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ScienceDirect

Journal of Policy Modeling xxx (xxxx) xxx–xxx

www.elsevier.com/locate/jpm

Institutional determinants of internal conflicts in fragile developing countries

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Received 12 January 2023; Received in revised form 19 April 2023; Accepted 6 May 2023
Available online xxxx

JEL classifications: C23; D74; O10

Keywords: Conflict; Fragile countries; Institutions; Economic reforms; Education; Democracy

Abstract

In this article, we use fixed-effect Poisson regressions (FEPR) with robust standard errors and instrumental variables (IV) to study the economic, social, and institutional determinants of internal conflicts in 58 fragile developing countries from 2004 to 2017. We show that effective institutions (measured by judicial efficiency and governance) and higher incomes could help reduce conflict in fragile countries. In contrast, trade reform does not seem to reduce violence, and education and democratic institutions may fuel conflict in some cases. These results imply that education and trade liberalization do not have the expected effects in fragile countries, which should probably first improve their social, economic, and institutional situation, before reaping the benefits of economic reforms and education. This may also be the case for political reforms, because democratic experience seems to lead to increased violence in some countries in our sample.

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https://doi.org/10.1016/j.jpolmod.2023.06.004
0161-8938/

Please cite this article as: S.M.A.E.R. Rizvi and M-A. Véganzonès-Varoudakis, Institutional determinants of internal conflicts in fragile developing countries, Journal of Policy Modeling, https://doi.org/10.1016/j.jpolmod.2023.06.004

1. Introduction

Over the past decade, the Uppsala Conflict Data Program has recorded an upward trend of violence in the world (Allansson et al., 2017). In addition to human suffering, civil strife causes considerable damage to economies due to its negative effects on, among other things, infrastructure, social spending, political stability, foreign direct investment, trade, and growth. As a result, while extreme poverty is declining worldwide, it is increasing in fragile countries affected by conflicts (World Bank, 2018). Conflicts in a country also have a destabilizing effect on neighboring countries and entire regions (Taydas et al, 2011). If left unchecked, nearly half of the world's poor will live in fragile countries facing conflict situations by 2030 (World Bank, 2018).

Several studies have suggested that armed violence occurs mostly in fragile countries which have poor economic and social conditions (World Bank, 2011 and 2018). Collier (2007) states that "seventy-three percent of people of the bottom billion have been through a civil war or are still in one". Stewart (2005) notes that most of the economies with the lowest level of human development have been confronted with civil wars over the past three decades. Ostby (2008) shows that poverty, inequality, and dependence on natural resources are at the root of most conflicts in the world. Lai (2007) states that low income levels and high income inequality are positively associated with terrorism.

Countries with fragile institutions and political conditions are also more vulnerable to domestic violence (Ross, 1993; Basuchoudhary and Shughart, 2010). Coggins (2015) found that political collapse has a positive correlation with armed conflict. Newman (2007) and Piazza (2008) state that it is easier for extremist groups to establish their organizations in failed states. People who have grievances and who do not trust the institutions may also find it legitimate to use force (Choi and Piazza, 2016).

Fragile countries therefore offer fertile ground for studying the mechanisms at work in the emergence of conflict. In this study, we aim to better understand the impact of institutions on armed violence. Several authors have highlighted the role of institutions in the economic performances of developing countries (Rodrik, 2004; Acemoglu et al., 2005; Méon and Sekkat, 2008). However, research on the impact of institutions on the occurrence of conflicts is still limited.

When justifying the role of institutions as a main source of differences in economic development, Acemoglu et al. (2005) explains that weak institutions can also increase conflict. For instance, a government that does not properly protect property rights can be a source of instability.[1] Recently, because of the effects of agglomeration linked to progress of the means of communication, some citizens have tried to solve their economic, social or political problems collectively.[2] This collective effort has sometimes led to de facto parallel political power. In response, those who held de jure political power frequently used force to suppress those who threatened their power, often leading the country to long run political instability. Weak institutions and less democratic accountability have often contributed to the emergence of violent conflict in these cases (Mansfield and Snyder, 2012).

Conversely, good institutions, independent of political influence and capable of enforcing contracts, for example, can increase public confidence and better ensure peace. Good

[1] See Acemoglu et al. (2005) for further details

[2] Arab Spring is one example of this situation.

institutions can also contribute to increasing the opportunity cost of conflict by, among other things, improving economic conditions and the social contract between citizens, thus reducing the risk that the country will fall into a conflict trap. (Walter, 2011).

For our empirical work, we choose judicial efficiency, and more generally governance, as variables of interest for conflict reduction in fragile developing countries. We also use the annual number of conflict-based domestic incidents processed from the Global Terrorism Database (GTD) as a proxy for internal conflict.[3] Although a large literature on conflict has emerged over time, few studies are based on GTD data. The advantage of GTD is to provide data on the number of violent events, which constitutes precise information on the frequency and therefore the disruptive effect of conflicts. Another advantage is to isolate the domestic component of conflicts, the most common but the least studied because of a lack of data (Enders et al., 2011; Berkebile, 2017).

Another particularity of our work lies in our choice of fixed-effect Poisson estimators, while most studies use Negative Binomial Regressions for count data (Krieger and Meierrieks, 2019). The use of instrumental variables (IV) is another specificity of our approach which aims to address the possible endogeneity problems underlying our regressions.

