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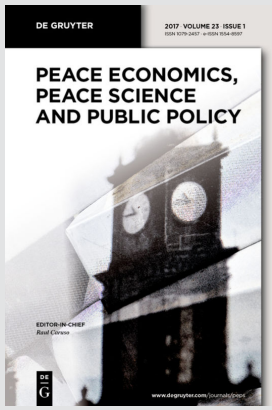

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Iwan J. Azis* and Alvin Pratama

Polarization and Local Conflicts in Post Decentralization Indonesia

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Abstract: Exploring the hypothesis that socio-economic discrimination contributes to conflict occurrence, we show that the experience of a large country that have gone through a big-bang shift from centralized to decentralized system and introduced direct local elections, confirms the link. Using the case of Indonesia, and by controlling for poverty, demand-induced resource scarcity, and institutional variables, it is revealed that income polarization and inequality at the provincial level explain the occurrence of violent conflict (causing at least 1 death), be it for total or for different types. The results are robust to a series of model specifications. For understanding its impact on conflict, polarization is found more important than income inequality as a measure of socio-economic discrimination.

Keywords: polarization, deadly conflict, local election, inequality, Indonesia
JEL Classification: D31, J15, J39, O15, O53

1 Introduction

The question of whether socio-economic discrimination constitutes a driving force of conflicts has been at the heart of controversy among social scientists for more-than half a century. Findings from experimental economics tend to confirm that conflicts are often triggered by strong grievance feelings especially when people tend to resent situations deemed unfair. A class of individuals can be strong

Correction note: Correction added after online publication on June 4, 2020: In a previous version of this article, Alvin Pratama's affiliation was mistakenly stated as "University of Indonesia, Depok, Indonesia".

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reciprocators willing to punish others for norm violations, even when such punishments constitute pure costs to the punisher (Camerer and Fehr 2006).

Numerous studies have indeed confirmed that there is an important link between the occurrence of conflict and socio-economic discrimination manifested among others in the high degree of income polarization and income inequality. The mechanisms, however, are complex, involving factors that may not be easy to measure. The characterization and classification of conflict also vary, ranging from a benign form of conflict to a deadly violence. The prevailing social network and government policy could play an important part either in triggering the conflict or in functioning as a mediating role through the diffusion of behaviors and opinions of the society.

In an environment of low income inequality, the risk of conflict could remain high when the degree of polarization is elevated. This is one of the main arguments we make in this paper. When society is split into two equally sized groups, and the differences within groups are considerably smaller than those between groups, inequality is low but polarization is high, and that could be an important source of conflict. The most notable contemporary example is perhaps the episode of "Arab Spring" in 2010, where sectarian conflicts erupted in the largely Muslim countries (Tunisia, Morocco, Syria, Libya, Egypt and Bahrain) despite little variations in income inequality across the affected countries. On the contrary, variations in polarization were fairly high prior to the escalated conflicts.[1]

While income inequality measuring the income distance between two tails —low and high-income groups-has attracted much attention, income polarization measuring the move from the middle of the income distribution out into the tails, has not. By using the case of post-decentralization Indonesia, we hypothesize in this paper that income inequality and polarization explain the rise of different conflicts following the direct elections at the regional subnational level. Indonesia is selected as a case because it went through a big-bang shift from a highly centralized to a highly decentralized system during the early 2000s. The dramatic shift in the policy was subsequently followed by the direct local elections that began in the mid-2000s, before reaching a full swing in 2008, during and after which the number of conflicts escalated. We employ a polarization measure in which the "distance" between groups play a central role, and for the conflicts we utilize the village-level provincial data based on

1 Sparked in the central Tunisian town of Sidi Bouzid in December 2010, the "Arab Spring" was supposed to be a success story. Yet, Tunisia's growing crisis and conflict became inextricably entangled in the Arab spring's wider unravelling as dreadful events across north Africa and through the wider Arab world fueled each other.

surveys conducted by the country's official statistical office few years after the local elections began.

The paper is organized as follows. The next section discussed the background related to direct elections following the decentralization in Indonesia, followed by explanations about the models and data. The discussions about the results and the analysis are discussed in the subsequent section before conclusions.

2 Decentralization, Local Capture, and Conflict

Before the Asian Financial Crisis broke out in 1997, Indonesia's development performance was considered a success. The country's centralized system produced a fairly strong economic growth with falling poverty and reduced income inequality. The once-famous World Bank report published in 1993, *The East Asian Miracle: Economic Growth and Public Policy*, put Indonesia in the "miracle" group.[2] At the time, there was no strong demand for rushing towards decentralization. Most analysts recommended that the country should decentralize gradually and in stages, not in a big-bang style (see Silver, Azis, and Schroeder 2001). But to the dismay of many, the government made a shocking and rushing announcement in 1999 to turn the centralized system upside down in fairly abrupt way, making the country to become one of the world's most decentralized system by giving a broader autonomy (through Law No. 22/1999) and allocating more resources to the regions (through Law No. 25/1999). Interestingly, the decision was not driven by pressures from governors, regents, mayors, and local elites (Azis 2011). Instead, it was motivated by the ambition of few supporters of the then President Habibie (Suharto's hand-picked presidential successor) to win voters by making his administration appear reformist. They also expected that members of the parliament would use it to send a signal that they embraced the

2 The report was prepared under the persuasion of the Japanese government for the World Bank to make a special study of East and Southeast Asia, by focusing on why the region has become rich and what other countries should learn from the experience. It classified the "high-performing Asian economies" (HPAEs) led by Japan into two groups: 1) the Four Tigers consisting of Hong Kong, the Republic of Korea, Singapore, and Taiwan, China) that grew rapidly for decades and have approached the ranks of high-income economies; and 2) the newly industrializing economies (NIEs) consisting of Indonesia, Malaysia, and Thailand, that have joined the group of HPAEs within the last two decades at the time of the report writing.

reform agenda by passing the Laws (Smith 2008). [3] Indeed, eager to grab at every opportunity to present themselves as reform-oriented, and with only little information available, the parliament passed the Laws easily with minimum public debate and with no substantial changes made in the original draft (Rasyid 2003).

