

A STUDY ON THE ONSET OF CIVIL CONFLICT

By

JUNG, Chanil

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

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ABSTRACT

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The author broadly categorizes the models of civil war literatures on conflict onset into five dimensions: government, individual, geo-political, regional, and international. From empirically testing the models from each dimension, this study was able to find largely consistent results with major works on the topic. The following indicators were significant from the testing: on government dimension, the government's capacity to repress and contain dissents; on individual dimension, the private incentives such as lootable primary commodities and opportunity costs proxied by education and income; on geo-political dimension, natural resource sites and the history of conflict; on regional dimension, regional spill-over effects through population movement and neighboring conflicts; finally, on international dimension, peacekeeping operations on the prevention of recurring civil war. This study used panel IV regression with an endogenous variable, GDP per capita instrumented with the access to electricity (% of household). Additionally, this study used dynamic panel models for the estimation of the effect of peacekeeping operations on the recurrence of civil war to supplement more commonly used survival analysis, which does not include temporal variations of independent variables. The findings suggest that there are specific conditions that favor the onset of civil war, and that civil wars are not necessarily accidental or idiosyncratic. Based on this findings, the author argues that the international efforts should be a two-tracked approach: one with immediate intervention to halt conflicts and regional spill-over; and the other with a more targeted approach to economic and social development.

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For the completion of this thesis.

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“Politically speaking, it is insufficient to say that power and violence are not the same. Power and violence are opposites; where the one rules absolutely, the other is absent. Violence appears where power is in jeopardy, but left to its own course it ends in power’s disappearance.”

-On Violence, Hannah Arendt

“And we must take the current when it serves

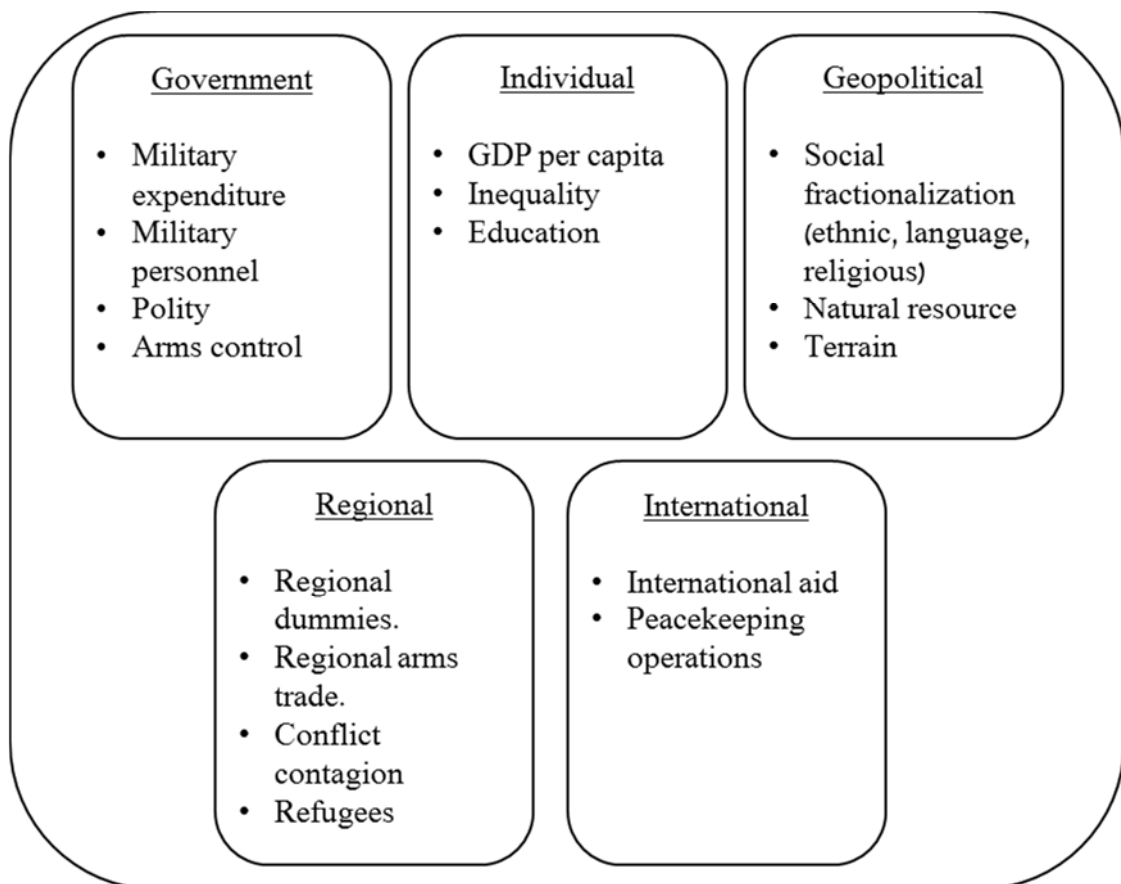
Or lose our ventures.”

-Julius Caesar, William Shakespeare

I. INTRODUCTION

The burgeoning studies of civil war onset have claimed that various macro-economic, geographic, and political indicators can explain the mechanisms behind the outbreak of civil conflict. The purpose of this study is to survey literatures on civil war onset and empirically test their models on the basis of the five-dimension categorization. This study argues that the models and hypotheses from the existing literatures can be sorted into governmental, individual, geo-political, regional, and international dimensions depending on their emphasis as the following figure illustrates.

Figure 1. Dimensions of Civil Conflict



These dimensions are based on specific mechanisms and theories on the determinants of civil war: on government dimension, the government's capacity to repress; on individual dimension,

the theories on the individual incentives of participating in the rebel activities; on geo-political dimension, geographically inherent or politically inherited aspects; on regional dimension, direct and indirect spill-over of neighboring conflicts; and on international dimension, the effectiveness of international aid and peacekeeping operations in preventing civil war recurrence. These theories are not mutually exclusive or unilateral. Some indicators of civil war may be translated from one dimension to the other following a different logic. For instance, both rebels (at individual level) and the government can fund their hostile activities using natural resources in the geo-political dimension. Still, the logical focus is different across the dimensions.

The empirical testing part of this research will use binary dependent variable panel data that has been constructed from a number of different datasets. The testing econometrics methods are panel ordinary least squares with random effects and instrumental variable and Arellano-Bond/Blundell-Blover dynamic panel estimation. Since the dependent variable is binary (civil war onset), the non-linear maximum likelihood estimation is widely used among civil war literatures. However, this study is not particularly interested in the marginal effects of the independent variable and the statistical results and inferences are very similar between the two estimation techniques. Moreover, the most frequently raised concern on this type of studies is the problem of endogeneity, i.e., the control variable, GDP per capita is assumed to be highly endogenous and reversely correlated with the civil war. Although fixed-effect/random-effect framework can provide a solution to unobserved heterogeneity, these methods cannot rightly dress the question on the endogenous regressor within the model. This type of problem can be alleviated with using the right types of instrumental variables in panel OLS models. On the other hand, the dynamic panel estimation method provides additional insight to the testing of the indicator of major interest in the international dimension, peacekeeping operations, through

controlling for strong reverse causality of peacekeeping and civil war which could not be controlled using the former method. This was made possible through using lags of independent and dependent variables as instruments as the statistical model specifies.

The previous studies often neglect endogeneity problems or use lags of independent variables or clustered periods (Collier & Hoeffler, 2002, 2008; Rost & Greig, 2011) but this treatment does not provide a good solution (Satyanath and Sergenti, 2004). In some other cases they use instrumental variables for consistent estimation of their models.¹ This study also seeks to avert the criticism on the endogeneity of income variable by using “access to electricity (% of population)” as instrument.

Studying the overall, and interacting effects of the above dimensions may shed a light on the policy implications related to “what can be done and how?” in preventing and discouraging intrastate conflict.

¹ Ross (2006) uses ‘resource per capita’ and Braithwaite et al. (2014) use ‘international inequalities’ as their instruments.

II. LITERATURE REVIEW

Government dimension

Peace is not merely an absence of violence. As Max Weber wrote in his seminal essay, *Politics as a Vocation* (1919), regardless of whether the state owns the legitimacy bestowed by the majority of its people, the state is the entity that possesses the “monopoly on violence” within its territorial bound. The state is needlessly just or democratic if it is to be stable. A fully autocratic regimes may be more stable than feeble democracies with weak state institutions (Hegre et al. 2001). From this point of view, a power balance between the government and the rebel is critical. No matter how saturated is the grievance or greed among the populace, a strong polity with repressive state apparatuses can prevent the coalescence of violent upheaval. A good example is North Korea. In spite of its frail economy and alleged human rights violations, there has not been many known accounts of mass civil strifes or violent clashes within its country that can amount to a civil war. The political elites has maintained their absolute grasp on the means of violence and terror in North Korea through military drills and terrorizing executions and persecutions of dissenters.

Likewise, many existing literatures pay attention to the dynamics between the rebel’s capacity and the capacity of repressive state (Besley & Persson, 2008, 2009; Hegre et al, 2001; Smith, 2004; Zack-Williams, 1999). A state’s capacity can be expressed as its expenditure spent on military, control of weapons, and the extent and the efficiency of population-monitoring intelligence state institutions. Basically, any kind of civil war mechanism requires the expected cost and benefit analysis of the population who are the most likely to join the rebel force. For the government-centric mechanism, a cost-increasing role of the government is important in suppressing any possible anti-government movements in light of the fact that civil wars are

predominantly clustered in countries that either generates a great amount of grievances or do not provide representative channels to the population.