We analyze the development of violence for 4 different groups of countries from 2004 to 2017. The data are from the Fund for Peace (FFP) database, which annually publishes a fragility index for 178 countries around the world.[4] In addition to an objective of robustness, our choice to work on different categories of countries was motivated by the search for characteristics allowing to refine the understanding of the mechanisms of violence, and to clarify the recommendations of economic policy.

The rest of the article is organized as follows. Section-2 summarizes some ideas about the institutions and reasons that motivate violence in fragile countries. Based on the literature, Section-3 presents our model of conflict and justify the variables used in the analysis. Section-4 describes our samples. Section-5 introduces the methodological aspects related to our estimates. Section-6 presents the results of the empirical analysis and the robustness for our different specifications. The last section concludes with our main findings and policy recommendations.

2. Institutions and conflict motivations

The motivations for the use of illegal force can be studied using the Rational Choice theory framework. Rational behavior implies that individuals perform a cost/benefit analysis before acting. In the case of conflict, the expected benefits of violence include a redistribution of power, recognition, and wealth; the costs include a reduction in resources and sanctions (Frey and Luechinger, 2003; Harrison, 2006).

Sanctions can be legal or military. LaFree et al. (2009) state that these sanctions can have two contradictory effects on violence: a “deterrent” effect, or an “amplification” effect. Deterrence models assume that the threat or imposition of a sanction changes the behavior of individuals. According to Nagin and Paternoster (1993), deterrence works when the expected benefits of illegal actions are lower than the expected costs. Dezhbakhsh et al. (2003) confirm that the probability of arrest, conviction, or execution results in a significant decrease in the crime rate of a population.

[3] https://www.start.umd.edu/data-tools/global-terrorism-database-gtd.
[4] https://fragilestatesindex.org/data/.

On the contrary, Higson-Smith (2002) puts forward the idea that conflict may get worse as a result of government sanctions. This is the case, for example, when extremists use the public's potential for sympathy to recruit new members, or when opponents become more radicalized by sanctions.

Sherman (1993) explains that deterrence or amplification effects depend on how offenders accept sanctions. If they do not consider them to be legitimate, it will create new grievances. If for example the judicial system is inefficient, people who have grievances but do not trust the justice system may find it legitimate to advance their cause by force.

On the opposite, if justice is effective and the penalties are perceived as fair, the threat of punishment can modify the behavior of individuals. Freytag et al. (2011) state that the possibility of punishment constitutes a cost for opponents. Dezhbakhsh et al. (2003) find that the probability of a sanction in this case leads to a decrease in crime in a country. More generally, George (2018) shows that, in failed states, building reliable institutions can be seen as a counter-terrorism measure.

The impact in particular of the speed of judicial decisions on the perception of fairness has been studied by several authors (Heise, 1999: Sourdin, 2009). The legal maxim "justice delayed, justice denied", attributed to former British Prime Minister William E. Gladstone, has led to improvements in the performance of justice systems around the world (Melcarne and Ramello, 2021). Faster court decisions offer many benefits: reduced court costs, increased deterrence and increased public confidence in the justice system. Sourdin (2009) shows the negative correlation between case resolution time and the perception of fairness. Melcarne and Ramello (2021) show a negative impact of judicial delays on the quality of justice.

In addition, delays in justice provide benefits to criminals by making it easier for them to avoid punishment. Judicial inefficiency therefore reduces the opportunity cost of the crime by allowing the litigant not to serve the sentence that he would otherwise have incurred. An effective judicial system therefore seems essential to increase deterrence from joining a terrorist organization and reduce conflicts.

3. Presentation of the model and the variables

3.1. The model

The equation used to study the determinants of conflict in fragile developing countries is as follows:

$$Confl_{it}=\alpha_0+\alpha_1(Contracts_{it}\text{-or-}Gov_{it})+\alpha_2(Demo_{it})+\alpha_3(EthnTens_{it})+\alpha_4(ReligTens_{it})+\alpha_5(GDPc_{it})+\alpha_6(Open_{it})+\alpha_7(H_{it})+\alpha_8(Inequal_t)+\alpha_9(Pop_{it})+\alpha_{10}(NatRes_{it})+\mathcal{E}_t \quad (1)$$

Where *Confl* is the count data variable for measuring conflict, *Contracts* the proxy for judicial effectiveness, and *Gov* the governance indicator, our two variables of interest, *Demo* the proxy for democratic institutions, *EthnTens* and *ReligTens* the variables for ethnics and religious tensions, *GDPc* the logarithm of real GDP per capita, *Open* the indicator of trade liberalization, *H* the human capital index, *Inequal* the measure of income inequalities, *Pop* the logarithm of population, and *NatRes* the natural resources indicator. e.*i* is the cross sections index, *t* the time dimension and $\mathcal{E}$ the error term. *α0* to *α10* are the parameters to estimate.

Besides the role of the justice system and, more generally, of governance and institutions, our model explains conflicts by a wide range of other factors. We control in particular for the

impact of other institutional variables such as democratic accountability and ethnic and religious tensions, economic factors such as incomes and trade, social dimension such as education and wealth distribution, and geographical questions through the presence of natural resources.

3.2. The variables

3.2.1. Annual conflict-based domestic incidents as proxy for internal conflict

We develop our proxy for internal conflict, the annual conflict-based domestic incidents, from the Global Terrorism Database (GTD).[5] In the GTD codebook, the conflict-based incidents are defined as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation".[6] Following Enders et al (2011), we isolated domestic incidents from transnational incidents by eliminating events where the nationality of one of the victims was different from that of the country where they occurred. The time period for the annual data is from 2004 to 2017 (Table A1 for data-sources and Tables A2.1 to A2.4 for descriptive-statistics).