Clearly, the demand from the regions was not a major factor behind the decision to decentralize. If anything, widespread pressures at the time were for reducing corruption, curtailing the military's role in politics, establishing press freedom, and lifting restrictions on political parties, all of which were national in scope (Bünte 1999). But to his supporters, gaining voters especially those outside Jawa was critical for the upcoming first direct elections Habibie had to face. And for that matter, the move to decentralize was considered urgent. A lack of involvement of local actors in the early debate and absence of serious analysis were considered less of a problem than giving the impression of a reform-minded administration.[4]

A decentralization driven not by local demand is actually not rare. In analyzing the nature of decentralization and its impact, Agrawal and Ostrom (2001) used four case studies of South Asia to assess the extent of decentralization and the rights and capacities transferred to actors at the lower levels by making comparisons of the processes and outcomes of decentralization. The four cases represent different origins of pressures for decentralization. They concluded that local actors' participation is not a prerequisite for decentralization to be launched. In some cases, local mobilization was instrumental in the initiation of decentralization; in others decentralization took place without local actors' movement or national agitation. The authors also revealed that in some cases pressures for decentralization were generated through the intervention of an international donor agency, hence pressures from outside the region/country, not from local actors.

While the decentralization in Indonesia was clearly driven more by national political interest, not by local pressure, the welfare performance after the policy was

3 To put in a context, following the collapse of the highly centralized regime of Soeharto, the sentiment for unqualified denial of the Soeharto regime quickly spread throughout the Indonesian society. Being handpicked by Soeharto, and regarded as his protégé, Habibie was under heavy pressure to get rid of anything reminiscent of Soeharto. Thus, a string of measures was issued, including election reform, abolition of restrictions on the freedom of speech, and transforming the country from a centralized system to a decentralized one. The draft law on decentralization was prepared by seven individuals close to Habibie who saw the sudden opportunity as part of the reform ("Reformasi") package to make Habibie administration appear as reformist ahead of the elections.

4 Like in many other countries, a persistent belief in the superiority of decentralized system was prevalent at the time. This defies experts caution for not making overhasty generalization due to a lack of systematic theory and evidence supporting it, and that the virtue of decentralization should be put in a cultural and historical context, as argued in Treisman (2007).

enacted has not been encouraging. Many regions experienced a decline in economic growth, and the human development index showed a dismal progress. In some regions, the index was even lower than before the direct elections took place. Reasons behind the disappointing performance vary, but a common one occurring in all regions is the widespread incidence of "local capture" where the elected candidates receiving supports from powerful and rich individuals or parties during the campaign felt compelled to return the favor, even if it contradicts with the public interest (Azis 2011, 2013). Political clientelism, job or money offering, and granting work contracts in exchange for electoral support are common in "local capture." They underline the deep problems of corruption, inadequate public services, and weak law enforcement, which could become a fertile ground for conflicts (Fukuyama 2011; World Bank 2017). Yet, fund being decentralized through intergovernmental transfers along with direct local elections continues despite the disappointing welfare outcome. The role of incentives created by the political and fiscal institutions may explain the survivalness of such a system, reflecting the second generation fiscal federalism studied by Weingast (2014). Unlike the first generation that focuses on the performance of decentralized systems under benevolent social planners, the second generation puts the emphasis on the performance based on the fiscal and political incentives facing subnational officials.

In theory, direct elections hold local government accountable since on the one hand they can encourage people and citizens to see themselves as having the right to participate in the development process, on the other hand they can make elected officials to see the people as citizens with rights to public services. Either way, this should reduce tension and conflict as it encourages people to see that election is the only legitimate opportunity for change. It has been argued that the chances for a success for a new democracy depend on the structure of political and democratic institutions (Myerson 2006). Being a new democracy, Indonesia fits the classification where direct election is a critical component of democracy.

In reality, as shown in Figure 1 the number of villages reporting violent conflicts increased from less-than 200 in 2005 (when direct elections were first implemented) to 351 in 2014. Notice particularly the significant increase after 2008, the year when direct local elections reached their full swing. During that period, the conflicting parties often mobilized supporters to put pressures even in cases related to the resolution of dispute over votes-counting where the High Court (*Mahkamah Agung*) is supposed to help settle the dispute. More often than not, such disputes led to tension and violent conflicts. When unresolved, frustration followed, elevated the potentials for more conflicts.

Compared to the conflicts during the national parliamentary and presidential elections, those related to direct local elections have been far more frequent. They took the forms of incidents between citizens, between villages, between youths or students, as well as clashes between ethnic groups. The triggering issue could range

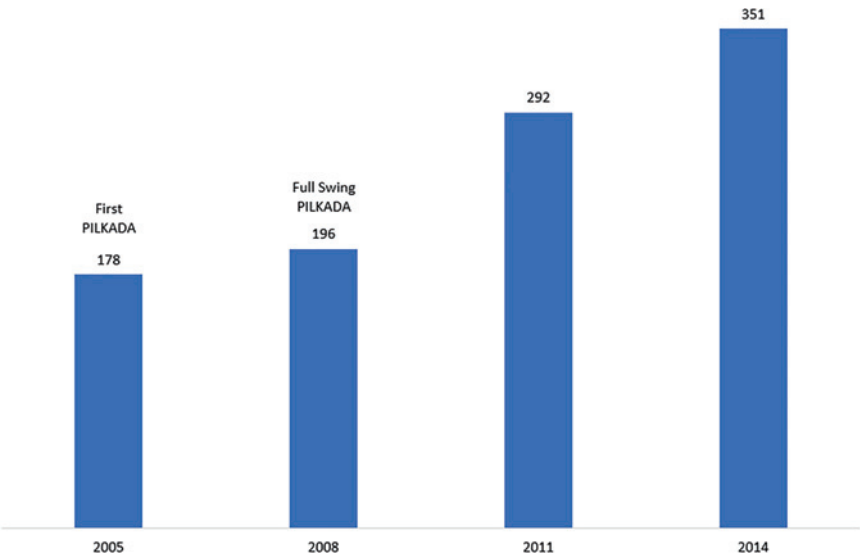

Figure 1: Number of villages reporting violent conflicts. Source: Authors' calculations from PODES 2005, 2008, 2011, 2014.

from religious and ethnic-rivalry to claims to indigeneity and resources (as in the case of conflict during local elections in Musi Banyuasin, South Sumatera, after some palm oil companies came in).[5] When followed by mass mobilization, an originally benign dispute turned into a violent conflict (exemplified by events in Poso, Central Sulawesi, in Ternate, Northern Maluku, and in West Kalimantan).

