0.127	1.07	1.571
Writing ability	20	1.303	0.128	1.07	1.578
School Attendance	20	1.209	0.113	1.06	1.657
Income	20	29335.9	39835.8	2188.9	171236.6
Expenditure	20	8418.1	19601.1	1793.1	132482.1
Food consumption	20	10281.7	2198.7	6041	16979.4
Non food consumption	20	295681.5	176285.7	70870.7	885970.6

## B Detailed Outcomes

### B.1 Income Generation

Table A2. Treatment effect of SMU on Income and Community Living Conditions

	Community_production			Community_sales			Level of overall living			Monthly income		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DID	0.048 (0.129)			0.143 (0.112)			0.144 (0.134)			0.160* (0.091)		
PSM+DID (Kernel Matching)		0.535*** (0.0400)			0.834*** (0.0456)			0.627*** (0.0369)			0.326*** (0.0444)	
PSM+DID (Nearest Neighbor)			0.744*** (0.0530)			1.244*** (0.0410)			0.786*** (0.0432)			0.637*** (0.0519)
Observations	5,149	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171	4,330	5,171	5,171
R-squared	0.129			0.209			0.132			0.114		
	Harvest improvement			Weighted assets			Electricity of community			Housing condition		
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
DID	-0.143 (0.114)			-0.174 (0.131)			-0.001 (0.112)			0.067 (0.130)		
PSM+DID (Kernel Matching)		0.326*** (0.0493)			0.654*** (0.0784)			0.493*** (0.0344)			0.138*** (0.0399)	
PSM+DID (Nearest Neighbor)			0.479*** (0.0467)			1.044*** (0.0764)			0.748*** (0.0422)			0.370*** (0.0344)
Observations	2,976	5,171	5,171	5,148	5,171	5,171	4,801	5,171	5,171	5,149	5,171	5,171
R-squared	0.071			0.118			0.156			0.047		
	Availability of public transportation			Job training center			Technical assistance			Community cooperative		
	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)
DID	0.014 (0.165)			0.081 (0.130)			-0.043 (0.125)			-0.164 (0.166)		
PSM+DID (Kernel Matching)		0.733*** (0.0371)			0.196*** (0.0431)			0.0941** (0.0402)			-0.108*** (0.0398)	
PSM+DID (Nearest Neighbor)			0.985*** (0.0355)			-0.0519 (0.0386)			-0.0777* (0.0455)			-0.233*** (0.0465)
Observations	3,895	5,171	5,171	5,076	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171
R-squared	0.314			0.093			0.058			0.034		

## **B.2 Empowerment of Self-Governance**

Table A3. Treatment effect of SMU on Capacity Building

	Happiness			Having control in life			Making important decisions			Impact to village		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DID	-0.055 (0.088)			-0.065 (0.104)			0.191 (0.133)			0.267** (0.106)		
PSM+DID (Kernel Matching)		0.475*** (0.0467)			0.259*** (0.0461)			0.0523 (0.0505)			0.505*** (0.0435)	
PSM+DID (Nearest Neighbor)			0.571*** (0.0462)			0.390*** (0.0478)			0.0638 (0.0595)			0.564*** (0.0473)
Observations	5,149	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171
R-squared	0.093			0.064			0.032			0.068		
	Collective action for water supply			Collective action for members			Frequency of participation			Self-safeness in home		
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
DID	-0.046 (0.121)			-0.126 (0.114)			0.019 (0.147)			-0.185* (0.101)		
PSM+DID (Kernel Matching)		0.157*** (0.0384)			0.439*** (0.0399)			0.111 (0.0871)			-0.0523 (0.0627)	
PSM+DID (Nearest Neighbor)			0.141*** (0.0386)			0.523*** (0.0390)			-0.0384 (0.110)			-0.180*** (0.0472)
Observations	5,149	5,171	5,171	5,149	5,171	5,171	3,449	5,171	5,171	5,149	5,171	5,171
R-squared	0.023			0.158			0.022			0.023		
	Self-safeness in dark place			Safeness of community			Feeling togetherness					
	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)			
DID	-0.138 (0.108)			-0.102 (0.080)			0.129 (0.156)		0.199*** (0.0393)			
PSM+DID (Kernel Matching)		-0.402*** (0.0584)			0.448*** (0.0499)							
PSM+DID (Nearest Neighbor)			-0.600*** (0.0574)			0.478*** (0.0499)						0.186*** (0.0483)
Observations	5,149	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171
R-squared	0.075			0.069			0.026			0.026		