3.2.2. Efficient judiciary and governance for deterrence and institutions

We use the "Time for Enforcing Contracts" variable from the "Doing Business" database as our indirect indicator of the efficiency of the judicial system. In section-2, we hypothesize that the efficient processing of court cases may increase the opportunity cost of violence. Faster court decisions offer many benefits: lower cost of litigation, better quality of justice, stronger deterrence and greater public confidence in the justice system. If the justice system is effective and citizens trust its decisions, this can deter violent activity.

For robustness, we test the broader impact of governance on the frequency of conflict. To do this, we use principal component analysis to generate an aggregated indicator from variables from the International Country Risk Guide (ICRG) database (Aysan et al, 2007). These variables are: (i) "Control of Corruption", (ii) "Investment Profile", (iii) "Public-Order" and (iv) "Quality of Bureaucracy". A high value of these variables means better governance and institutions, and vice versa '(Table A4).

3.2.3. Democratic accountability as another institutional variable

The impact of the type of political regime on violence and civil unrest is a dimension whose empirical evidence is contradictory (Asongu et al., 2021). Some of the literature emphasizes that democratic regimes allow people to express their demands and be heard, thereby reducing the grievances they may have towards the government. This is the case of Eyerman (1998) and Li (2005) who highlight a positive relationship between democracy and the absence of violence.

Other authors point out that it is easier and cheaper for extremists to engage in violent activities when they enjoy more civil liberties and political rights. For instance, Li and Schaub (2004) and Rizvi and Véganzonès-Varoudakis, (2020) note an increase of violence in fragile countries during democratic periods. Eubank and Winberg (1998) find that terrorism occurs more often in democracies than in more authoritarian regimes.

[5] https://www.start.umd.edu/data-tools/global-terrorism-database-gtd.

[6] Attack types are listed as: assassination, hijacking, kidnapping, barricade incident, bombing/explosion, unknown armed assault, unarmed assault, and facility/infrastructure attack.

We use the Democratic Accountability variable of ICRG database as an indicator of the type of regime (Howell, 2011). A high value of the variable indicates more democratic institutions and vice-versa.

3.2.4. The role of ethnic and religious tensions

Ethnic and religious differences are two other issues explored in the conflict literature. Several studies have used ethnic diversity as an explanatory variable for violence. Horowitz (2000) considers that both countries which are very homogeneous and those which are very heterogeneous may have less violence. Fearon and Laitin (2003) point out that countries with more diversity face less violence because minority groups can share political platforms through alliances and coalitions. Collier and Hoeffler (2004) hypothesize that if political loyalties are ethnically based, the likelihood of conflict increases when an ethnic group has a small majority.

Empirically, Fearon and Laitin (2003) show that ethnic fragmentation has no significant impact on conflict. Collier and Hoeffler (2004) use different indicators of ethnic diversity and highlight a positive impact of ethnic dominance on violence. Basuchoudhary and Shughart (2010) conclude that ethnic tensions increase conflict.

Regarding religious differences, Collier and Hoeffler (2004) argue that, like ethnic diversity, a population which is more heterogeneous in terms of religion faces less conflict. Bandyopadhyay and Younas (2011) use religious fragmentation as an explanatory variable of conflict and stress that countries with greater religious diversity experience less violence. However, Collier and Hoeffler (2004) and Abadie (2006) don't find a significant impact of religious fragmentation on conflict.

We use ethnic and religious tensions from the ICRG database as control variables in our conflict model. The ICRG data range from 0 to 6, where higher values indicate lower tensions.

3.2.5. GDP per Capita as economic variable and proxy for income

The empirical evidence for the impact of income on internal conflict yields mixed results. Some research find that poverty and low income are causes of violence. Humphreys (2003) indicates that low resources increase the likelihood of civil wars. Collier and Hoeffler (2004) show that low incomes increase domestic conflict. These results show that economically disadvantaged people in fragile countries can develop grievances against their government. They also show that poor economic conditions make violence more likely because direct costs (including recruiting rebel) and opportunity costs are low.

By contrast, Caruso and Schneider (2011) find a positive relationship between increased income and the number of people killed in conflict-based incidents. Freytag et al. (2011) and Shahbaz (2013) highlight a positive correlation between increasing GDP per capita and increased violence. Piazza (2008) however does not find a significant association between the two variables.

GDP per capita is our measure of income. The data comes from WDI (2017). For some countries we collect data from national sources and other international institutions for missing values. We use the logarithm of GDP per capita in real terms.

3.2.6. Trade openness as proxy for trade liberalization

The influence of economic reforms on violence is another dimension studied in the literature. The impact of trade liberalization has been the subject of much discussion. Trade liberalization can be a factor of growth and modernization of the economy (Frankel and Romer, 1999; Dollar and Kraay, 2003). New opportunities created by trade can reduce the discontent of the

population and increase the opportunity cost of violence, thus reducing the risk of civil unrest. Kurrild-Klitgaard et al. (2006) and Blomberg and Hess (2008) find an inverse relationship between trade openness and the use of illegal force which would confirm that trade reforms can help reduce violence.