Figure 2 shows the total number of different types of conflicts after the full implementation of direct local elections in 2008. Except for conflicts between ethnic groups, the number increased for all conflict types. Combining violent conflicts all together, the frequency of conflict shot up from 258 in 2008 to 555 in 2014.[6] The trend was so concerning that at one point the Regional Representative Assembly (*Dewan Pertimbangan Daerah*) and the country's two biggest Islamic organizations, *Nahdatul Ulama* and *Muhammadiyah* began to question whether

5 Identity politics, which is common and often cited as a major problem, is not always conflictual, rarely involved substantive discussion of policy. The 2014 legislative election in the province of Bangka Belitung is a case in point. Identity politics was used by some candidates only as the means to avoid discussing policies due to their incompetence. It did not lead to conflicts.

6 Note that the number for total violent conflict is slightly larger than the sum of the four types of conflict listed in Figure 2 because we do not include two other types of violent conflict (between citizens and local officials, and other types of violent conflict).

the political costs of conducting PILKADA not outweigh the benefits (Tadjoeddin et al. 2012).

Like in other developing countries, democratization and direct elections in Indonesia are messy and complex, involving uncertain processes in their consolidation. The commonly shared features are: weak parties, patrimonialism, low education and political participation, high poverty and income inequality, and sharp divisions between ethnic/religious groups (Sulistiyanto 2009). The direct elections process simply brought these features to the surface. Given the history of Indonesia, its archipelagic nature, as well as the heterogeneity of its society, however, a strategic and pragmatic centralist imposition should have been in place in order to reduce the potential conflicts and to prevent provinces from breaking apart. Such an underlying conflict stage, however, is difficult to avoid due to the continuous presence of elitism and rampant money-politics as a consequence of "local capture." While the underlying conflict can exist for a long period of time before any actual conflict arises, certain conditions could accelerate the speed. We

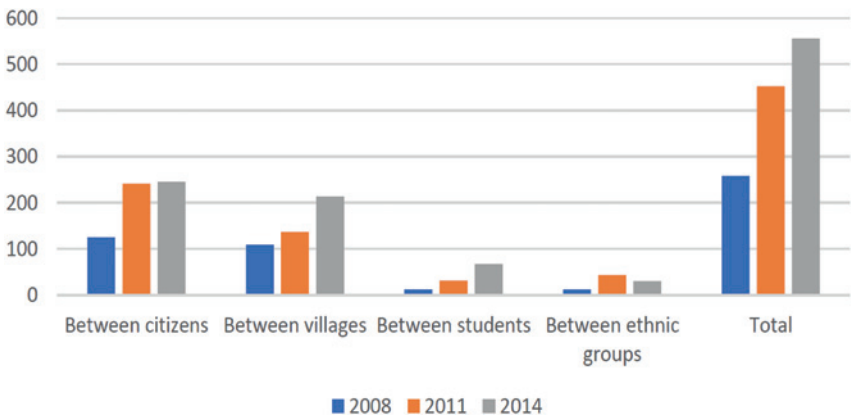

Figure 2: Post direct elections: Number of different types of violent conflict.
Source: Calculated based on a series of *Statistics Indonesia,* "Village Potential Survey (PODES)" for 2008, 2011, 2014.
Notes:

- Violent conflict between citizens is defined as conflict between citizens with at least one death in a village.
- Violent conflict between villages is defined as conflict between one village and others with at least one death.
- Violent conflict between students is defined as conflict between students with at least one death in a village.
- Violent conflict between ethnic groups is defined as conflict between ethnic groups with at least one death in a village.
- Total number of violent conflict is the total number of four types of violent conflicts above.

argue that the worsening of socio-economic discrimination—manifested in a greater polarization and income inequality—is one of such conditions.

3 Models and Data

In a game-theory framework, when the payoffs fall short of what a group can acquire through non-cooperative strategy, conflicts arise. To the extent the prevailing institution and political system determine the payoffs, the responsiveness of the political system to a group's aspiration given competing alternatives could foretell the occurrence of conflicts. To establish a precise link, however, is a challenge. Using an appropriate time lag, it is hypothesized that polarization and income inequality of all sort are positively related to conflict outbreak. The relations, however, are far from monotonic. When the degree of polarization is high, the result could be either a rare but severe conflict or a non-conflict situation if the potential cost of actions leading to conflict is extremely high.

Analyzing the intensity of occurring conflicts is not the same with studying the likelihood of conflict occurrence. This paper is more about the latter. A common problem with estimating the likelihood of occurrence is related to the identification issue. Causal effects are difficult to estimate because it is not easy to find variables that are genuinely exogenous; we rarely observe cases where other variables remain constant when changes occur in the independent variables. Yet, in testing the hypothesis that income inequality and polarization affect the occurrence of conflicts, we ought to make such an assumption. To circumvent the problems associated with omitted relevant variables, we introduce some control variables.

For the measure of polarization, two closely related variables are: fractionalization and income inequality. For the latter, the Gini index based on a cumulative frequency Lorenz curve whose value is between 0 and one is widely used: 0 reflects perfect equality, one reflects perfect inequality (all income is owned by one person and the rest has nothing):

$$G = \sum_{i=1}^{m} \sum_{j=1}^{m} n_i n_j d_{ij} \tag{1}$$

where n_i and n_j represents the population shares of group i and j, respectively, and d_{ij} is the distance between group. On the other hand, fractionalization represents the probability that two randomly chosen individuals happen to belong to different groups, and is measured based on two theoretical justifications. First, the industrial organization-based relation between market structure and profitability, which is measured by the level of market power in a Cournot-type of oligopoly using the

well-known Herfindahl index. Second, the theory of inequality whose measure is derived from the concept of entropy in information theory. Measuring the group division without taking account the intergroup distance d_{ij}, a fractionalization index is expressed as (see Easterly and Levine 1997):

$$F = \sum_{i=1}^{m} n_i (1 - n_i) \tag{2}$$

the values of which are between 0 and 1. Thus, the probability that two randomly selected individuals from a population belong to different groups depends on the value of that index: 0 means no fractionalization (there is only one group), and one means high fractionalization (every individual is within a unique group).

Unlike the inequality measures, fractionalization index decreases with (hence not independent of) the population size. It is also different from the polarization index because distance between groups is not taken into account in fractionalization. Thus, if the number of population group changes, the two measures can run in the opposite direction: a larger number of groups may decrease polarization but increase fractionalization. To claim that the trend of income inequality is the same with that of income polarization is equivalent to ignoring the role of fractionalization.