Unlike strong authoritarian states like North Korea or working institutionalized democratic states, transitional governments and repressive governments without a strong polity are likely to be exposed to the threats of civil war because they can neither sufficiently increase the costs of rebellion nor provide enough incentives to quell dissents and grievances. In such cases, a move to strengthen their authoritative state institutions or military could lead to a backfire, by drawing resources from other social sectors and adversely affecting economic growth (Collier & Hoeffler, 2002c) or as citizens are aggrieved and inflamed by the repressive the government's repression (Davenport et al., 2005).

In their paper which studied the regional spill-over effect of military expenditure, Collier & Hoeffler (2002c) found that a country's military expenditure does increase in accordance with the increase in the military expenditure of its neighbors. However, they could not find a supporting empirical evidence that the increase in the spending actually leads to the diminished risk (deterrence) of internal civil conflict from the regression analysis. Since there is a reasonable concern on reverse causality where the general security environment which is more conducive of civil conflict affected the military expenditure, they used 'external threats' as instruments. Still, the regression results on the model which included military expenditure and its squared term were jointly insignificant, indicating "ineffectiveness" of the government's attempt to raise military expenditure to attain domestic stability.² This reflects the difficulties faced by weak institutions in their attempt to bolster their legitimacy through repression. The simple calculation by Besley & Persson 2009 using the Political Terror Scale dataset (Gibney

² Collier and Hoeffler, 2002

et al.) backs up this idea. In their calculations, the repressive states have significantly lower average per capita income (\$3,200) compared to peaceful countries (\$6,500), but higher per capita income compared to civil war stricken countries (\$2,000). This suggests that the repression is commonly chosen by weak institution, but they can only be successful when their capacity exceeds some threshold; a typical inverse U-shaped relationship.

Although it's a subject of discussion in the later part of this paper, the literatures on natural resources and its relationship with the conflict onset or duration postulate that oil and other primary resources oftentimes provide the governments means to invest in the regime's security apparatuses and military (Ross, 2001; Smith, 2004; Fjelde, 2009).

In general, the current works on civil war agree that weak institutions are more susceptible to conflicts and the logics of the government dimension revolves around the government's capacity to repress. It appears that the propensity of civil war has less to do with the types of polity—whether it's democratic or autocratic, but much more to do with its capacity.

Individual dimension

The theories of individual incentives provide the most commonly used theoretical framework in the studies of civil war. This approach pays attention to the expected return and the cost of participating insurrection at the individual level, i.e. lower the cost of participation and higher the expected return, an individual is more likely to participate in the rebel activity. While the theories of government focuses on the government's capacity to crash down dissents, the theories of private incentives highlight the supply side of the equation on how rebels recruit and how individuals are attracted to the opportunities of insurrection.

Grossman (1991) is one of the earliest scholars who theorized this line of thought. According to his general equilibrium model, a peasant family has options to earn income from productive activity, soldiering, and insurrection. The amount of time devoted by a peasant to insurrection is determined by the ruler's tax rate and the probability of successful insurrection. According to the model, when the tax rate and the winning chances of the insurrection are high, a peasant can expect higher returns from insurrection.

On a similar vein, Collier and Hoeffler (2004) introduced 'grievance' and 'greed' models of civil war. The greed model uses the exploitation of primary resources as incentives to the rebel recruitment and treats per capita income as the opportunity cost; and the grievance model incorporates various factors of discontent among people, such as ethnic and religious fractionalization, income inequality, and the state repression.

Following the greed logic, it appears economically sound to assume that the individuals with less opportunity cost can be more easily attracted to joining militant groups. This can provide plausible explanations to the well-known phenomenon of civil war being the most frequent among the lowest per capita income countries. However, controlling for the reverse or spurious correlation in empirical studies to test this claim is challenging due to the extent of which can be affected by the poverty. Therefore, proxy variables such as secondary education enrollment (Collier & Hoeffler, 2004; Deininger, 2003) and economic shocks (Besley & Persson, 2009; Chassang & Padro-i-Miquel, 2009; Collier et al., 2004; Dube & Vargas, 2008; Miguel & Satyanath, 2011; Miguel et al., 2004) are often used in lieu of, and in addition to GDP per capita variable. The rationales are: countries rich in human capital typically generate wealth in ways that cannot be easily exploited by simple violence and occupation; and external economic shocks are exogenous to income variation. These studies were able to find some robust links

between civil strifes and education attainment; and also external income shocks such as those caused by fluctuations of primary commodity prices.

On the grievance model side, income inequality is frequently discussed as a source of grievance and civil strifes (Baten & Mumme, 2013; Collier & Hoeffler, 2004, 2002b; Fjelde, 2009; Houle, 2014). Also, higher inequality implies lower recruitment cost (Collier & Hoeffler, 2002b). However, the results of its empirical testing on the outbreak of civil war are somewhat mixed, although it may be related to the duration of civil conflict.³

Because of the incompleteness of the data on inequality, Baten and Mumme (2013) used an anthropometric indicator, an adult height data as a proxy for the measure of social and income inequality for the period of 1816 to 1999. To address possible endogeneity problems, they used the ratio of sugar cane and wheat plantations as instrument variable since sugar cane is the “inequality crop” that is preferred to the relatively well-off compared to wheat which is the “equality crop”.⁴ The IV-Probit results from their analysis showed a strong, positive relationship between the social and income inequality (deprivation) with the onset of civil war.

Similarly, to augment for the weaknesses of the known Gini index as an inequality measure, Houle (2014) used “capital share of the value added in the manufacturing sector” and top 1 percent share of the total income measures in his empirical study.⁵ Using maximum likelihood estimation (logit and two-stage probit) he found that coups are more likely when inequality is severe, but civil wars are not. His theory suggests that the direct and indirect effects of inequality have an ambiguous overall effects on civil war, because inequality can strengthen

³ Collier and Hoeffler, 2002b

⁴ Batten and Mumme, 2013

⁵ Houle, 2014, p.17.

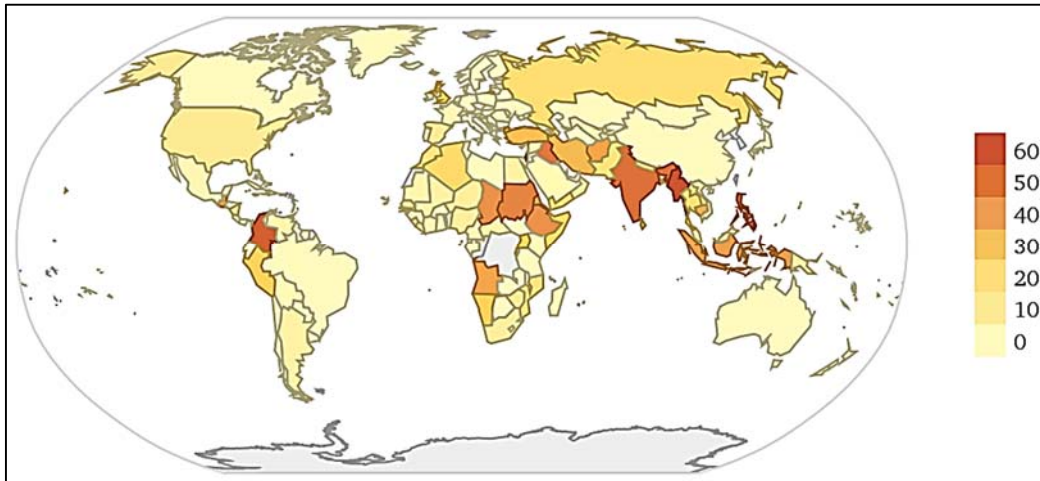
military, which in turn, positively affects coups but negatively affects insurrections counteracting to the redistributive struggles.

Another way of looking at private incentive mechanism is rent-seeking. Oil, coffee, precious metals, and some primary commodities are relatively easy to exploit and cause greed-driven factional strifes. Some of them are termed as ‘conflict-minerals’ because of their known proclivity to cause civil war. However, the exploitation often takes place higher than an individual level and the presence of these resources are highly geography-dependent. Therefore, in this study, the subject of natural resource is included in the ‘geo-political dimension’ in the next part of this chapter. Also, although some scholars relate ethnic and religious fractionalization with grievance, it is hard to believe that ethnic and religious heterogeneity is in and of itself a direct cause of hatred (Collier, 2003). Therefore, they were not included in this dimension.

Geopolitical dimension

This dimension pertains to factors that either tend to be inherent in the geographic region and relatively time-invariant (land size, natural resource, ethnic and religious heterogeneity, mountainous regions, forest size, border proximity, and climate), or political factors that tend to be exogenously determined (given) from the previous conflicts or by political actors (conflict settlement, ‘veto players’ (Cunningham 2006), extremist violence, and the characteristics of the previous conflict). This type of approach may be less useful in prescribing policy suggestions, but can be useful in understanding why civil wars tend to cluster in geographic space (as it can be seen from Figure 2, the most conflict-prone regions are often closely located).

Figure 2. Civil Conflict Heat Map (1960-2010)



Source: Armed Conflict Dataset (UCDP/PRIO), computed using WolframAlpha.

Ross (2004) presents a set of hypotheses on how natural resources affect civil war onset: 1) looted natural resources fund rebel's initial startup; 2) & 3) resource extraction fuel grievances and separatism; 4) resource rents foster rentier state and weak institutions. From the thirteen cases he studied he could find that the natural resources indeed make civil wars more likely, last longer, and more intense. However, he could not find supporting evidence to the hypotheses 1 through 3. Regarding the hypothesis 4, Ross (2006) found a partial support that onshore oil revenue contribution to GDP per capita is tied to civil conflict.