Another part of the literature, however, emphasizes the destabilizing effect of economic reforms. Caruso and Schneider (2011) state that reforms can reduce the wealth of some stakeholders. Wintrobe (2006) and Freytag et al. (2011) confirm that globalization can be seen as a threat to part of the population. In this case, reforms can lead to political and social unrest fueled by groups of people who lose, or fear losing, because of change (Gaibulloev and Sandler, 2019).

Following the empirical literature, we use the ratio of the sum of exports plus imports to GDP (in real terms) as a proxy for trade reform (Kurrild-Klitgaard et al., 2006, Freytag et al., 2011). The data come from national and international sources.

3.2.7. Education as social indicator and proxy for human capital

Human development may be seen as a way to reduce violence. Higher human development can limit the risk of conflict by reducing people's grievances (Kurrild-Kitgaard et al., 2006). Educated people may also be less likely to choose illegal force because they can use their own reasoning to form their own opinion. Educated people can also use their knowledge to improve their economic and social situation (Berrebi, 2007). Advances in education may thus increase the opportunity cost of conflict by providing better opportunities for people (Freytag et al., 2011).

Empirically, Hamilton and Hamilton (1983) note that illiteracy is positively correlated with armed violence. Collier and Hoeffler (2004) highlight the negative impact of education on conflict. However, Berrebi (2007) and Brockhoff et al. (2015) show a positive relationship between education and the use of illegal force. Brockhoff et al. (2015) show that in countries where social, economic, political, and demographic conditions are unfavorable, education can exacerbate discontent. If access to education does not translate into the expected better life, it may increase frustration and civil unrest (Krueger, 2008). In addition, extremist groups may have an interest in recruiting educated people, because this can increase the chances of success of their activities, as well as contribute to a better image for their propaganda in the media (Krueger and Maleckova, 2003).

We use the average number of years of schooling of the population aged 25 or older from the United-Nations-Development-Program (UNDP) as proxy for human capital. We also use The Penn World Tables (PWT) human capital indicator as a robustness test of our results.

3.2.8. The role of income inequalities

Another social indicator is the unequal distribution of wealth which can increase grievances among the population and fuel conflict. In his theory of relative deprivation, Gur (1970) argues that people assess their economic situation in relation to that of others and describes a positive relationship between income inequality and violence. In the literature, relatively unfavorable economic conditions are generally described as leading to increased frustration and conflict.

The empirical literature also illustrates this positive link between income inequalities and conflicts. Krieger and Meierrieks (2019) show that these inequalities increase violence in their sample of countries. They also highlight that countries which redistribute more experience fewer internal conflicts. Piazza (2011) and Malik and Zaman (2013) also finds that greater income inequality increases the likelihood of violence. However, some authors do not validate this link (for instance Kurrild-Klitgaard et al., 2006).

The richest 10% share of pre-tax national income from the World Inequality Database (WID) is our indicator of inequalities.

3.2.9. Population and population density

We also study the impact of population size on the development of conflicts. Krueger and Malečková (2003), Piazza (2008), Freytag et al. (2011) and Richardson (2011) point out that more populous countries tend to face more violence. Taydas et al. (2011) and Gaibulloev and Sandler (2019) argue that, due in part to a great diversity, it is difficult for governments to manage, serve, and respond to the demands of all in the case of large populations. We alternatively use population and population density variables from WDI in logarithm.

3.2.10. Geography and the presence of natural resources

A country with abundant natural resources offers financial resources to both regime and opponents. On the one hand, natural resources provide useful funding for governments to control insurgencies (Collier and Hoeffler, 2004). On the other hand, natural resources can attract rebellion, as the financial gains from controlling these resources increase the potential benefits of an outcome of the conflict in their favor.

Collier and Hoeffler (2004) use the ratio of exports of primary goods to GDP as an indicator of natural resources and find a significant relationship with conflict. They conclude that the availability of financing, through the possibility of extortion allied to these assets, makes rebellion more feasible and attractive. Lujala (2010) and Farzanegan et al. (2018) also show that the abundance of natural resources increases the risk of internal violence.

We use the natural resource rents from the World Development Indicators (WDI) to proxy a country's natural resources.

4. Presentation of the sample

This study focuses on fragile developing countries from the Fund for Peace (FFP) database. The FFP annually publishes a Fragile States Index (FSI), a ranking of 178 countries based on the quantification of different pressures the countries face. The FSI is calculated from 12 key qualitative and quantitative indicators (political, social, and economic) from a variety of public sources.

We use a sample of 58 fragile countries, with data available from 2004 to 2017, for which FSI was above 70, which corresponds to a high degree of fragility. Geographically, our dataset is divided into 21 African countries, 13 MENA countries, 9 Asian countries, 11 Latin American countries and 4 European countries (Table A3).

We analyze the development of conflict activities for 4 different groups of fragile developing countries: (i)-An overall sample of fragile developing countries, (ii)-Islamic fragile developing countries, (iii)-Fragile developing countries with more than one main religion,[7] (iv)-Fragile developing countries affected by major conflicts[8] (Table-A.3). Our choice to work on different categories of countries was motivated by the desire to refine our understanding of the mechanisms of violence. In countries where unrest is fueled by poverty, or an uneven distribution of wealth for example, it might be thought that an increase in income, a policy of wealth

[7] Countries where more than 10% of people belong to a different religious group

[8] Countries having had at least 5 conflict-related incidents per year for at least half of the period studied

redistribution, better access to education, health and more generally a higher level of development, would contribute to reduce social dissatisfaction, and thus reduce conflict. If the reason for the violence is not economic, but religious, an increase in income or education may on the contrary fuel the conflict.