### B.3 Enhancing Trust

Table A4. Treatment effect of SMU on Trust

	Trust in central government			Trust in local government			Trust in police			Contribute time for villagers		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DID	-0.023 (0.116)			0.125 (0.125)			0.002 (0.127)			-0.182** (0.082)		
PSM+DID (Kernel Matching)		0.185*** (0.0431)			0.0345 (0.0408)			0.160*** (0.0345)			-0.287*** (0.0494)	
PSM+DID (Nearest Neighbor)			0.198*** (0.0493)			0.0298 (0.0422)			0.0692 (0.0426)			-0.259*** (0.0567)
Observations	5,149	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171
R-squared	0.020			0.011			0.014			0.015		
	Contribute money for villagers			Help villagers			Expected to help from villagers			Trust in villagers		
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
DID	-0.334*** (0.092)			0.052 (0.201)			-0.054 (0.108)			-0.164* (0.088)		
PSM+DID (Kernel Matching)		-0.358*** (0.0420)			-0.120*** (0.0438)			-0.0946** (0.0393)			-0.111** (0.0433)	
PSM+DID (Nearest Neighbor)			-0.351*** (0.0484)			-0.116** (0.0465)			-0.117** (0.0495)			-0.176*** (0.0463)
Observations	5,149	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171	5,149	5,171	5,171
R-squared	0.021			0.013			0.005			0.019		

## B.4 Additional Evidence on the Effect of SMU on Within-village Trust

Table A5. Treatment effect of SMU on Network

	Friends who you can call on help					People you can borrow a small amount of money				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PSM DID (Nearest neighbour)	-0.214*** (0.0749)					-0.311*** (0.0610)				
PSM DID (Stratification)		-0.241*** (0.0713)					-0.326*** (0.0720)			
PSM DID (Kernel)			-0.136** (0.0541)					-0.197*** (0.0551)		
PSM DID (Radius)				-0.222*** (0.0855)					-0.336*** (0.0740)	
DID					-0.251 (0.162)					-0.505** (0.219)
Group fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	5,171	5,171	5,171	5,171	5,148	5,171	5,171	5,171	5,171	5,148
R-squared					0.030					0.036

## B.5 Distribution of the SMU impact on Economic Outcomes

Table A6. Distribution Effect of the SMU Impact on Additional Economic Outcomes

	Community production		Level of overall living		Harvest improvement		Electricity		Job training center	
	Khmer (1)	Non-Khmer (2)	Khmer (3)	Non-Khmer (4)	Khmer (5)	Non-Khmer (6)	Khmer (7)	Non-Khmer (8)	Khmer (9)	Non-Khmer (10)
Panel A. Ethnic minorities										
Treatment x Post	1.152*** (0.0815)	0.454*** (0.0360)	0.933*** (0.0883)	0.620*** (0.0408)	0.648*** (0.152)	0.315*** (0.0507)	0.471*** (0.128)	0.553*** (0.0417)	0.258*** (0.0871)	0.214*** (0.0404)
	Less (13)	More (14)	Less (15)	More (16)	Less (17)	More (18)	Less (19)	More (20)	Less (21)	More (22)
Panel B. Less educated group										
Treatment x Post	0.472*** (0.0632)	0.561*** (0.0471)	0.508*** (0.0606)	0.681*** (0.0505)	0.433*** (0.0895)	0.283*** (0.0603)	0.594*** (0.0631)	0.456*** (0.0485)	0.189*** (0.0627)	0.196*** (0.0468)
	Male (25)	Female (26)	Male (27)	Female (28)	Male (29)	Female (30)	Male (31)	Female (32)	Male (33)	Female (34)
Panel C. Female Household										
Treatment x Post	0.491*** (0.0574)	0.606*** (0.0809)	0.614*** (0.0427)	0.619*** (0.0666)	0.338*** (0.0640)	0.308*** (0.0897)	0.472*** (0.0517)	0.531*** (0.0847)	0.164*** (0.0514)	0.238*** (0.0834)
(All panels)										
Group fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171