As natural resources can spur civil war, they can also help with the regime survival. Smith (2004) tested these contradicting claims on the effect of natural resources on the regime durability. He treated the regime failure as dependent variable and ran a logistic regression with the oil revenue as a share of GDP as one of the independent variable. The overall result was negative, meaning that the higher the share of oil revenue the less likely the regime will experience subversion.

Among the items that frequently appear in the literatures on natural resources and civil war,

diamonds receive special attention. Lujala et al. (2005) and Ross (2006) used diamond deposit locations data to test their relationship with civil war and found that ‘secondary diamonds’ which are relatively low grade compared to ‘primary diamonds’ but are more lootable, are positively linked with the civil war onset. However, the number diamond producing countries and the number of civil wars took place in those countries are not big enough to draw strong implications.

In empirical studies of civil war, ethnic and religious fractionalization is another famous topic of discussion. The baseline idea is that the fractionalization is the source of social grievance and dissension through the marginalization of minority groups (Collier & Hoeffler, 2004). Nonetheless, there seems not to be a reached consensus on its impact among scholars. While Fearon and Laitin (2003) rejected this school of thought, Collier and Hoeffler (1998, 2004), Buhaug (2010), Buhaug and Gleditsch (2008), and Cederman et al. (2009) were able to find moderate to strong linkages of ethnic/religious heterogeneity to civil conflicts.

Other than those, geographical and sociological factors such as land size (Buhaug & Gates, 2002), population (Fearon and Laitin, 2003), climate (Burke et al., 2009), and terrain (Cederman et al., 2009; Fjelde, 2009; Ross, 2006) are typically discussed in the empirical studies. The geographically larger nations and countries with big population are more likely to experience civil war probably due to the difficulty of controlling periphery regions with a limited state capacity. The principal-agent problems also tend to exacerbate as the organization becomes larger. The shares of mountainous and forest area within a country are thought to be positively related to insurrection because they provide covers and hideouts to the rebels shifting the tactical aspect to their advantage in conducting asymmetrical fights against the government’s regular military. Still, there is not much empirical evidence from the use of

macro data (Buhaug & Gates, 2002).

On the political side, arguments on actors (Cunningham, 2006; Cunningham et al. 2005; Kydd and Walter, 2002) exist and concern mostly on the duration of civil war and the mechanisms on how the capacity of rebels and their extremism can shape the course of events. Settlement or agreement arguments (DeRouen et al. 2009; Glassmyer & Sambanis, 2008; Hartzell & Hoddie, 2003; Mattes & Savun, 2009) point out that specific types of agreements and their implementation after the termination of civil conflict matter deeply in the prevention of the recurrence of conflicts.

Lastly, some studies make assertions that the history and characteristics of previous conflicts, such as outcomes are strongest determinants of civil war recurrence (Fortna 2004a; Kreutz, 2010). They found that decisive victories won by the government's side tend to create more lasting peace than stalemates or truce. Other studies find that the cost of conflict, such as battle deaths, affect the recurrence of civil war both directly and indirectly (Tiernay, 2014; Rost & Greig, 2011). There is also a study on the negative effect of colonial legacy on the onset of civil conflict (Craft & Smaldone, 2002).

Regional dimension

This dimension shares a common ground with the previous geopolitical dimension because of the inseparable nature of geographic regions with spatially shared geopolitical aspects. Nonetheless, I intend to separate this section from the last in order to highlight the concept of conflict spill-over, and bundle regional effects that are not accounted from the previous dimension. Also, compared to the geopolitical dimension of civil war determinants, the theories

I categorized under this section try to include extra-state geopolitical influences as opposed to within-state influences.

There are a number of ways how a country can interact with its neighbors with regard to civil war onset. As mentioned above, regional spill-over of conflict is one possibility. Studies do find some evidences to this claim (Bosker & de Ree, 2014; Buhaug & Gates, 2002; Buhaug & Gleditsch, 2008; Sambanis, 2001), but the conflicts normally diffuse along the ethnic lines and does not affect neighboring countries as adversely when the countries do not share strong ethnic ties.

Another channel of which neighboring states affect intrastate conflict is through aiding rebel activities through the support of arms and finance to weaken or subvert antagonistic states. Surprisingly, there has not been an extensive coverage on this topic. The existing literatures that I have found so far suggest the plausibility of this hypotheses using macro data. For example, Sambanis (2001) used median polity scores of neighboring states to assert that ‘bad neighborhood’ which are either undemocratic or at warring state, increases the probability of civil war onset. Similarly, Akcinaroglu and Radziszewski (2005) used the rivalry data and hazard ratio models to test the effect of expectations of rival intervention on civil war. According to their findings, the expectations tend to substantially lengthen the duration of fighting. Nevertheless, since politico-economic characteristics tend to be shared across states within a region whether their finding is robustly indicating such conclusions is in doubt. To better test these claims, we would need some in-depth qualitative case studies and more detailed data.

Some literatures point to refugees and expatriates as a way to provide causal mechanisms to the neighborhood effect of civil conflict. The causal directions can go both ways: “refugees

can change the ethnic composition of the host state; exacerbate economic competition; bring with them arms, combatants, and ideologies that are conducive to violence”; and they could mobilize against their country of origin or join anti-government organization (Salehyan & Gleditsch 2006; Zack-Williams, 1999)⁶. Since refugees and displaced persons tend not to travel much far, this view reflects another regionally shared weakness in governance. Refugees from the country that is landlocked by working polities may find it extremely difficult to mobilize trans-national rebels because good chances are these types of organizations would be strictly forbidden and controlled. South Korea hosts tens of thousands North Korean refugees and these refugees often organize antagonistic campaign against North Korea. Still, these activities rarely go beyond leaflet dropping using balloons and stops far short from actually forming any type of militia-level organization.

International dimension

Other than what had been discussed above, the international community or international actors (regional community, NGOs, or sovereign states) can affect the likelihood of civil war through multiple avenues: international aid, deployment of peacekeepers, and trade policies. These are clearly extra-state in nature and have much room for policy implications unlike other within-state variables.

On the topic of international aid, the existing literatures are typically skeptical, if not only indirectly supportive of its conflict-detering role. From empirical analysis, the literatures outlined in the below table 1 found either ‘no effect’ or ‘positive’ effect, i.e. conflict-prone.

⁶ Salehyan & Gleditsch, 2006. P. 338.

The signs in the parenthesis are the direction of possible indirect effects based on the author’s theories. The overall results are contrary to common expectations that aid would foster good governance and deter further conflicts. The explanatory mechanisms follow ‘greed’ or ‘repression’ logics. The international aid can increase the expected rents once the rebels capture the state or strengthen the incumbent governments with funds to finance their military or financial means to appease the rebels (Arcand & Chauvet, 2001; Collier & Hoeffler, 2002b; Nunn & Qian, 2012; Grossman, 1992).

Despite the lack of empirical evidence that aid is linked with longer peacetime, Collier and Hoeffler (2002b), suggests growth logic of the duration of peace. This mechanism suggests that aid is helpful in fostering good governance and growth, which in turn, has a potential to make civil wars less likely. Since economic development is the single-most prominent indicator of lasting peace, if the linkage between the aid and the economic growth is proven to be significantly positive, this theory can generate more support. Yet, due to the mechanisms presented above, the outcome can be reversed, even if such effects do exist.

Table 1. Theories on International Aid and Civil War

Author(Year)	Note	Effect on CW	
		Onset	Duration
<i>Arcand & Chauvet (2001)</i>	Aid strengthens the incumbent, stabilizes the regime.	No effect (-)	NA
<i>Collier & Hoeffler (2002b)</i>	Aid does not directly affect the civil war onset, but may indirectly contribute to peace through growth effect; Increased aid may shorten conflict.	Indirect effect (-)	-
<i>De Ree & Nillesen (2009)</i>	Increasing aid may shorten conflict. No relationship is found between aid and the onset of civil war.	No effect	-

<i>Nielsen et al. (2011)</i>	Negative aid shocks increase the probability of conflict onset.	No effect (+)	NA
<i>Nunn & Qian (2012)</i>	US food aid increases the incidence, onset, and duration of civil conflicts.	+	+

In sum, the dubious and elusive nature of the relationship between the international aid and the civil war requires further studies to differentiate any positive or negative effects, although the relationship itself may be “*a priori* ambiguous”, to quote Collier and Hoeffler (2002b).⁷

On the other hand, in crisis situations, peacekeeping operations are often called for. Regarding its effect on bringing more lasting peace, scholars show stronger support than international aid. The claims are the following: the effect of the traditional and multidimensional peacekeeping operations is highly significant and consistent (Fortna, 2003, 2004a, 2004b); the expenditures spent on the UN peacekeeping missions substantially reduce the risk of civil conflict recurrence (Collier et al., 2008); the UN peacekeeping missions induce democratization and multilateral enforcement operations help with ending violence (Doyle and Sambanis (2000).

Questions may be asked on the sample selection biases that peacekeeping operations may be deployed following specific patterns. Indeed, Rost and Greig (2011) found a statistical propensity of state-sent peacekeepers to be deployed to countries that share some linkages such as being a former colony or a trade partner. In addition, Gilligan and Stedman (2003) showed that the United Nations tend to spend more money on the missions in Africa, Latin America, Caribbean, and the Middle East. However, despite these tendencies, the UN peacekeeping missions did not choose relatively ‘easy’ missions as they select missions with humanitarian

⁷ Collier and Hoeffler, 2002b. P. 3.

crisis or great casualties (Fortna, 2004b; Gilligan & Stedman, 2003; Hultman, 2013).