The statistical analysis highlights interesting differences between our groups of countries (Tables-A.2.1 to Table A.2.4).

One result is that the countries affected by major conflicts have, on average, a higher average annual number of conflict-based incidents, higher per capita incomes, a higher level of education, relatively more democratic institutions, and more natural resources than in the other groups. In contrast, ethnic and religious tensions are less in these countries, and their quality of governance is also the weakest of our sample of fragile countries.

Another result is that countries with more than one main religion appear to be the poorest, the most populous, the most unequal, the least endowed with natural resources, and subject to the highest ethnic tensions, but endowed with a better quality of political and economic institutions than the other groups.

The fragile Muslim countries have per capita income and level of natural resources among the highest in our sample, but their political and economic institutions are among the poorest, and religious tensions the highest.

We therefore see very different country typologies from one group to another, which suggests that the causes of conflicts may vary between groups, and that the policies to de-escalate violence may need to vary too.

5. Estimation of the model: methodological aspects

Since we have the annual number of conflict-based domestic incidents as proxy for violence, this implies that our dependent variable is a non-negative integer (count data).[9] We use Fixed Effect Poisson Regressions (FEPR) with robust standard-errors to address the issues related to count data. Poisson estimators are particularly suitable in the case of rare events, which corresponds well to our situation. Many empirical researches have used Poisson regression or Negative Binomial Regression (NBR)[10] for count data models (see Krieger and Meierrieks, 2019, for a synthesis). However, Berrebi and Ostwald (2013) suggest that, while NBR offers potential efficiency gains, the consistent estimates provided by Poisson regression are more valuable than efficiency. Wooldridge (1999) confirms that Poisson regression with fixed-effects is robust and consistent for count data models.[11] We also choose FEPR with clustered standard-errors, which allows us to estimate our model with robust standard-errors (Simcoe, 2008; Santos Silva and Tenreyro, 2009). These standard-errors are robust to clustering, under-dispersion/over-dispersion, arbitrary heteroscedasticity, and arbitrary serial-correlation, as explained in Wooldridge (1999) and Berrebi and Ostwald (2013).[12]

[9] For more details on count data regression see Cameron and Trivedi (2013)

[10] See George (2018) and Piazza (2008) for NBR

[11] Although the problem of underdispersion/overdispersion when applying Poisson regression has been highlighted in various studies, FEPR has been preferred to NBR by several authors for these reasons (Berrebi and Ostwald, 2013; Gardeazabal and Sandler, 2015; Lee and Eck, 2021). Also, Gourieroux et al. (1984) and Wooldridge (1999) explain that the Poisson estimator (with robust standard-errors) does not make any assumptions about the distribution of the errors,

[12] NBR were also performed for our analysis. The results are consistent with those obtained with FEPR. They are available upon request

Following Santos Silva and Tenreyro (2006), we also perform Ramsey (1969) RESET[13] specification test to verify the adequacy of our model.[14] The results of the test show that our model is not misspecified and there is no omitted variable bias.

The question of a possible endogeneity of the explanatory variables of conflicts (growth or income in particular) has been raised by some authors (Krieger and Meierrieks, 2019 and Ajide and Alimi, 2021 for example). Most of the time, the literature pays little attention to this question. We address the possible endogeneity issue underlying our regressions by re-estimating our initial specifications using the two-step control-function (CF) approach.[15] In the first-stage, we explain the endogenous variable (the GDP per capita in our case) by all the explanatory variables plus the instrument (i.e. the lag form of the endogenous variable). This allows to predict the residuals of this first-stage equation. In the second-stage, along with our explanatory variables of conflict, we also control for the residuals of the first equation. The control-function approach has now been used in numerous empirical studies (Ajide and Alimi, 2021; Dreher et al., 2019; Hou, 2021).

Finally, as robustness check we re-estimate our model on a sample of less fragile countries, with a fragility score higher than 60, and on a sample of more fragile countries, whose score is higher than 80.

6. The results of the estimations

Table 1 presents the results for our total sample of fragile countries, Table 2 for the Muslim countries, Table 3 for the countries affected by major conflicts and Table 4 for the countries with more than one main religion. For each specification, we give the results respectively for simple and instrumental variables (IV) Fixed Effects Poisson Regressions (FEPR). We do not present the results of the regressions on the two other samples of more and less fragile countries. However, the results are consistent between all sets of regressions.[16]

6.1. Main results

For almost all specifications, estimators, and groups of countries, weak governance, ineffectiveness of the justice system, low income and size of the population are positively linked to domestic conflicts in our sample of fragile developing countries.

These results indicate that an effective way to reduce conflict in fragile developing countries could be to improve institutions, especially the justice system. This finding is consistent with the one of LaFree et al. (2009) and Dezhbakhsh et al. (2003) who confirm the dissuasive effect of the threat of sanctions. According to Freytag et al. (2011), the possibility of government sanction increases the opportunity cost and risk of violence. If the legal system punishes in a timely manner, the population will be reluctant to resort to violence and rebels will be reluctant

[13] Regression Specification Error Test

[14] To perform the test, Santos Silva and Tenreyro (2006) construct an additional regressor $(x'b)^{2,}$ where the bi represent the vector of the estimated factors and the xi are obtained from the data in memory. The null hypothesis of absence of mispecification (i.e. the non-significance of this additional regressor) corresponds to a coefficient equal to 0.