Although it is necessary to include fractionalization in the measure of polarization, however, by itself fractionalization is not an important determinant for conflict occurrence. For example, the index of (ethnic) fractionalization does not have a significant effect on the likelihood of conflicts, but (ethnic) polarization does. In the case of ethnic fractionalization, most of the literature fails to find any significant evidence of it as a cause of conflict. On the other hand, Montalvo and Reynal-Querol (2005a) showed that the polarization index is a significant explanatory variable for the incidence of civil wars, and the result is robust to the use of other proxies for ethnic heterogeneity, alternative sources of data, regional dummies, and the use of a single cross section of data. In a related study, the same authors found that an increase in ethnic polarization has an indirect negative effect on growth because it increases the incidence of civil wars and public consumption, and reduces the rate of investment (Montalvo and Reynal-Querol 2005b). Even Easterly and Levine (1997) who argued that the very high level of ethnic diversity of countries (the case of Africa) is an important contributor to their poor economic performance, used the theoretical arguments based on "polarized societies," not on highly fractionalized cases. Thus, the claim that the more ethnic groups there are, the higher the probability of a conflict (due to a positive relationship between an index of fractionalization and conflicts) is disputable. The fact is, there is less violence in highly homogeneous

and highly heterogeneous societies; instead, more conflict in societies where a large ethnic minority faces an ethnic majority (Horowitz 1985). From this perspective, an index of polarization should capture the likelihood of conflicts better than an index of fractionalization.

Conceptually, polarization reflects a division of two or more sharply contrasting groups. In a society consisting of several groups, each identified by some vectors of characteristics, when the intra-group attributes of members are very similar but the inter-group attributes are very different, it is likely that such a society is very polarized even when the degree of inequality is low.[7]

To the extent an individual's feeling of identification is an increasing function of the number of individuals with a similar level of income, Esteban and Ray (1994) proposed an income polarization index based on an identification and alienation setting. The more the number of people in a group with same levels of income, the stronger the feeling of identification of an individual in that group. Two individuals belonging to two different groups can feel very different from each other, and the greater the difference/distance, the greater is the polarization. In turn, this could cause social tensions and elevate the probability of conflict occurrence.[8]

In this sense, a polarization index reflects the sum of all possible antagonisms between individuals, and is therefore based on discrete distribution or distinct number of points. There is, however, a practical problem as we need to assume that population is already been bunched in relevant groups that causes an unpleasant discontinuity. Overcoming this problem requires the use of continuous distribution. Duclos, Esteban, and Ray (2004) and Esteban et al. (2012) proposed an alternative measure to capture the sum of all effective antagonisms:

$$P = \sum_{i=1}^{m} \sum_{j=1}^{m} n_i^2 n_j d_{ij} \tag{3}$$

where i and j are the two different groups. Note that G is a kind of general form of P, where the latter puts more weight on the share of population in each group, emphasizing the role of an individual's feeling of identification within a group (i. e. identification component).

The above three distributional measures represent the information on preferences and group sizes. Their effect on conflict is determined by the weight of each, which in turns depends on the prize and the level of group commitment. Esteban and Ray (2011) used the concept of equilibrium per capita conflict where

7 In a two-group (or two-party) case, moderate or middle groups tend to lose influence.

8 The absolute income differences between individuals measure the alienation component.

the intensity of conflict is measured by the ratio of conflict to its payoffs. They argued that such a measure, denoted by σ, can be explained by a set of factors that capture the variation in individual preferences, group size, nature, and level and prize of group cohesion. Denoting N as the number of group:

$$\sigma \doteq a[\lambda P + (1-\lambda)F] + \lambda(1-\alpha)\frac{G}{N} + \frac{(1-\lambda)(1-\alpha)(m-1)}{N} \tag{4}$$

When several groups in a population engaged in a conflict, the winner is said to receive the private prize (e g. political positions, rents, disproportionate allocation of expenditure and infrastructures). The publicness of the prize, denoted by λ, may take the form of political power, influence over policy, religious dominance, etc. The effect of polarization (P) is strengthened by λ, whereas the effect of fractionalization (F) is reinforced by the private prize. While a group cohesion reduces the effect of G/N, it tends to strengthen P and F.

Since we are interested with the occurrence rather than the intensity of conflicts, for which fractionalization by itself may not be an important determinant, we focus on the role of polarization (P) and income inequality (G) by taking into account a set of control variables. The data for calculating P and G are taken from the Indonesian *National Socioeconomic Survey* (SUSENAS), which is a series of large-scale multi-purpose surveys with a fairly large sample size (more than 200,000 households). For the conflict measure, we use the count data (instead of the ratio) from the *Potensi Desa* (PODES). Such data contain socioeconomic information collected every three years from the village heads in all 69,000 Indonesian rural and urban regions, by the national statistical office. If the village heads reported conflicts, the follow-up questions were about the type and impacts of conflicts (fatalities, injuries, and material damage) and the parties involved (between citizens, between villages, etc.). Noted limitations of PODES data are: first, the survey was not specially designed for collecting information about conflict; second, the definition of conflict, asked for the first time in PODES 2003, was rather ambiguous that could cause underreporting data. The latter may also be due to the fact that incidence of conflict is perceived as a sign of failure of leadership (Baron et al. 2009). Also, in some cases the village heads have limited information about the purpose of the survey (Vothknecht and Sumarto 2012, p. 8). Since originally the data are at the village level, we aggregated them to obtain the provincial level data. While most studies use data of large scale and high intensity episodic conflict, here we focus only on data of violent conflicts defined as routine conflicts with at least one death within a village. The same data of "violent conflict" was also used by Barron, Kaiser, and Pradhan (2009), although they combined PODES with information from the

Variable	Obs	Mean	Std. Dev.	Min	Max
Total Violent conflict	99	14.05051	21.48914	0	160
Violent conflict between citizens	99	6.171717	11.35695	0	96
Violent conflict between villages	99	4.636364	6.925927	0	38
Violent conflict between students	99	1.111111	5.256461	0	50
Violent conflict between ethnic groups	99	0.858586	4.31658	0	37

	Polarization	Inequality	Poverty	Log Population	Democratic institution	Political rights	Log Share of mining	P*MS
Polarization	1							
Income inequality	0.3921	1						
Poverty	0.0845	−0.0874	1					
Log Population	0.2511	0.2921	−0.1642	1				
Democratic institution	0.2641	0.2593	−0.4473	0.0948	1			
Political rights	0.111	0.4276	−0.3725	0.1877	0.2531	1		
Log Share of mining	−0.3886	−0.1942	0.1302	−0.2337	−0.1694	−0.0933	1	
P*MS	−0.4397	−0.123	0.103	−0.1196	−0.1848	−0.0041	0.9157	1

fieldwork. Murshed et al. (2009) used the term "routine/everyday violence" to reflect the same "violent conflict" that we use.