IV. EMPIRICAL ANALYSIS OF THE THEORIES OF CIVIL WAR ONSET

Research Data

The dependent variable of this study is intrastate conflict episode. The internecine conflicts can be fought between the government and military faction(s) or among different factions. The events were recorded as episodes when they resulted in 25 or more annual battle-related deaths between the periods of 1990 to 2010 using Armed Conflict Dataset and Conflict Termination Dataset (CTD) constructed by Uppsala Conflict Data Program and Peace Research Institute Oslo (UCDP/PRIO). These datasets differentiate multiple conflicts fought at the same location if they involve different actors. This approach may be useful to track the recurrence of conflict between the same actors (namely, dyadic interactions), but may not be appropriate to look at country-centered conflicts because the same country can be counted multiple times depending on the number of dyadic relationships existing in the country. In that case, the most of same independent variables are included in the dataset multiple times, potentially biasing the results. For example, CTD records eight separate conflict episodes that are fought between the Indian government and various anti-government groups in which periods include the year 1997. Instead of treating these episodes as individual dyadic events, the dataset used in this study coded the year 1997 in India as '1' (intrastate conflict is taking place).

Similarly, multiple dyads were clustered based on the location of the conflict because the number of dyads may have implications on the scope and the intensity of conflict-prone situation at certain years, the initial conflict-begetting conditions may not be significantly different across civil wars. This research is primarily interested in the situation that favors or

begets internal conflicts amidst specific political and macroeconomic backdrops within national boundaries.

Basing on the newly coded conflict dataset and World Bank's country IDs, multitude of political/economic indicators spanning the period of 1990 to 2010 were collected using publicly available datasets to develop a comprehensive dataset that can provide multiple angles toward the subject. The list of data sources is in the following table.

Table 2. Data Sources

<i>Data source</i>	<i>Acronym</i>	<i>Indicators used</i>
World Development Indicator	WDI	Socio-economic and political indicators.
Penn World Table, version 8.0	PWT 8.0	GDP per capita.
Conflict Termination Dataset	CTD	Conflict episodes.
Bethany Lacina & Nils Petter Gleditsch, 2005	Lacina & Gleditsch	Battle deaths.
Organization for Economic Co-operation and Development	OECD	International aid. Total, commitment, and disbursement.
United Nations	UN	Peacekeeping operations.
The UN Refugee Agency	UNHCR	Number of refugee population.
Stockholm International Peace Research Institute	SIPRI	Arms transfer, military expenditure.
The Standardized World Income Inequality Database	SWIID	Gini index.
Fractionalization Data (Alesina et al. 2003)	Alesina et al.	Ethnic, language, religious fractionalization
Small Arms Survey	SAS	Number of small arms among civilian.
Center for Systemic Peace	CSP	Refugee and polity data.
Freedom House	FH	Political rights, civil liberty.
Uppsala Conflict Data Program and Peace Research Institute Oslo	UCDP/PRIO	Conflict termination, armed conflict episodes from 1960-1990.
World Governance Indicator	WGI	Quality of governance.
Barro-Lee Educational Attainment Dataset	Barro-Lee	Primary education attainment, percentage of no schooling.
Maddison Project Database	MPD	GDP per capita.
The Conference Board	CB	Labor composition and quantity.
United Nations Commodity Trade Database	UN Comtrade	Raw materials trade statistics.
U.S. Energy Information Administration	EIA	Historical crude oil prices.

Ziltener&Künzler, 2013	Ziltener&Künzler	Countries with past colonial experiences.
Providing for Peacekeeping	PFP	Peacekeeping operations.
Fraser Institute	FI	Economic freedom
Political Terror Scale 1976-2013	PTS	Scale measures of physical integrity rights violations worldwide

Models and Hypotheses Testing

The most commonly preferred econometrics techniques in the literatures of civil conflict are maximum likelihood estimation (logit or probit) and survival analysis model (Cox or Weibull hazard ratio models). Survival analysis models are useful in showing relative risk changes over time in the entire sample. For example, it can show the relative probability of getting a job depending on the duration of unemployment using a sample of unemployed people. This method has become famous among the scholars studying civil war and is also widely used. The method uses duration and event as a dependent variable. The duration is typically coded as the time (period) before an event takes place. In the studies of civil war, it is the years of peace before the conflict onset or recurrence. The caveat is that the standard application of this method does not capture the temporal variations of independent variables unlike the panel or time-series-cross-section (TSCS) data. The number of observations tend to be substantially dropped if the panel or TSCS data are rendered to run this type of estimation. Smaller number of observation is not always inimical to more correct or robust analysis, but requires deeper knowledge in the sampled cases.

The standard likelihood estimation takes on the following form in case of binary dependent variable.

$$\Pr(C_{it} = 1|X_{it}) = F(X_{it}'\beta)$$

(1)

Where $C_{it=1}$ is a presence of civil conflict at country i in year t , X is a vector of regressors and β is a vector of unknown population parameters. In the case of logit model, the $F(\cdot)$ function is specified as the cumulative distribution function of the logistic distribution.

On the other hand, the linear probability model has the following form:

$$\Pr(C_{it} = 1|X_{it}) = X_{it}'\beta \quad (2)$$

In this case, the probability of civil war onset is not confined in 0 to 1 bounds giving it a disadvantage in measuring the marginal effects of coefficient when they are greater than 1 or less than -1. Other than this interpretational drawback, the sign and significance of estimated coefficient, $\hat{\beta}_{OLS}$ are generally agree with $\hat{\beta}_{MLE}$.

Under the standard OLS framework, the model of civil war onset can be expressed as the following:

$$c_{it} = \lambda gdp c_{it-1} + X_{it}'\beta + \alpha_i + \epsilon_{it} \quad (3)$$

Here, the lag of GDP per capita is an endogenous variable and X is a vector of controls and the regressors of interest. The term, α_i is an unobserved, time-invariant heterogeneity and ϵ_{it} is an error term. In this model, the sources of heteroskedasticity are the endogenous GDP per capita and α_i . α_i can be treated with fixed-effects/random-effects estimation depending on whether this idiosyncratic noise is systemically correlated with the exogenous regressors. The choice of transformation can be determined using Hausman test.

The advantage of IV panel OLS regression over binary logit/probit model is that it provides a

consistent estimation of the endogenous variable, *gdpc*. In the presence of endogeneity, the covariance between endogenous regressor and the error term is no longer zero ($\text{Cov}(\text{gdpc} \cdot \mu_{it}) \neq 0$, when $\mu_{it} = \alpha_i + \epsilon_{it}$). This makes the estimate of λ and β biased and inconsistent. This is one of the biggest problems that the studies of civil war onset commonly face. The variable, GDP per capita is widely agreed to be a very important control to be included in the model, but is also highly endogenous. With the use of right IVs, the estimates of coefficients can become consistent, though still biased.

The IV used in this study is “access to electricity (% of population)” index from WDI. A good IV requires be strongly correlated with the endogenous variable while not directly correlated with the error term. This “access to electricity” index is strongly correlated with the log of GDP per capita in the dataset and there are some works that identify the causal relationship between the electricity provision and the income (Wolde-Rufael, 2006; Mozumder & Marathe, 2007; Kanagawa & Nakata, 2008). I have not encountered any theoretical/empirical work on civil war that specify the relationship between the electricity provision and the onset of civil war, and there hardly is a good theoretical linkage between the two. This makes this variable a good candidate for an IV.

Since this study deals with a multitude of models from each dimension, more concerns on endogeneity of some independent variables from this study may be raised. However, while the possible endogeneity of those regressors requires some investigation, the endogeneity of GDP capita is obvious and needs to be addressed. In the following empirical section, the log and 1 year lag (to remove additional temporal endogeneity) of GDP per capita are included in most of the models and its IV treated coefficients and standard deviations are reported.

Government Dimension

For the government dimension, based on the models discussed in the literature review, I included independent variables that can measure the government's capacity and repression. The baseline controls were largely taken from Collier and Hoeffler (2004): log of GDP per capita, log of population, primary commodity dependence (proxied by the percentage of agricultural value added in GDP and the percentage of crude oil exports in the total export), previous war, and social fractionalization. Although Collier and Hoeffler included 'male secondary schooling' in their control variables, as they had mentioned in their paper, the secondary schooling is likely to be highly correlated with GDP per capita.⁸ Also, it is widely agreed that the three controls—GDP per capita, population size, and the previous war should be included in empirical models.⁹ Therefore, the log of GDP per capita was used in lieu of secondary schooling from the Collier and Hoeffler model.

The other independent variables of interest are: military expenditure to GDP ratio, military expenditure to GDP ratio squared, armed forces personnel as a percentage of total labor force and its squared, polity measures (whether a country is institutionalized democracy or autocracy), arms imported, number of small arms among population, and freedom status ('-1' for 'Not Free', '0' for 'Partially Free', and '1' for 'Free')¹⁰.

Each of these regressors was included in the models at different trials to segregate their similar effects and to avoid multicollinearity problems except for the squared terms. The

⁸ Collier and Hoeffler, 2004. Page 15.

⁹ Hegre and Sambanis, 2006. P. 513.

¹⁰ Re-coded from the Freedom House dataset.

IV panel regression results are in Table 3.

The result demonstrates a good support to the repression model—a repressive government with sufficient capacity is less likely to see rebellion. Especially, while the sign of military expenditure to GDP ratio is positive, the sign of its squared term is negative in all the model outcomes suggesting an inverse U-curve relationship. In other words, moderately repressive governments may fall short of fully deterring insurrection and merely incite unauthorized violence following Collier and Hoeffler’s ‘grievance’ logic of civil war.