[15] It is not possible to capture the fixed-effects in the Instrumental Variable Poisson Regression (IVPR). Wooldridge (2015) illustrates that control-function is an efficient instrumental variable (IV) way to counter problems of endogeneity.

[16] Other results are available on request

Table 1
Fixed Effect Poisson Regression for Total Fragile Countries Dependent Variable: Annual Number of Conflict-based Domestic Incidents (*Confl*).

Variables	Spec.1	Spec.1 (iv)	Spec.2	Spec.2 (iv)	Spec.3	Spec.3 (iv)	Spec.4	Spec.4 (iv)	Spec.5	Spec.5 (iv)
Lgdpc	-1.164 * **	-1.148 * **	-1.163 * **	-1.147 * **	-1.090 * **	-1.045 * **	-0.974 * **	-0.885 * **	-0.181	0.268
	(0.315)	(0.305)	(0.322)	(0.315)	(0.320)	(0.310)	(0.294)	(0.279)	(0.626)	(0.755)
Contracts	1.353 *	1.403 *	1.344 *	1.395 *	1.213	1.239	1.000	1.036	1.412	1.524
	(0.766)	(0.824)	(0.763)	(0.821)	(0.783)	(0.877)	(0.908)	(1.018)	(0.990)	(1.114)
Edu	0.758 * **	0.680 * **	0.790 * **	0.722 * **	0.790 * **	0.707 * **	0.767 * **	0.656 * **	0.752 * *	0.615 * *
	(0.173)	(0.183)	(0.207)	(0.217)	(0.213)	(0.226)	(0.215)	(0.228)	(0.295)	(0.286)
Open	-0.320	-0.216	-0.283	-0.178	0.133	0.367	0.262	0.434	0.569	0.959
	(0.999)	(0.977)	(1.044)	(1.011)	(0.973)	(1.036)	(1.052)	(1.073)	(1.355)	(1.499)
Demo	0.113 * *	0.092	0.114 * *	0.094	0.104	0.106 *	0.105 *	0.126 * *	0.128 * *	0.170 * **
	(0.057)	(0.062)	(0.056)	(0.060)	(0.064)	(0.064)	(0.059)	(0.062)	(0.053)	(0.065)
lPop	4.318 * **	4.317 * **	4.253 * **	4.227 * **	4.142 * **	4.168 * **	3.851 * **	3.814 * **	2.807 * **	2.305 * *
	(0.697)	(0.599)	(0.729)	(0.652)	(0.628)	(0.555)	(0.561)	(0.503)	(1.009)	(1.051)
Inequal			-1.211	-1.719	-1.035	-1.571	-1.045	-1.590	-3.041	-3.709
			(6.345)	(6.353)	(5.994)	(6.182)	(5.972)	(6.196)	(5.929)	(6.050)
EthnTens					-0.453 * *	-0.562	-0.393 * *	-0.441	-0.439 * *	-0.602 *
					(0.223)	(0.384)	(0.199)	(0.366)	(0.173)	(0.318)
ReligTens							-0.277	-0.374	-0.094	-0.156
							(0.259)	(0.345)	(0.231)	(0.288)
NatRes									-0.012	-0.018
									(0.018)	(0.019)
Res		-0.149		-0.144		-0.177		-0.211		-0.909
		(0.231)		(0.227)		(0.228)		(0.195)		(0.664)
RESET	0.941	0.996	0.969	0.887	0.839	0.924	0.911	0.855	0.592	0.628
Obs	812	754	812	754	812	754	812	754	795	738
Groups	58	58	58	58	58	58	58	58	57	57

Table 2
Fixed Effect Poisson Regression for Muslim Fragile Countries. Dependent Variable: Annual Number of Conflict-based Domestic Incidents (*Confl*).

Variables	Spec.1	Spec.1 (iv)	Spec.2	Spec.2 (iv)	Spec.3	Spec.3 (iv)	Spec.4	Spec.4 (iv)	Spec.5	Spec.5 (iv)
Lgdpc	-1.251***	-1.199***	-1.192***	-1.139***	-1.145***	-1.139***	-1.009***	-0.930***	-0.383	-0.085
	(0.268)	(0.288)	(0.274)	(0.297)	(0.283)	(0.307)	(0.266)	(0.291)	(0.879)	(0.937)
Contracts	2.425***	2.459***	2.824***	2.884***	2.705***	2.885***	2.456**	2.756**	2.640**	2.835**
	(0.806)	(0.872)	(0.928)	(1.010)	(0.910)	(1.024)	(1.025)	(1.184)	(1.058)	(1.165)
Edu	0.591	0.530	0.487	0.428	0.480	0.428	0.409	0.283	0.565	0.427
	(0.400)	(0.429)	(0.430)	(0.459)	(0.425)	(0.486)	(0.439)	(0.526)	(0.520)	(0.557)
Open	-0.082	-0.120	-0.211	-0.256	-0.071	-0.259	0.335	-0.022	0.821	0.443
	(1.134)	(1.090)	(0.960)	(0.942)	(0.960)	(1.105)	(1.135)	(1.181)	(2.278)	(2.405)
Demo	0.158**	0.134*	0.218***	0.207**	0.211***	0.207**	0.220***	0.242**	0.224**	0.251**
	(0.064)	(0.074)	(0.078)	(0.096)	(0.077)	(0.095)	(0.083)	(0.100)	(0.099)	(0.115)
lPop	4.431***	4.319***	4.468***	4.381***	4.424***	4.380***	4.215***	3.998***	2.698**	2.443*
	(0.920)	(0.854)	(0.900)	(0.877)	(0.854)	(0.923)	(0.812)	(0.920)	(1.327)	(1.285)
Inequal			-18.081	-17.331	-17.659	-17.331	-17.550*	-17.499	-17.321*	-17.272
			(11.793)	(11.424)	(11.197)	(11.415)	(10.588)	(10.788)	(10.297)	(10.577)
EthnTens					-0.213	0.003	-0.140	0.517	-0.220*	0.170
					(0.216)	(0.686)	(0.189)	(0.732)	(0.117)	(0.519)
ReligTens							-0.361	-0.666	-0.126	-0.362
							(0.296)	(0.432)	(0.248)	(0.291)
NatRes									-0.017	-0.016
									(0.021)	(0.021)
Res		-0.129		-0.094		-0.093		-0.161		-0.459
		(0.244)		(0.215)		(0.220)		(0.171)		(0.410)
RESET	0.450	0.447	0.898	0.976	0.947	0.973	0.704	0.721	0.238	0.275
Obs	350	325	350	325	350	325	350	325	336	312
Groups	25	25	25	25	25	25	25	25	24	24