Using the data set produced by the United Nations Facility for Indonesian Recovery Caruso et al. (2016) analyzed the relationship between climate change and "violence," in which the latter is measured by the number of monthly events and the number of victims (sum of injured and killed people). The term "violence" they used actually refers to violent conflict exemplified by the World Bank report on those INSFIR data "Understanding Violent Conflict in Indonesia." (see Barron, Jaffrey, and Palmer 2009). Such data were collected only once, between early-1990 and end of 2003, way before the direct local elections in 2005 and 2008. Czaika and Kis-Katos (2009) used PODES 2003 data to analyze the civil conflict and displacement in Aceh, but not focusing on the violent type.

Four types of violent conflict are considered: between citizens and between villages (the top three highest number in 2014), between students, and between ethnic groups. The following are the descriptive statistics of the data and the a correlation matrix between explanatory variables.

Denoting c_{it} as the sum of conflict in province i at time t:

$$c_{it} = X_{1it-3}\beta_1 + X_{2it-3}\beta_2 + \varepsilon_{it-3} \tag{5}$$

where $i = 1, \ldots, 33$ indicate regions (provinces), t = observation period (2008, 2011, 2014), X_1 represents the distributional indices of polarization (P) and inequality (G), X_2 denotes a set of control variables, and ε is the error term. Considering the duration of conflicts and the lingering effects, we select a time lag of 3-year.

The first control variable we use is intended to capture the level of province's development. Lower level of development is often associated with higher occurrence of conflict. One of the mechanisms is through the ineffectiveness of local government and authority in dealing with public affairs as often happened in low-income countries. In such circumstances, conflict perpetrators have a high probability to succeed. In some cases, the level of development may work indirectly through mitigating the effect of income inequality on conflict.

Many studies use per-capita income as a proxy for "state's overall financial, administrative, police, and military capabilities" to reflect the level of development that could, in turn, affect the occurrence of conflict (Fearon and Laitin 2003). In this study, we use the poverty level in order to capture the feeling of injustice or alienation. In our judgment, per-capita income is too broad to represent such a feeling. A high poverty rate is often characterized by a high level of corruption that could stifle the ability of political systems to adopt an anticorruption measure. This could cause internal instability and lower the cost for players to engage in a

conflict. Even in cases where the veto-players agree on the desirability of the measure, its implementation is likely obstructed by a high level of fractionalization between veto-players and stakeholders (Torenvlied and Haarhuis 2008).

Another relevant control variable is the population density. Seen as equivalent to taxing available space and resources, thereby undermining stability, higher density is treated as a proxy for demand-induced resource scarcity, capable of escalating competition for space and resources. Of-course the distribution—hence the role of other factors in affecting it—determines the extent of the effect. By using various definitions and types of conflict, results of several studies on this subject have been mixed; see among others Bremer et al. (1973); Choucri (1977); Hauge and Ellingsen (1998); Tir (1998). Nonetheless, most authors seem to agree on the mechanisms, one of which is through population pressure in static and dynamic sense; the static part is reflected in population density, the dynamic part is in the growth of population. In our model, we use log of population to seize the effect of higher competition for space and resources.

When population growth is high, competition over space and resources turns fiercer, resulting in land overcrowding, resource degradation, lower freshwater availability, all of which likely to breed unrest, elevating the risk of local conflict. The unprecedented population increases following the international epidemiological transition of the 1940s is among the often-quoted examples. The episode has been shown to contribute to increased violent conflict, confirming the conjecture that higher population growth without a corresponding increase in resources and technology tends to raise the likelihood of conflicts presumably through a more intense competition for scarce resources (Acemoglu, Fergusson, and Johnson 2017).

The next set of control variables is intended to reflect the role of institution. In particular, we use democratic institution and political rights as a proxy for the country's institutional quality.[9] Like in many developing countries, the institutional factors play an important role in determining Indonesia's development outcomes. Equally important is the role of institutional factors in affecting the occurrence of conflict, especially those cross-provincial variations in institutional quality are prevalent. Strong and effective institutions could prevent disagreements; they could deter criminal acts that may escalate into larger conflicts. In some cases, effective institutions may also function as intermediaries between disputing parties, reducing the probability of conflict occurrence (Barron, Nathan, and Welsh 2005; and Barron et al. 2009).

9 The data are taken from the United Nations Development Program (UNDP), Indonesia's National Development Planning Agency (BAPPENAS), and the National Statistical Office.

The last control variable is to reflect the extent of natural resource activities, particularly the mining sector, in each province. The paradox of a negative impact of natural resource abundance on economic performance has been widely documented (Gylfason 2000, 2001; Sachs and Warner 1997, 1999), all focused on the impact on economic growth. The mechanisms of the effect are important to delineate. The direct effect is explained by a high degree of corruption, low investment in non-resource sectors, increased protectionism, and deteriorating terms of trade, while the indirect effect works through the socio-economic indicators such as education and health conditions. Similar mechanisms for conflict occurrence are also at work.

Despite the shift towards a more decentralized system, a majority of resource and mining rent in Indonesia is collected by the central government to be distributed later across provinces and districts. Before decentralization, the central government transferred only 10 percent of its total expenditures to the regions. After decentralization, that number increased dramatically to 60 percent, and local officials gained more controls over the permits, local fees, and other regulations deemed relevant for local development. This has become a fertile ground for local corruption, collusion, and nepotism on the one hand, and local tensions or conflicts on the other. Higher local government revenue also retarded efficiency. Increased excess in administrative spending due to a lack of political accountability combined with decreases in public investments under directly elected districts heads has been analyzed in Sjahrir et al. (2014) and Katos and Sjahrir (2017). This and the fact that owners of companies operating in natural resource activities are largely non-locals have often made local citizens feel they are not benefiting as much from the activities; some think that their regions are being exploited. Competition and tensions often increased among local residents and officials who want to have some controls over the resources. A competition between elites over natural resource rents is also present. All the above could elevate the likelihood of conflicts (Collier and Hoeffler 2004). The evidence of increased number of conflicts was indeed seen in Indonesia especially after the direct local elections reached a full swing in 2008.