Table 3. Panel IV Regression Results, Random Effects (Government Dimension)

VARIABLES	(1) Onset	(2) Onset	(3) Onset	(4) Onset	(5) Onset	(6) Onset	(7) Onset	(8) Onset	(9) Onset
Log of GDP per capita. 1 year-lagged. (PWT)	-0.0333 (0.0494)	-0.128* (0.0657)	-0.108* (0.0655)	-0.106 (0.0651)	-0.114* (0.0637)	-0.222** (0.0949)	-0.121* (0.0669)	-0.140* (0.0764)	-0.118* (0.0617)
Log of population. (WDI)	0.0506*** (0.0150)	0.0461*** (0.0162)	0.0627*** (0.0198)	0.0631*** (0.0198)	0.0609*** (0.0191)	0.0508** (0.0212)	0.0444*** (0.0166)	0.0480*** (0.0171)	0.0533** (0.0241)
Countries with civil war experience before 1990. (CTD)	0.0819 (0.0569)	0.0686 (0.0696)	0.0701 (0.0732)	0.0733 (0.0731)	0.0786 (0.0702)	0.0675 (0.0878)	0.0642 (0.0711)	0.0638 (0.0722)	0.0720 (0.0692)
Military expenditure to GDP ratio. 1yr-lag. (SIPRI)	-	0.0158 (0.00992)	0.0165 (0.0102)	0.0166 (0.0102)	0.0186* (0.0100)	0.00752 (0.0129)	0.0155 (0.0101)	0.0150 (0.0103)	0.0167* (0.00980)
Military expenditure to GDP ratio squared. 1yr-lag. (SIPRI)	-	-0.000658** (0.000271)	-0.000684** (0.000277)	-0.000705** (0.000277)	-0.000764*** (0.000275)	-0.000791* (0.000428)	-0.000610** (0.000275)	-0.000642** (0.000278)	-0.000677** (0.000269)
Ethnic fractionalization. (Alesina et al.)	0.000442 (0.112)	-0.0154 (0.130)	0.0271 (0.137)	0.0341 (0.137)	0.0549 (0.133)	0.0839 (0.157)	-0.0376 (0.132)	-0.0146 (0.131)	-0.0176 (0.131)
Agriculture, value added (% of GDP) (WDI)	0.00186 (0.00373)	-0.00826* (0.00490)	-0.00669 (0.00488)	-0.00641 (0.00486)	-0.00669 (0.00475)	-0.0180** (0.00806)	-0.00773 (0.00501)	-0.00890* (0.00537)	-0.00765* (0.00463)
Crude petroleum export (% of total export) (comtrade)	0.151** (0.0682)	0.140* (0.0776)	0.143* (0.0816)	0.154* (0.0815)	0.183** (0.0832)	0.0329 (0.0999)	0.110 (0.0796)	0.140* (0.0781)	0.142* (0.0779)
Armed forces personnel (% of total labor force) 1yr lag. (WDI)	0.00753 (0.0169)	-	-	-	-	-	-	-	-
Armed forces personnel (% of total labor force) squared. 1yr lag. (WDI)	-0.00142 (0.00188)	-	-	-	-	-	-	-	-
Institutionalized Democracy (CSP)	-	-	-0.00152** (0.000699)	-	-	-	-	-	-
Institutionalized Autocracy (CSP)	-	-	-	-0.00207*** (0.000708)	-	-	-	-	-

Revised Combined Polity (CSP)	-	-	-	-	0.00669** (0.00295)	-	-	-	-
2-year lag of logged TIV of arms imported. (SIPRI)	-	-	-	-	-	0.0111* (0.00589)	-	-	-
Freedom status. (FH)	-	-	-	-	-	-	-0.0403** (0.0196)	-	-
Log of number of small arms per 100 people. 1yr-lag. (SAS)	-	-	-	-	-	-	-	0.0110 (0.0284)	-
Log of the number of small arms among civilians. 1yr-lag. (SAS)	-	-	-	-	-	-	-	-	-0.00962 (0.0235)
Constant	-0.479 (0.547)	0.535 (0.715)	0.0449 (0.683)	0.00209 (0.679)	0.0646 (0.667)	1.372 (1.021)	0.518 (0.723)	0.599(0.760)	0.447(0.677)
Observations	1,367	935	896	896	887	704	926	935	935
Number of cn	133	100	94	94	93	83	100	100	100

Standard errors in parentheses

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

On the contrary, if the governments' investment in its repressive apparatus reaches above certain level, like North Korea, the cost of insurrection may become prohibitively high. A similar relationship was found with the arms imported while the number of armed forces personnel among total labor force did not show any statistical significance (Model (2) and (6)).

As predicted, the sign of the coefficient of the variable, 'freedom status' is negative, adding weight to the grievance logic. The coefficient is also significant at the 0.1 level. 'Institutionalized Autocracy' and 'Institutionalized Democracy' are significant at the 0.5 level with a negative sign. This may look counterintuitive, but is consistent with the findings from Hegre et al. (2001), that "semi democracies (regimes intermediate between a democracy and an autocracy) exhibit a higher propensity for civil conflict than either

extreme”.¹¹

The number of small arms among people was expected to display some significant relationship because it erodes the government’s monopoly right over violence. However, contrary to the expectation, it did not turn out to be statistically significant. Still, the data on arms among civilians is incomplete and subject to strong sample selection bias. Therefore, one should take this result with care.

Individual Dimension

The independent variables in this category were chosen to see the effect of individual incentives in the breakout of intrastate conflicts. Broadly, they concern with education, primary commodity dependence, labor compensation, inequality, and health. For education, primary education enrollment (gross) and percentage of no-schooling among adults aged 20-24 were selected; for primary commodity dependence, crude petroleum export and agriculture value added as a percentage of GDP were used; and for labor compensation, inequality, and health, labor participation rate, Gini coefficient, and lagged life expectancy indicators were used, respectively. The baseline control variables are, in general, similar to Fearon and Laitin (2003) except for ‘mountainous terrain’ variable, which was substituted with the percentage of forest area within country.

¹¹ Hegre et al. 2001. p 33.

Table 4. Panel IV Regression Results, Random Effects (Individual Dimension)

VARIABLES	(1) Onset	(2) Onset	(3) Onset	(4) Onset	(5) Onset	(6) Onset
Log of GDP per capita. 1 year-lagged. (PWT)	-0.0224 (0.0312)	0.0425 (0.0373)	-0.0656*** (0.0201)	0.0541 (0.0456)	-0.0263 (0.0313)	-0.0465* (0.0240)
Log of population. (WDI)	0.0391*** (0.0150)	0.0433*** (0.0163)	0.0362*** (0.0122)	0.0368*** (0.0107)	0.0354*** (0.0109)	0.0395*** (0.0130)
Countries with civil war experience before 1990. (CTD)	0.143** (0.0590)	0.179*** (0.0625)	0.123*** (0.0472)	0.151*** (0.0487)	0.102** (0.0479)	0.137*** (0.0501)
Primary education (gross). (WDI)	-0.00308*** (0.000947)	-	-	-	-	-
Ethnic fractionalization. (Alesina et al.)	0.0168 (0.121)	-0.0118 (0.120)	-0.00928 (0.0913)	-0.0685 (0.0846)	-0.0113 (0.0904)	-0.0201 (0.105)
Crude petroleum export (% of total export) (comtrade)	0.0907 (0.0743)	0.116 (0.0768)	-	-	-	-
Percentage of No Schooling, age 20-24 (Barro-Lee)	-	0.00605*** (0.00175)	-	-	-	-
Forest area (% of land area) (WDI)	-	-	0.000290 (0.000830)	1.71e-05 (0.000802)	0.000520 (0.000806)	-
Labor force participation rate, male (% of male population ages 15-64) (modeled ILO estimate) (WDI)	-	-	-0.00323* (0.00185)	-	-	-
Life expectancy at birth, male (years). 1yr lag. (WDI)	-	-	-	-0.0162*** (0.00436)	-	-
Agriculture, value added (% of GDP) (WDI)	-	-	-	-	0.00417*** (0.00158)	-
Gini coefficient. (SWIID)	-	-	-	-	-	0.000380 (0.00146)
Constant	-0.0569 (0.370)	-1.070** (0.442)	0.327 (0.305)	0.123 (0.219)	-0.313 (0.323)	-0.155 (0.298)
Observations	1,343	1,417	3,237	3,318	3,072	2,539
Number of cn	134	123	166	174	167	154

Standard errors in parentheses

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

Table 4 is the result of the logistic regression on these topics. The results appear to be consistent with the theories of private incentives found in the literatures.

The coefficients of the primary education enrollment and the percentage of no schooling among 20-24 years old are both significant and partially suggest that the less the opportunity cost (approximated by the education attainment level) the more likely the individual actors are likely to participate in the rebel activity as it was suggested by Collier and Hoeffler's greed logic. A simple collinearity check was performed to test possible multicollinearity issue between GDP per capita, education and labor. The result showed a moderate degree of variance inflation factor (VIF), indicating a minor multicollinearity (Table 5).