Table 3
Fixed Effect Poisson Regression for Fragile Countries Affected by Major Conflicts Dependent Variable: Annual Number of Conflict-based Domestic Incidents (*Confl*).

Variables	Spec.1	Spec.1 (iv)	Spec.2	Spec.2 (iv)	Spec.3	Spec.3 (iv)	Spec.4	Spec.4 (iv)	Spec.5	Spec.5 (iv)
Lgdpc	-1.180 * **	-1.157 * **	-1.178 * **	-1.155 * **	-1.098 * **	-1.047 * **	-0.989 * **	-0.887 * **	-0.072	0.419
	(0.308)	(0.301)	(0.317)	(0.312)	(0.317)	(0.305)	(0.291)	(0.280)	(0.684)	(0.804)
Contracts	1.511 *	1.606 *	1.501 *	1.597 *	1.362 *	1.441	1.151	1.236	1.618	1.773
	(0.801)	(0.846)	(0.799)	(0.846)	(0.822)	(0.907)	(0.971)	(1.066)	(1.077)	(1.203)
Edu	0.750 * **	0.664 * **	0.792 * **	0.717 * **	0.788 * **	0.697 * **	0.766 * **	0.644 * **	0.715 * *	0.557 *
	(0.179)	(0.194)	(0.214)	(0.229)	(0.222)	(0.241)	(0.225)	(0.245)	(0.317)	(0.311)
Open	-0.441	-0.372	-0.399	-0.332	0.030	0.223	0.150	0.286	0.379	0.718
	(1.062)	(1.028)	(1.102)	(1.054)	(1.024)	(1.090)	(1.099)	(1.122)	(1.389)	(1.580)
Demo	0.122 * *	0.106	0.123 * *	0.109 *	0.113 *	0.122 *	0.113 *	0.141 * *	0.143 * *	0.197 * **
	(0.061)	(0.068)	(0.060)	(0.066)	(0.068)	(0.069)	(0.063)	(0.067)	(0.058)	(0.069)
lPop	4.195 * **	4.173 * **	4.108 * **	4.056 * **	3.992 * **	4.002 * **	3.728 * **	3.657 * **	2.635 * *	2.064 *
	(0.658)	(0.526)	(0.692)	(0.594)	(0.589)	(0.514)	(0.529)	(0.495)	(1.049)	(1.137)
Inequal			-1.497	-2.046	-1.300	-1.870	-1.290	-1.866	-3.438	-4.191
			(6.539)	(6.560)	(6.170)	(6.374)	(6.146)	(6.391)	(6.101)	(6.252)
EthnTens					-0.464 *	-0.567	-0.413 *	-0.458	-0.459 * *	-0.641
					(0.246)	(0.438)	(0.219)	(0.417)	(0.189)	(0.390)
ReligTens							-0.250	-0.354	-0.104	-0.193
							(0.266)	(0.357)	(0.250)	(0.313)
NatRes									-0.010	-0.017
									(0.018)	(0.020)
Res		-0.111		-0.104		-0.141		-0.175		-0.824
		(0.206)		(0.201)		(0.196)		(0.159)		(0.581)
RESET	0.922	0.890	0.810	0.781	0.986	0.834	0.772	0.748	0.681	0.649
Obs	308	286	308	286	308	286	308	286	294	273
Groups	22	22	22	22	22	22	22	22	21	21

Table 4
Fixed Effect Poisson Regression for Fragile Countries with more than One Main Religion. Dependent Variable: Annual Number of Conflict-based Domestic Incidents (*Confl*).