The next section discusses the results and analysis of the model using the case of post-decentralization Indonesia.

4 Results and Analysis

Given the nature of count data, it is necessary to select an appropriate econometric model to use. We use the negative binomial regression (NBR) because the dependent variable (c_{it} in equation (5)) is a count of the number of times an event occurs and follows the negative binomial distribution where the (conditional)

variance is greater than the (conditional) mean. This condition applies for discrete count data as some zeros make the mean smaller.[10] The difference between the variance and the mean is captured by a dispersion parameter (equals to unity when the variance equals the mean). When the dispersion is close to unity, a Poisson model is more appropriate to use, but when it is greater than unity (overdispersion) the NBR model fits the model better.[11] The NBR coefficients can be interpreted as follows: for a one unit change in the independent variable (polarization), the difference in the logs of expected counts of the dependent variable (the occurrence of conflicts) is expected to change by the respective regression coefficient, holding other variables constant.

In the first set of regression, we use the total number of violent conflicts as the dependent variable. Results in Table 1 show that the coefficients for income polarization are both positive and significant under all model specifications, and they are all positive, mostly significant for income inequality. There is indeed an indication that socio-economic discrimination is associated with higher conflict.

The results for income inequality are similar with the finding of Tadjoeddin et al. (2016), but different from østby et al. (2011). Using the 1990 and 2003 data, the latter found that the link between horizontal inequalities and routine-episodic violence in Indonesia were all insignificant and negative.

On the role of polarization, to our knowledge no work on the subject using Indonesian data has ever been done. Studies in other countries pointed to a positive link between polarization and conflict. Using data of Latin American countries, for example, Gasparini et al. (2008) confirmed the presence of a positive link between the two. They also argued that conflicts are more closely related to polarization and income inequality than to poverty (the coefficient of poverty was insignificant). In the Indonesian case, we found that the role of poverty in explaining the occurrence of conflict is significant at 1 percent level: provinces with higher poverty rate tend to experience more violent conflict (holding income

10 Examples of studies on conflict and related subjects that used NBR method are: Hoelscher & Nygard (2017); Noe and Rieckmann (2013); Capuno (2019); Carriere & Encinosa (2017); and Koch & Tkach (2012).

11 NBR is a generalization of Poisson regression with a looser assumption. One key criterion often used to compare Poisson and NBR models for discrete count outcomes is the relative value of the variance to the mean after accounting for the effect of the predictors (the Poisson model is nested in NBR since its dispersion is held constant). The mean of the dependent variable in NBR is determined by the exposure time t and a set of k regressors (see Cameron and Trivedi 2013; and Hardin and Hilbe, 2014): $\mu i = \exp(\ln(t_i) + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki})$ where $\beta_1, \beta_2, \ldots, \beta_k$ are the unknown coefficients to be estimated using the maximum likelihood estimation (MLE).

Table 1: Results of negative binomial regression for violent conflict following full direct local elections (2008, 2011, 2014).

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Polarization	22.70***	17.76**	21.04***	20.36***	22.86***	15.15**	17.82**	17.82**
	(7.523)	(7.369)	(7.891)	(7.557)	(7.464)	(7.251)	(7.880)	(7.869)
Inequality	6.450**	5.186	5.530*	6.530**	6.148*	6.782**	6.919**	6.926**
	(2.718)	(3.156)	(3.159)	(3.224)	(3.213)	(3.254)	(3.261)	(3.287)
Poverty	0.0545***	0.0604***	0.0539***	0.0496***	0.0479***	0.0619***	0.0570***	0.0569***
	(0.0110)	(0.0122)	(0.0141)	(0.0133)	(0.0144)	(0.0137)	(0.0159)	(0.0155)
Log population (P)		0.244**	0.222*	0.217*	0.254**	0.433***	0.400**	0.400***
		(0.118)	(0.121)	(0.120)	(0.124)	(0.148)	(0.156)	(0.152)
Democratic institution			−1.007	−1.068	−1.063		−0.757	−0.758
			(0.809)	(0.798)	(0.789)		(0.816)	(0.810)
Political rights				−0.387	−0.204			0.00292
				(0.518)	(0.518)			(0.526)
Log mining share (MS)					0.120	0.335**	0.314**	0.314**
					(0.0729)	(0.146)	(0.151)	(0.156)
P*MS						−0.161**	−0.144**	−0.144**
						(0.0816)	(0.0844)	(0.0865)
Constant	−4.810***	−3.916***	−0.210	1.426	0.167	4.532***	−1.712	−1.699
	(1.380)	(1.342)	(3.401)	(3.651)	(3.637)	(1.404)	(3.479)	(3.884)
Observations	99	99	99	99	99	99	99	99
AIC	7.02	6.987	6.995	7.012	7.008	6.977	6.99	7.01
BIC	252.99	252.34	255.77	260.02	262.22	256.53	260.417	265.012

Robust standard errors in parentheses ***$p < 0.01$, **$p < 0.05$ *$p < 0.1$.

inequality, polarization, and other control variables listed in columns two to eight of Table 1 constant).[12]

The log of the population to capture the effect of competition over space and resources is included in the model. As the costs of living in provinces with large population size are usually higher, some sort of perverse incentives for poor residents are effectively in place (e g., through property tax). On the one hand, this reflects a broader coverage of income inequality, more than just income-based inequality (*G*), on the other hand it could have a similar effect on the likelihood of conflict occurrence. In all cases, the population coefficients have the expected signs and are statistically significant, suggesting that population pressure (population-driven scarcity) is indeed another factor that could incite conflicts. Provinces with higher population growth are likely to have more violent conflicts than those with lower population growth. Note that since only the independent variable is log-transformed, the coefficients for Log Population in Table 1 should be interpreted more carefully. For example, in model eight where the coefficient is 0.400, we can interpret that holding all other independent variables constant a province with one percent higher population is associated with 0.400*ln (1.01) or 0.004 higher conflict occurrence.