Table 5. Variance Inflation Factor (VIF) Analysis, model (1-6)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Log of population. (WDI)	1.14	1.2	1.16	1.22	1.26	1.15
Log of GDP per capita. (PWT)	1.45	1.59	1.44	3.67	3.72	1.65
Countries with civil war experience before 1990. (CTD)	1.26	1.25	1.29	1.32	1.34	1.36
Primary education (gross). (WDI)	1.05					
Ethnic fractionalization. (Alesina et al.)	1.34	1.31	1.32	1.46	1.41	1.44
Crude petroleum export (% of total export) (comtrade)	1.1	1.11				
Percentage of No Schooling, age 20-24 (Barro-Lee)		1.32				
Forest area (% of land area) (WDI)			1.03	1.04	3.17	
Labor force participation rate, male (% of male population ages 15-64) (modeled ILO estimate) (WDI)			1.01			
Life expectancy at birth, male (years). 1yr lag. (WDI)				3.8		
Agriculture, value added (% of GDP) (WDI)					1.07	
Gini coefficient. (SWIID)						1.4
Mean VIF	1.22	1.3	1.21	2.09	1.99	1.4

Calculated using STATA *collin* command.

The coefficients of labor compensation, health (4), and primary commodity dependence (5) seem to behave in ways predicted from the theory: smaller labor compensation and worse health are related with lowering the opportunity cost. The primary commodities are linked with ‘rent-seeking’ logic because they are relatively more appropriable and lootable using violence compared to secondary and tertiary commodities. The coefficients are all statistically significant as well.

On the topic on inequality, no statistical evidence was found from the empirical testing (model (6)). This may be in part due to the availability and measurement error issues in the publicly available data. The lack of strongly plausible and convincing theories that connect inequality with civil wars may be another problem. More studies in theory and empirical research is required on this issue.

Geo-political Dimension

As mentioned above, the tested variables in this section are the indicators that are inherently geo-political in nature. For example, ethnic and religious fractionalization in a state do not change significantly over time. Its terrain, history, population make-up, and etc. are broadly inherited rather than contemporaneously changing.

Those variables are: ethnic, religious, and language heterogeneities, natural resource (primary commodity, oil, and diamond), terrain (land area and the forest area as a percentage of surface area), a country’s colonial history, previous history of civil conflict (binary and the counts of battle-related deaths from 1960 to 1989), population density, and agricultural productivity

(measured by cereal yield per hectare). The basic controls are identical to previous empirical tests as the models of geo-political dimension came from a wide array of literatures.

Table 6 lists the models from which the empirical testing from this section drew its rationales. The results from those models do not always point to the same direction due to the differences in scopes and analytic methods of those literatures. Nevertheless, some of those topics receive continuous attention throughout the empirical studies in the field.

Table 6. Geo-political Variables and Empirical Models

Topic	Empirical Model
Social fractionalization	<i>Buhaug, 2010; Buhaug and Gleditsch, 2008; Braithwaite et al., 2014; Cederman et al., 2009; Collier & Hoeffler, 1998, 2004; Fjelde, 2009</i>
Crude oil	<i>Besley and Persson, 2008; De Ree and Nillesen, 2009; Dube & Vargas, 2008; Fjelde, 2009; Ross, 2001, 2004, 2006; Smith, 2004</i>
Land size	<i>Buhaug & Gates, 2002</i>
Terrain	<i>Cederman et al., 2009; Fjelde, 2009; Ross, 2006</i>
Battle deaths	<i>Rost & Greig, 2011; Tiernay, 2014</i>
Colonial experience	<i>Craft & Smaldone, 2002</i>
Diamond	<i>Lujala et al. 2005; Ross, 2006</i>

Although not much is talked about the effect of population density, it is included in the model to see the possible relations between the two most cited geo-political variables; population size and the size of land area. The fertility of the land may be highly correlated with the GDP per capita because the agricultural technology is a strong indicator of crop production within a given space of land. Still, it is also highly affected by climate (temperature and precipitation) and was expected to provide deeper insight on the possible

relationship between the geographic characteristics of the land and the conflict onset. For instance, people living on a barren field may be more likely to feel the incentives of joining militia if the organization offers means to survive and opportunities to plunder.

Based on these rationales, logistic regression was used to test the models in this dimension.

The panel IV regression results are in Table 7.

Table 7. Panel IV Regression Results, Random Effects (Geo-political Dimension)

VARIABLES	(2) Onset	(1) Onset	(3) Onset	(4) Onset	(5) Onset	(6) Onset	(7) Onset	(8) Onset	(9) Onset
Log of GDP per capita. 1 year-lagged. (PWT)	-0.0370 (0.0323)	-0.0474** (0.0203)	-0.0746*** (0.0188)	-0.0663*** (0.0190)	-0.1000*** (0.0330)	-0.0569*** (0.0217)	-0.0635*** (0.0199)	-0.0568*** (0.0183)	-0.0668*** (0.0191)
Log of population. (WDI)	0.0420*** (0.0125)	0.0286*** (0.0108)	0.0130 (0.0118)	0.0328*** (0.0109)	0.0423* (0.0251)	0.0287*** (0.0110)	0.0302*** (0.0108)	-	0.0310*** (0.0106)
Countries with civil war experience before 1990. (CTD)	0.0822* (0.0493)	0.113** (0.0462)	0.119*** (0.0457)	0.104** (0.0465)	-	0.106** (0.0461)	0.103** (0.0466)	0.133*** (0.0445)	0.107** (0.0463)
Ethnic fractionalization. (Alesina et al.)	0.0283 (0.0952)	-0.0905 (0.106)	0.0301 (0.0865)	0.0204 (0.0883)	-0.00888 (0.161)	0.00626 (0.0881)	0.00959 (0.0881)	0.00472 (0.0897)	0.0189 (0.0875)
Forest area (% of land area) (WDI)	0.00102 (0.000901)	0.000649 (0.000788)	0.000570 (0.000782)	0.000836 (0.000808)	0.00206 (0.00152)	0.000772 (0.000794)	0.000694 (0.000799)	0.000392 (0.000789)	0.000813 (0.000805)
Religion fractionalization. (Alesina et al.)	-0.247*** (0.0935)	-0.277*** (0.0870)	-0.237*** (0.0838)	-0.210** (0.0861)	-0.376** (0.148)	-0.217** (0.0849)	-0.220** (0.0853)	-0.204** (0.0871)	-0.224*** (0.0860)
Agriculture, value added (% of GDP) (WDI)	0.00395** (0.00161)	-	-	-	-	-	-	-	-
Cereal yield (kg per hectare) (WDI)	-6.21e-07 (2.09e-06)	-	-	-	-	-	-	-	-
Language fractionalization. (Alesina et al.)	-	0.223** (0.100)	-	-	-	-	-	-	-
Numbers of petroleum producing sites. (PRIO)	-	-	0.00602*** (0.00177)	-	-	-	-	-	-
Numbers of diamond sites. (PRIO)	-	-	-	-0.000582 (0.000805)	-	-	-	-	-
Log of cumulative battle deaths. Pre-1990. (L&G)	-	-	-	-	1.71e-06*** (6.21e-07)	-	-	-	-
Colonial experience (binary, 1=past colony). (Z&K)	-	-	-	-	-	0.0424 (0.0499)	-	-	-

Years of colonial experience. (Z&K)	-	-	-	-	-	-	0.000109 (0.000215)	-	-
Log of land area. (WDI)	-	-	-	-	-	-	-	0.0190** (0.00909)	-
Population density (people per sq. km of land area) (WDI)	-	-	-	-	-	-	-	-	2.46e-05 (3.57e-05)
Constant	-0.243 (0.346)	0.103 (0.235)	0.563** (0.235)	0.208 (0.225)	0.425 (0.437)	0.182 (0.230)	0.230 (0.222)	0.423** (0.214)	0.240 (0.221)
Observations	2,907	3,230	3,390	3,390	1,706	3,390	3,390	3,393	3,390
Number of cn	157	165	173	173	89	173	173	173	173

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results are, in general, conforms to the findings from the previous literatures. The history of civil violence is strongly related with the civil wars in later years and so does the log of cumulative battle related deaths (model (1), (3-4), (6-9) for the past civil war, model (5) for cumulative battle deaths). The number of petroleum producing sites is also found significant at .05 level. In model (8), the population size was replaced with the log of land size; they are all significant in other models as generally agreed among scholarly works. On social fractionalization, only religious fractionalization appears to be significant and the signs are all negative throughout the models (1-9). The smaller fractionalization in the religious status within a country reflects the less tolerant atmosphere of the society (Collier, 2003). There exists a number of religiously motivated civil wars (Toft, 2007), and the negative sign of the coefficient of religious fractionalization does neither directly support nor disapprove their existence. At least, the heterogeneity of a society appears to be a positive sign for peace. When this study used a logit random effect model for comparison, the cereal yield (kilograms per

hectare) was significant without controlling for the endogeneity of GDP per capita, but was insignificant when used with IV panel model.

No statistically significant results were reported for colonial experience, population density, forest area, and diamonds.

Regional Dimension

In this dimension, the variables concerning the regional spill-over effects and region-specific elements were tested. The variables of key interest are: regional dummies, the inflow of refugees into the country, and neighborhood conflicts. The controlling variables are log of population, log of GDP per capita, ethnic fractionalization, and civil war experience and were identically applied to the models (1-10).

As previously discussed, literatures often argue that conflicts can spill-over across borders (Buhaug & Gates, 2002; Murdoch & Sandler, 2002; Sambanis, 2001; Ward and Gleditsch, 2002). For the assessment of this mechanism, CSP's magnitude score of Major Event of Political Violence and total number of episodes at given year were used for bordering, neighboring, and regional states instead of simple binary estimate that marks the existence of violence at the year ('neighborhood conflict dummy' from Buhaug & Gleditsch, 2008) to add precision to the regression models. Additionally, the number of borders shared by the neighboring states was added into the model (model (4)) to see whether the effect is related to the increased exposure to such risks.