## B.6 The Impact of SMU on Building Capacity and Trust

Table A7. The Impact of SMU on Building Capacity and Trust (Additional Outcomes)

	Trust in local govt		Trust in police		Frequency of action		Safe in home	
	Khmer (1)	Non-Khmer (2)	Khmer (3)	Non-Khmer (4)	Khmer (5)	Non-Khmer (6)	Khmer (7)	Non-Khmer (8)
Panel A. Ethnic minorities								
Treatment x Post	-0.00763 (0.0924)	0.0318 (0.0436)	-0.235*** (0.0833)	0.224*** (0.0403)	0.599*** (0.213)	0.0177 (0.0938)	-0.152 (0.130)	-0.0359 (0.0649)
	Less (13)	More (14)	Less (15)	More (16)	Less (17)	More (18)	Less (19)	More (20)
Panel B. Less educated group								
Treatment x Post	0.0129 (0.0687)	0.0426 (0.0485)	0.247*** (0.0690)	0.116*** (0.0435)	-0.160 (0.247)	0.215*** (0.0696)	0.141 (0.100)	-0.134** (0.0612)
	Male (25)	Female (26)	Male (27)	Female (28)	Male (29)	Female (30)	Male (31)	Female (32)
Panel C. Female Household								
Treatment x Post	0.0372 (0.0471)	0.00951 (0.0880)	0.141*** (0.0459)	0.180** (0.0713)	0.130 (0.134)	0.00683 (0.136)	0.00429 (0.0651)	-0.120 (0.101)
	Low (37)	High (38)	Low (39)	High (40)	Low (41)	High (42)	Low (43)	High (44)
Panel D. Pol Pot trauma								
Treatment x Post	-0.0442 (0.0386)	0.0734 (0.0650)	0.107* (0.0559)	0.166** (0.0661)	-0.0674 (0.116)	0.297*** (0.0964)	-0.169** (0.0857)	0.149 (0.113)
(All panels)								
Group fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observation	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171

(Continued)

	Safe in dark		Safeness of community		Having control in life		Impact to village	
	Khmer	Non-Khmer	Khmer	Non-Khmer	Khmer	Non-Khmer	Khmer	Non-Khmer
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Ethnic minorities								
Treatment x Post	-0.420*** (0.129)	-0.402*** (0.0569)	0.602*** (0.102)	0.461*** (0.0559)	0.307*** (0.117)	0.263*** (0.0410)	0.647*** (0.0956)	0.474*** (0.0404)
	Less (13)	More (14)	Less (15)	More (16)	Less (17)	More (18)	Less (19)	More (20)
Panel B. Less educated group								
Treatment x Post	-0.229** (0.100)	-0.478*** (0.0613)	0.560*** (0.0837)	0.397*** (0.0499)	0.167** (0.0789)	0.306*** (0.0557)	0.327*** (0.0754)	0.587*** (0.0465)
	Male (25)	Female (26)	Male (27)	Female (28)	Male (29)	Female (30)	Male (31)	Female (32)
Panel C. Female Household								
Treatment x Post	-0.337*** (0.0630)	-0.507*** (0.0962)	0.519*** (0.0429)	0.318*** (0.0859)	0.202*** (0.0377)	0.373*** (0.0836)	0.463*** (0.0426)	0.635*** (0.0853)
	Low (45)	High (46)	Low (47)	High (48)	Low (49)	High (50)	Low (51)	High (52)
Panel D. Pol Pot trauma								
Treatment x Post	-0.596*** (0.0759)	-0.0356 (0.113)	0.388*** (0.0662)	0.553*** (0.114)	0.207*** (0.0694)	0.134* (0.0738)	0.445*** (0.0607)	0.497*** (0.0696)
(All panels)								
Group fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observation	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171