The link between the socio-economic discrimination and conflict is complex, to which institutional factors have an important role to play. In the model, we use the "democratic institution" index published jointly by the country's National Development Planning Agency, the National Statistical Office, and the Regional Planning Agency. The following is a set of variables included in the democratic institution index: aligning the election commission in the administration of elections, vote rigging, budget allocation for education and health, regional regulation initiated by the regional council, recommendation of regional council to the executive, regeneration activities undertaken by the electoral party, women political party officials, policies of local government officials found guilty by the court (PTUN), efforts to provide local budget (APBD) information by local governments, controversial judges' decision, and termination of controversial investigation by prosecutors or police. As shown in Table 1, the coefficients of this index are all negative albeit insignificant; provinces with better democratic institution tend to have less conflict. Another institutional variable we use is the "political rights," measured by "the right to vote and be elected" and "political participation in decision-making supervision." More specifically, they are measured based on the scoring of the following factors: whether the right to elect or be elected is impeded, facilities for the disables to use

12 Barron et al. (2009) also found the important role of poverty in raising the likelihood of local conflict in Indonesia.

their right to vote, the quality of permanent voters list, voters turnout, percentage of women elected to the provincial council, demonstration/strike violent, and public complaints about government administration. The coefficients of this variable are also insignificant but negative as hypothesized.

The last control variable is the share of province's mining sector in total output. Based on this indicator, measured in log term, four provinces in Indonesia are classified as natural resource-rich: Aceh, Riau, East Kalimantan and Papua. In columns 5 to 8, the positive sign of the coefficients is according to what is hypothesized, and only in model five the coefficient is not significant. We also try to include the effect of interaction between population growth and the difference in mining share (MS) between provinces, the results of which are displayed in columns six to 8. This time, the log population growth and MS coefficients are all positive and significant. However, the interaction component has a negative and significant coefficient, suggesting that the effect of MS on conflict occurrence is not the same for provinces with different population growth. The unique effect of MS is not limited to the positive coefficients (0.335, 0.314 and 0.314 in columns 6, 7 and 8, respectively) but it also depends on the negative values of the interaction coefficients and the population growth. Only if population did not grow (zero growth) the positive coefficients can be interpreted as the unique effect of MS on conflict occurrence. Note also that a similar explanation applies (symmetrically) to the unique effect of population growth coefficients. The joint-effect of population growth and MS is far from monotonic.

Next is to break down the violent conflict into four types and use the same control variables as in Table 1. Displayed in Table 2, the coefficients of two variables of interest, polarization and income inequality, are all positive and only few not significant. For violent conflict between villages, the coefficient of income inequality is significant but that of polarization is not. For violent conflict between citizens, between students, and between ethnic groups, the coefficient of polarization is significant but of inequality is not. In the case of poverty, with the exception for conflict between citizens, all of the coefficients are positive and significant, confirming the important role of the level of development in explaining the rise of different types of conflict. The coefficients of the log population also have positive signs and are significant at 1 percent level for violent conflicts between villages and between students.

It is also of interest to evaluate the results of different models for each conflict type. Table 3 summarizes the significance of the variables (the regression results are shown in the Appendix). Poverty appears to be a good explanatory variable for three out of four types of violent conflict, and along with two institutional variables the income inequality measure explains only one out of 4.

Table 2: Results of negative binomial regression different types of violent conflict following full direct local elections (2008, 2011, 2014).

	Total	B Citizens	B Villages	B Students	B Ethnic Gr
Polarization	22.86***	32.80***	5.646	48.55***	33.72*
	(7.464)	(9.105)	(11.27)	(15.54)	(18.20)
Inequality	6.148*	3.997	6.723*	8.551	2.957
	(3.213)	(3.474)	(3.924)	(5.757)	(7.687)
Poverty	0.0479***	0.0272	0.0828***	−0.0612	0.154***
	(0.0144)	(0.0166)	(0.0203)	(0.0421)	(0.0516)
Log population (P)	0.254**	0.0930	0.350***	0.836***	0.0334
	(0.124)	(0.136)	(0.127)	(0.293)	(0.336)
Democratic institution	−1.063	−1.739*	−0.0191	−2.551	3.850*
	(0.789)	(0.982)	(1.030)	(1.779)	(2.286)
Political rights	−0.204	−0.256	0.724	−3.622***	0.358
	(0.518)	(0.542)	(0.776)	(1.236)	(1.832)
Log mining share (MS)	0.120	0.176**	−0.0177	0.216	0.441**
	(0.0729)	(0.0846)	(0.0928)	(0.152)	(0.172)
Constant	0.167	1.875	−6.665	12.01	−29.92*
	(3.637)	(4.037)	(5.853)	(8.140)	(15.48)
Observations	99	99	99	99	99
AIC	7.008	5.516	4.975	2.019	1.365
BIC	262.22	114.535	60.97	−231.663	−296.453

Robust standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Obviously, further research needs to be done on why and through what mechanisms each variable explains different type of conflicts with different level of confidence. Looking horizontally at the types of violent conflict that could be explained by the largest number of independent variables, Table 3 also shows that violent conflict between citizens is clearly at the top; four variables significantly

Table 3: Types of violent conflict and independent variables.

	Independent variables						
Type of violent conflicts	**Polarization**	**Inequality**	**Poverty**	**Log of population**	**Democratic institution**	**Political rights**	**Log mining share**
Between citizens	✓		✓		✓		✓
Between villages		✓	✓	✓			
Between students	✓			✓		✓	
Between ethnic groups			✓				✓

explain the occurrence of such a conflict. Interestingly, the degree of income polarization is far more significant than income inequality in explaining the occurrence of violent conflict. As before, we also perform regression with interactive variable P*MS for each type of conflict, and the overall conclusions are generally unchanged (available upon request).

5 Conclusions

Most studies have confirmed that there is a negative relationship between polarization and growth. The effect can work directly through the fall of marginal propensity to consume associated with the "missing middle class," or indirectly through poor public policies, rent-seeking, and problems in the design of structural policies related to infrastructure and education. La Porta et al. (1999) pointed to corruption and low efficiency in governments as another important channel. Explicitly or implicitly, some of those studies interpreted the negative link between polarization and growth to be a consequence of the high probability of conflict associated with a highly fractionalized society.

The goal of this paper is to test the hypothesis that the likelihood of violent conflicts at the local level tends to increase when socio-economic discrimination measured by income polarization and income inequality is high. Using the case of Indonesia after the country's full swing of direct local elections in 2008, we found that both polarization and income inequality measures are significant in explaining the occurrence of violent conflict after controlling for local poverty, demand-induced resource scarcity, and some institutional factors. The results are fairly robust, not sensitive to alternative model specifications. Overall, the degree of significance of polarization is higher than that of inequality, very similar to the observation during the "Arab Spring" episode. The finding is also not sensitive to different types of conflict; only in "violent conflict between villages" the polarization coefficient is found insignificant.