On testing the subject of conflict diffusion/contagion through population movement suggested by Salehyan and Gleditsch (2006), an incoming refugee population variable was used. Luckily,

similar data from a number of sources (UNHCR, WDI, and CSP) exist. Therefore, a simple crosscheck of data validity could be done (models (1-3)). This variable was lagged a year to check for temporal causality that may exist between the influx of extra-state actors and the onset of civil war in the hosting country.

Using SIPRI's Trend Indicator Values of arms import data and 22 sub-region codes, I calculated the regional arms import at year t-1 by simply summing up the arms import at the sub-regional level. This variable was used in the model (9) to test the effect of regional buildup of arms on intrastate conflict.

Lastly, in model (10), regional dummies were tested to see whether intrastate conflicts favor specific regions over others after controlling for the baseline indicators of civil conflict. The regression results are in Table 8.

Table 8. Panel IV Regression Results, Random Effects (Regional Dimension)

VARIABLES	(1) Onset	(2) Onset	(3) Onset	(4) Onset	(5) Onset	(6) Onset	(7) Onset	(8) Onset	(9) Onset	(10) Onset
Log of GDP per capita. 1 year-lagged. (PWT)	-0.0556*** (0.0214)	0.0565*** (0.0214)	-0.0715** (0.0285)	-0.0547** (0.0221)	-0.0540** (0.0226)	-0.0443* (0.0245)	-0.0387* (0.0234)	-0.0398* (0.0228)	0.0752*** (0.0203)	-0.0729*** (0.0224)
Log of population. (WDI)	0.0275** (0.0136)	0.0276** (0.0135)	0.0341* (0.0184)	0.0296* (0.0168)	0.0415*** (0.0140)	0.0482*** (0.0133)	0.0508*** (0.0134)	0.0508*** (0.0134)	0.0276** (0.0111)	0.0278** (0.0113)
Countries with civil war experience before 1990. (CTD)	0.141*** (0.0496)	0.140*** (0.0495)	0.144** (0.0569)	0.144*** (0.0506)	0.132*** (0.0481)	0.128*** (0.0463)	0.130*** (0.0468)	0.129*** (0.0466)	0.122** (0.0475)	0.122** (0.0475)
Ethnic fractionalization. (Alesina et al.)	0.00577 (0.0963)	0.00201 (0.0959)	-0.0690 (0.121)	0.0121 (0.0992)	0.0234 (0.0943)	0.0479 (0.0947)	0.0549 (0.0946)	0.0515 (0.0938)	-0.0263 (0.0901)	0.0218 (0.0926)
Log of Inflow of people of refugee situation into the country. 1yr_lag. (UNHCR)	0.00883*** (0.00331)	-	-	0.00887*** (0.00339)	-	-	-	-	-	-

Log of refugee population by country or territory of asylum. 1yr_lag. (WDI)	-	0.00856** (0.00335)	-	-	-	-	-	-	-	-
Log of the number of Refugees (x1000) hosted. 1yr_lag. (CSP)	-	-	0.0189*** (0.00630)	-	-	-	-	-	-	-
Number of neighboring states sharing a border with the identified state. (CSP)	-	-	-	0.00542 (0.00982)	-	-	-	-	-	-
Sum of all societal (civil and ethnic) MEPV magnitude scores for all neighboring states. 1yr lag. (CSP)	-	-	-	-	0.00405* (0.00231)	-	-	-	-	-
Sum of all societal (civil or ethnic) MEPV magnitude Scores for all regional states. (CSP)	-	-	-	-	-	0.00355*** (0.00134)	-	-	-	-
Number of regional states with societal (civil or ethnic) war. (CSP)	-	-	-	-	-	-	0.0162*** (0.00395)	-	-	-
Number of regional states with any type (civil or interstate) MEPV (CSP)	-	-	-	-	-	-	-	0.0168*** (0.00380)	-	-
Log of regional arms imported. (Sub regional). 1yr-lag. (SIPRI)	-	-	-	-	-	-	-	-	0.0134** (0.00536)	-
Africa dummy. (WDI)	-	-	-	-	-	-	-	-	-	-0.0755 (0.0978)
Americas dummy. (WDI)	-	-	-	-	-	-	-	-	-	- 0.0679(0.0912)
Asia dummy. (WDI)	-	-	-	-	-	-	-	-	-	0.0398 (0.0918)
Europe dummy. (WDI)	-	-	-	-	-	-	-	-	-	-0.0197 (0.0900)
Constant	0.0484 (0.269)	0.0585 (0.267)	0.127 (0.349)	-0.0202 (0.284)	-0.139 (0.258)	-0.369 (0.294)	-0.479* (0.285)	-0.472* (0.280)	0.232 (0.226)	0.293 (0.230)
Observations	2,755	2,760	1,845	2,686	3,082	3,082	3,092	3,092	3,207	3,439
Number of cn	160	162	127	154	157	157	157	157	172	174
Standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

The refugee models (1-3) are similar differing only by the sources of data. The signs are all

positive and significant at .01 level indicating the possible existence of causal linkages between the numbers of hosted forcibly displaced persons and internal conflict. The data also appear to be consistent across different sources.

The ‘number of neighboring states sharing a border with the identified state’ variable is not statistically significant suggesting that the mere number of shared borders do not necessarily increase the possibility of civil conflict. On the other hand, ‘the sum of all societal (civil and ethnic) MEPV magnitude scores’ for neighboring states (model (5)) and regional states (model (6)) and ‘the number of regional states with societal (civil or ethnic) war (model (7)) are statistically significant suggesting ‘conflict spill-over’ effect. This result was also found with model (8) where interstate warfare scores were included, meaning not only civil wars, but also interstate wars may likely diffuse across borders as a form of civil unrest. However, this does not indicate the direct linkage between the interstate wars and civil wars. On a similar vein, the log of regional arms imported is significant at .05 level.

The regional dummies did not show any statistical significance from this result. After controlling for the key baseline variables, there appears to be no region which is more prone to civil wars than others although civil wars tend to disproportionately favor Africa and Asia over other regions.

International Dimension

The key determinants of international dimensions are international aid and peacekeeping. As discussed in the literature review section, the civil war studies are typically skeptical about the direct impact of international aid on deterring civil wars. Some literatures even go further and

argue that the international aid may even foster conflicts (Nunn & Qian, 2012). Furthermore, the theories like ‘greed theory’ introduces international aid as a possible lootable source for the anti-government rebels. The plausible counter-argument is the growth effect suggested by Collier and Hoeffler (2002a, 2002b), however, the discussion of aid and the economic development is outside the boundaries of this study.

Still, in an attempt to test the possible relationship between the international aid and civil war onset, empirical models that follow the baseline model from Arcand and Chauvet (2001) were used. For controlling variables, primary commodity, ethnic fractionalization, civil war experience, democracy, and the log of GDP per capita were selected. In addition, 2-year and 5-year lags of the total receipt of aid (the sum of official development aid + other official flows + private loans), disbursement of aid (an actual payment), and ‘Net ODA received per capita’ at current dollars with 2-year lag were put into different models (1-5) to see their effects. The results are in Table 8.

Similar to the results from previous studies, none of the tested models (1-5) show negative sign on aid variable and only 5-year lag of ‘log of aid disbursement’ is statistically significant at .05 level. This may be due to a ‘greed’ logic, or endogeneity issue where unaccounted error terms affect both the onset of civil war and the receipt of aid. In short, this study couldn’t find a strong supporting evidence on the international aid’s intrastate conflict-preventing role. More study on this topic will be needed to fully comprehend the true effect of the international aid on intrastate conflicts.

Table 9. Panel IV Regression Results, Random Effects (International Aid)

VARIABLES	(1) Onset	(2) Onset	(3) Onset	(4) Onset	(5) Onset
Log of GDP per capita. 1 year-lagged. (PWT)	-0.0212 (0.0402)	0.0103 (0.0437)	-0.0262 (0.0395)	0.0252 (0.0436)	-0.0179 (0.0387)
Log of population. (WDI)	0.0513*** (0.0170)	0.0605*** (0.0173)	0.0439** (0.0173)	0.0552*** (0.0173)	0.0512*** (0.0169)
Countries with civil war experience before 1990. (CTD)	0.114** (0.0548)	0.109** (0.0546)	0.109* (0.0561)	0.103* (0.0553)	0.110** (0.0557)
Log of aid total receipts. 2yr lag. (OECD)	-0.000881 (0.00770)	-	-	-	-
Ethnic fractionalization. (Alesina et al.)	0.00838 (0.116)	0.0120 (0.115)	-0.00914 (0.117)	0.0100 (0.116)	0.00593 (0.116)
Agriculture, value added (% of GDP) (WDI)	0.00461*** (0.00177)	0.00728*** (0.00219)	0.00419** (0.00180)	0.00809*** (0.00219)	0.00481*** (0.00178)
Institutionalized Democracy (CSP)	-0.00161*** (0.000459)	-0.00229*** (0.000481)	-0.00137*** (0.000433)	-0.00209*** (0.000461)	-0.00141*** (0.000431)
Log of aid total receipts. 5yr lag. (OECD)	-	0.00398 (0.00722)	-	-	-
Log of aid disbursement. 2yr_lag. (OECD)	-	-	0.00857 (0.00823)	-	-
Log of aid disbursement. 5yr_lag. (OECD)	-	-	-	0.0153* (0.00848)	-
Net ODA received per capita (current US\$). 2-yr lag. (WDI)	-	-	-	-	8.79e-06 (0.000189)
Constant	-0.624 (0.455)	-1.107** (0.494)	-0.496 (0.430)	-1.198** (0.482)	-0.656 (0.428)
Observations	1,851	1,557	1,949	1,648	2,016
Number of cn	119	118	119	119	119

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Lastly, contrary to other indicators of civil war in this study, testing the effect of the peacekeeping operations requires a different approach. The previous modeling method, the panel regression may not be the optimal approach because peacekeeping operations are *ipso facto* reversely correlated with crises (or highly endogenous), i.e. peacekeeping operations present only if when there is violent crisis situation; this effect cannot be sufficiently controlled with the previous modeling methods and the data. This constitutes a

reason why the literatures that empirically tested this topic using a panel-data method is scarce. Instead, the survival model is more commonly used, but as discussed, this model does not fully take into account the time-varying characteristic of independent variables, limiting the estimation results. Therefore, a linear dynamic panel model, which uses Generalized Method of Moments may be a better substitute.