We are fully aware that the actual causal links tying conflict to polarization, income inequality and other control variables are complex, multiple, and may run in the opposite direction. An amalgam between the independent variables can obscure the outcomes, and undermining the complexity of the link may produce vague results and ambiguity. Nonetheless, through a careful selection of control variables and model specifications we believe that our results are less ambiguous. To the extent rising conflicts could disrupt growth, its prospect, and the overall economic performance, efforts to lower polarization is imperative. Measures to ensure the delivery of productive private goods and the provision of quality public goods and social infrastructures are key to such efforts.

Further studies and improvements are warranted. One area that requires close attention is with respect to the proximity issue. When a province experiences conflict, neighboring provinces are likely to receive a spillover effect, and when a group of individuals involved in a conflict has a kinship tie to a group in the neighboring provinces, the latter may also experience conflicts. The probability of conflict occurrence is elevated when the degree of polarization is high. On the other hand, one may also need to take into account the growing use of social media (cellular phones, e-mail and other forms) that could diminish the importance of proximity and make local conflict no longer local.

Appendix

Table A1: Results of negative binomial regression for violent conflict between citizens following full swing direct local elections (2008, 2011, 2014).

Variables	(1)	(2)	(3)	(4)	(5)
Polarization	23.89***	22.70***	29.70***	28.70***	32.80***
	(7.688)	(7.751)	(9.089)	(8.809)	(9.105)
Inequality	3.409	3.075	3.683	4.843	3.997
	(3.277)	(3.502)	(3.506)	(3.500)	(3.474)
Poverty	0.0469***	0.0485***	0.0368**	0.0316**	0.0272
	(0.0123)	(0.0131)	(0.0154)	(0.0147)	(0.0166)
Log population		0.0778	0.0391	0.0334	0.0930
		(0.131)	(0.136)	(0.135)	(0.136)
Democratic institution			−1.891*	−1.950**	−1.739*
			(0.995)	(0.983)	(0.982)
Political rights				−0.454	−0.256
				(0.562)	(0.542)
Share of mining					0.176**
					(0.0846)
Constant	−4.634***	−4.432***	2.367	4.284	1.875
	(1.493)	(1.520)	(3.870)	(4.123)	(4.037)
Observations	99	99	99	99	99
AIC	5.515	5.531	5.521	5.537	5.516
BIC	104.023	108.226	109.875	114.056	114.535

Robust standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table A2: Results of negative binomial regression for violent conflict between villages following full swing direct local elections (2008, 2011, 2014).

Variables	(1)	(2)	(3)	(4)	(5)
Polarization	13.46	5.354	5.852	5.932	5.646
	(11.07)	(11.43)	(11.34)	(11.12)	(11.27)
Inequality	8.834***	8.486**	8.606**	6.688*	6.723*
	(3.376)	(3.892)	(3.855)	(3.902)	(3.924)
Poverty	0.0663***	0.0761***	0.0744***	0.0826***	0.0828***
	(0.0148)	(0.0163)	(0.0182)	(0.0205)	(0.0203)
Log population		0.334***	0.330***	0.355***	0.350***
		(0.124)	(0.124)	(0.119)	(0.127)
Democratic institution			−0.245	−0.0381	−0.0191
			(1.004)	(1.037)	(1.030)
Political rights				0.747	0.724
				(0.757)	(0.776)
Share of mining					−0.0177
					(0.0928)
Constant	−5.255***	−4.328**	−3.386	−6.744	−6.665
	(1.735)	(1.848)	(4.608)	(5.779)	(5.853)
Observations	99	99	99	99	99
AIC	4.97	4.922	4.942	4.955	4.975
BIC	50.109	47.958	52.5	56.407	60.97

Robust standard errors in parentheses.***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table A3: Results of negative binomial regression for violent conflict between student following full swing direct local elections (2008, 2011, 2014).

Variables	(1)	(2)	(3)	(4)	(5)
Polarization	60.03	26.92	33.18	37.31	48.55
	(25.05)	(14.43)	(16.21)	(14.22)	(15.54)
Inequality	13.12*	5.799	5.840	9.072	8.551
	(7.483)	(7.044)	(6.853)	(56950)	(5.757)
Poverty	−0.0171	0.0215	.00871	0.0396	−0.0612
	(0.0321)	(0.0283)	(0.0304)	(0.0355)	(0.0421)
Log population		0.711***	0.666***	0.816***	0.836***
		(0.275)	(0.278)	(0.284)	(0.293)
Democratic institution			−1.703	−2.209	−2.551
			(1.848)	(1.781)	(1.779)
Political rights				−3.531	3.622
				(1.143)	(1.236)
Share of mining					−0.216
					(0.152)
Constant	−15.255***	−8.882**	−2.517	12.07	12.01
	(4.379)	(2.873)	(6.879)	(7.934)	(8.140)
Observations	99	99	99	99	99
AIC	2.098	2.055	2.069	2.011	2.019
BIC	−234.282	−235.935	−231.939	235.079	231.663

Robust standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table A4: Results of negative binomial regression for violent conflict between ethic group full swing direct local elections (2008, 2011, 2014).

Variables	(1)	(2)	(3)	(4)	(5)
Polarization	26.14	26.41	22.41	19.25	33.72*
	(16.57)	(16.93)	(16.48)	(17.45)	(18.20)
Inequality	2.630	3.006	1.832	4.602	2.957
	(8.703)	(8.256)	(7.148)	(9.011)	(7.687)
Poverty	0.154***	0.152***	0.169***	0.159***	0.154***
	(0.0330)	(0.0363)	(0.0483)	(0.0590)	(0.0516)
Log population		−0.0649	−0.120	−0.0900	0.0334
		(0.377)	(0.368)	(0.357)	(0.336)
Democratic institution			2.910	2.925	3.850
			(2.427)	(2.362)	(2.286)
Political rights				−1.085	0.358
				(2.321)	(1.832)
Share of mining					0.441
					(0.0172)
Constant	−9.737***	9.802**	−21.34	−17.37	29.92*
	(4.127)	(4.019)	(12.15)	(17.52)	(15.48)
Observations	99	99	99	99	99
AIC	1.326	1.346	1.356	1.374	1.365
BIC	310.709	306.133	302.54	298.172	296.453

Robust standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

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