To this end, the previous model was re-modelled as the following general form:

$$c_{it} = \delta c_{i,t-1} + X_{it}'\beta + \alpha_i + \epsilon_{it} \quad (3)$$

As it can be seen from the formula (3), in this model, the dependent variable, ‘civil war onset’ at time t is now temporally correlated with ‘civil war onset’ at time t-1; and α_i specifies an unobserved, time-invariant country specific effects. This assumption is reasonable because civil wars tend to span over years. Once this type of autocorrelation is specified, and the unobserved heterogeneity (α_i) is removed using first difference,

$$\Delta c_{it} = \delta \Delta c_{i,t-1} + \Delta X_{it}'\beta + \Delta \epsilon_{it} \quad (4)$$

The standard ordinary least squares (OLS) estimation is biased because Δc_{it-1} is correlated with $\Delta \epsilon_{it}$. However, because $\Delta \epsilon_{it}$ is not correlated with Δc_{it-2} this can be used as an instrument to Δc_{it-1} . Arellano-Bover/Blundell-Bond estimation technique uses more lags as instruments and known to provide an efficient estimate of the above model.¹²

Another characteristic that is particularly useful for this technique is an additional input of lagged independent variables as instruments. Since peacekeeping operations display strong

¹²See Arellano and Bover, 1995; Blundell and Bond, 1998; Cameron & Trivedi, 2009 and Greene, 7th. Chapter 13 for more discussion on the technical aspect.

temporal dependence, this treatment may be useful in this type of empirical testing for more consistent estimation.

In the model, military expenditure, military expenditure squared, log of population, log of GDP per capita, ethnic and religious fractionalization, forest area, and previous civil war experienced were used as controls. The military expenditure was coded as predetermined in the STATA command and its one-year log was included as an additional regressor. The GDP per capita was coded endogenous with contemporaneous effect considering the negative shock from the conflict episode. As it was written in the model, the one and two-year logs of conflict episode binary variables were included as regressors and the years, t-3 to t-5 were used as instruments in the regression analysis. Similarly, one year lag of peacekeeping variable was included in the model and coded endogenous and the lagged years of t-3 to t-5 were used as instruments. The overall model was estimated using one-step GMM with 'vce(robust)' option specified.

The overall statistics are reported in the table 10. The statistical results provide some evidence to the effectiveness of peacekeeping operations with negative sign and a significance at 0.1 level (models (1-2) and (4-5)). Other coefficients are similar to the previous empirical tests in this study, with an exception of ethnic fractionalization, which was consistently insignificant throughout the tests. Yet, unlike Fortna (2004, 2008), this study is careful to assert that peacekeeping operations strongly work.

Table 10. Arellano-Bover/Blundell-Bond Dynamic Panel Estimation Results, (PKO)

VARIABLES	(1) Onset	(2) Onset	(3) Onset	(4) Onset	(5) Onset
L.Episode Year (CTD)	0.360*** (0.0526)	0.350*** (0.0515)	0.349*** (0.0514)	0.354*** (0.0526)	0.349*** (0.0527)
L2. Episode Year (CTD)	0.106* (0.0558)	0.0974* (0.0542)	0.0964* (0.0547)	0.0983* (0.0542)	0.0906* (0.0540)
Military expenditure to GDP ratio. (SIPRI)	0.0170 (0.0134)	0.0175 (0.0133)	0.0181 (0.0139)	0.0198 (0.0140)	0.0168 (0.0144)
L. Military expenditure to GDP ratio. (SIPRI)	0.0115*** (0.00409)	0.0105** (0.00410)	0.00984** (0.00409)	0.0113*** (0.00352)	0.00975*** (0.00369)
Military expenditure to GDP ratio squared. (SIPRI)	-0.000619** (0.000311)	-0.000703** (0.000322)	-0.000727** (0.000341)	-0.000771** (0.000340)	-0.000711** (0.000340)
Peacekeeping operations. 1 yr lag. (UN)	-0.102* (0.0556)	-0.100* (0.0561)	-0.0799 (0.0610)	-0.100* (0.0570)	-0.101* (0.0565)
Log of population. (WDI)	0.103*** (0.0282)	0.0952*** (0.0266)	0.1000*** (0.0264)	0.0959*** (0.0270)	0.0702** (0.0344)
Log of GDP per capita. (PWT)	-0.0246 (0.0156)	-0.0102 (0.0154)	-0.0114 (0.0158)	-0.00831 (0.0164)	-0.00163 (0.0158)
Ethnic fractionalization. (Alesina et al.)	-	0.484*** (0.180)	0.540*** (0.185)	0.485*** (0.171)	0.467*** (0.163)
Religion fractionalization. (Alesina et al.)	-	-	-0.201 (0.181)	-	-
Forest area (% of land area) (WDI)	-	-	-	0.00134 (0.00243)	0.00175 (0.00237)
Countries with civil war experience before 1990. (CTD)	-	-	-	-	0.145 (0.102)
Constant	-1.418*** (0.479)	-1.623*** (0.505)	-1.628*** (0.506)	-1.698*** (0.510)	-1.402** (0.580)
Observations	2,611	2,590	2,577	2,568	2,568
Number of cn	158	156	155	156	156

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

V. CONCLUSION

The models of civil war literatures on conflict onset can be broadly categorized into five dimensions: government, individual, geo-political, regional, and international. Those dimensions are not mutually exclusive about their arguments, but they are based on distinctive lines of thoughts. Their major emphases are: for government dimension, on government's capacity to repress and contain dissents; for individual dimension, on private incentives such as lootable primary commodities and opportunity costs proxied by education and income; for geo-political dimension, on exogenous geographical and political variables—terrain, natural resource sites, and history of conflict; for regional dimension, on regional spill-over effects through population movement (refugees) and neighboring conflicts; finally, for international dimension, on the effect of international aid and peacekeeping operations on the prevention of civil war onset.

This study attempted to empirically test the models proposed by each dimension using the panel IV estimation technique on binary dependent variable using a comprehensive dataset that includes 211 countries and years 1990-2010. For testing peacekeeping operations, dynamic panel data estimation method was used. By appending dozens of publicly available data, the dataset could compile more than 400 macroeconomic and political variables. This allowed more options of selecting variables with relatively small number of missing observations.

The empirical test results largely conformed to existing literatures. On government dimension, the indicators on government repression and military strength were statistically significant. Military expenditure to GDP ratio had a positive sign, but its squared was negative, suggesting inverse U-curve relationship between the armed conflict and government's investment in the repressive apparatus; on individual dimension, opportunity cost-related variables: education,

labor participation, and mortality rates were significant; on geo-political dimension, some evidences were found on the natural resources, cumulative battle deaths and the history of conflict, and religious heterogeneity variables—on the contrary, not enough evidence was found on diamonds and colonial history; on regional dimension, the magnitude scores of neighboring armed conflicts, inflow of refugees, and the regional arms import were significant while the regional dummies were not—suggesting that the countries in Africa and Asia are not conflict prone just because of their regional identities; on international dimension of aid and peacekeeping, only limited evidence for the effect of international aid and some supporting evidence for peacekeeping were found. Since peacekeeping operations are parts of consequences of civil conflicts, the reverse causality (endogeneity) issue is strong. Due to this problem, a survival analysis method, which often overlook temporal correlation of independent variable are typically used. Instead, a dynamic panel estimation techniques such as Arellano-Bover/Blundell-Bond dynamic panel method may provide a better estimate by treating lags of independent and dependent variables as instruments. Its result was supportive of the role of peacekeeping operations in deterring the onset of violence.

Overall, this study finds that there are some evidences that can back up the claims of each dimension. This implies that the onset of civil war is a complex phenomenon that is not likely to be caused by a single element. It also tells us that civil wars are likely to erupt under specific conditions and that the incidences are not purely accidental. With some mix of politico-economic conditions and regional influences, civil wars are more likely in certain countries than others. Additionally, while country-specific idiosyncrasies such as the number of petroleum sites and religious heterogeneity affect the onset of civil war, more general politico-economic characteristics seem to be more consistently related to its onset. This suggests that the civil wars are preventable through politico-economic changes. However, the international

efforts, such as international development aid and peacekeeping operations are successful in the prevention of civil war only to the limited extent. This is due to the rigidity of fundamental politico-economic capacities of a country. While these measures may prove to be effective in stopping immediate atrocities and humanitarian crises, without altering the underlying politics and economic development situations, the prevention of internal conflicts are more susceptible to failure. Therefore, I suggest, the international efforts should be a two-tracked approach: one with immediate intervention to halt conflicts and regional spill-over; and the other with a more targeted approach to economic and social development.

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