Variables	Spec.1	Spec.1 (iv)	Spec.2	Spec.2 (iv)	Spec.3	Spec.3 (iv)	Spec.4	Spec.4 (iv)	Spec.5	Spec.5 (iv)
Lgdpc	-1.529 * **	-1.500 * **	-1.397 * **	-1.382 * **	-1.164 * **	-1.139 * **	-0.775 * **	-0.772 * **	1.183	0.687
	(0.085)	(0.096)	(0.100)	(0.142)	(0.086)	(0.097)	(0.091)	(0.093)	(1.236)	(1.416)
Contracts	2.967	2.478	2.290	1.940	2.983	2.611	5.498 *	5.049	6.996 * *	6.314 * *
	(2.589)	(2.460)	(2.833)	(2.843)	(2.761)	(2.756)	(3.019)	(3.337)	(3.207)	(3.017)
Edu	0.724 * **	0.713 * **	0.244	0.298	0.151	0.200	0.385	0.478	0.270	0.338
	(0.266)	(0.265)	(0.347)	(0.416)	(0.331)	(0.392)	(0.339)	(0.367)	(0.224)	(0.233)
Open	1.852	1.626	0.968	0.949	1.100	1.056	2.649 * *	2.692 * *	5.594 * *	5.680 * **
	(1.629)	(1.818)	(1.730)	(2.010)	(1.235)	(1.401)	(1.096)	(1.234)	(2.208)	(2.116)
Demo	-0.154	-0.149	0.027	0.009	-0.067	-0.089	-0.008	-0.022	-0.204	-0.130
	(0.450)	(0.459)	(0.475)	(0.504)	(0.433)	(0.453)	(0.345)	(0.360)	(0.364)	(0.467)
lPop	8.302 * **	7.641 * **	9.569 * **	8.873 * **	10.13 * **	9.423 * **	8.132 * **	7.325 * **	7.177 * **	7.140 * **
	(2.892)	(2.709)	(2.969)	(2.827)	(3.021)	(2.928)	(2.561)	(2.530)	(1.495)	(1.774)
Inequal			6.753 * *	5.801	6.336 * *	5.446	3.837	2.530	-5.007	-5.272
			(3.225)	(3.921)	(3.058)	(3.930)	(2.968)	(3.355)	(5.637)	(5.997)
EthnTens					-1.264 * **	-1.467 * **	-0.589	-0.775 *	-0.747 * *	-0.947 * **
					(0.487)	(0.513)	(0.404)	(0.403)	(0.323)	(0.302)
ReligTens							-2.128 * **	-2.186 * **	-0.827 *	-0.820 *
							(0.470)	(0.460)	(0.482)	(0.454)
NatRes									-0.059 *	-0.058 *
									(0.031)	(0.034)
Res		-0.108		-0.180		-0.144		0.135		3.213
		(0.133)		(0.178)		(0.095)		(0.125)		(3.582)
RESET	0.000	0.000	0.007	0.008	0.006	0.004	0.528	0.534	0.094	0.122
Obs	224	208	224	208	224	208	224	208	210	195
Groups	16	16	16	16	16	16	16	16	15	15

Note Tables 1–4: *GDPc* is the logarithm of real GDP per capita, *Contracts* the Time for Enforcing Contracts variable from Doing Business, *Edu* the average number of years of schooling of population aged 25 or older from UNDP, *Open* the ratio of exports plus imports to GDP from various national and international sources, *Demo* the Democratic Accountability variable from ICRG, *Pop* the logarithm of population from WDI, $Inequal_t$ the share of top 1% pre-tax national income in total gdp from WID, *EthnTens and ReligTens* the indicators of ethnics and religious tension respectively from ICRG, *NatRes* the natural resources rent from WDI. *Res* is the residual of the 1rst stage estimation of the two-step control function (CF) procedure. *Reset* is for RESET Test- P Values. Robust standard errors are given in parenthesis. Significance level: * ** . * *, * is less than 1%, 5% and 10% respectively. Estimations include country fixed-effects. (iv): instrumental variables estimator.

to continue the conflict. More generally, our results indicate that developing countries with fragile institutions seem more vulnerable to violence (as seen in Ross, 1993, and Basuchoudhary and Shughart, 2010) because our findings are unchanged with our aggregate governance indicator which more broadly represents institutions.[17] (Tables A.3.1 to A.3.4).

Our results also corroborate the findings of Humphreys (2003), Collier and Hoeffler (2004), Lai (2007), and Ostby (2008), who show that low incomes are positively associated with violence. When poverty is high, disadvantaged people can develop grievances against their government. In this case, the use of violence is more likely since the opportunity cost of illegal force and the cost of recruiting rebels is low. Improving incomes seems a policy variable that governments could use to reduce violence in fragile developing countries.

With regard to population size, our results are in line with those of Taydas et al. (2011) and Gaibulloev and Sandler (2019) who show that fragile countries with big populations are more exposed to violence. The use of population density does not change our conclusions.[18]

Our results for education, trade liberalization and democratic accountability are less stable than those obtained for institutions, incomes and population. Trade liberalization does not seem to be related to conflict, except in the case of countries with more than one religion for some specifications (Table 4). Also, the sign of the coefficient of the trade openness variable varies according to the specifications, although it is not significant. This finding does not allow discriminating between the two options described in the literature. Trade reforms appear to be seen neither as an opportunity to improve people's prospects and incomes (as in Kurrild-Klitgaard et al., 2006, and Blomberg and Hess, 2008) nor as a threat of loss of income or of worsening inequalities (as in Wintrobe, 2006, and Freytag et al., 2011), except in countries with more than one religion in some cases.

Education and democratic institutions appear to be more regularly associated with violence. Our results show a positive relationship between education and democratic accountability and conflict. The impact of these factors on violence has been discussed in the literature. Our findings indicate that education in fragile developing countries may not translate into an opportunity to improve living conditions or as a means of strengthening critical thinking against terrorism, as in Berrebi (2007) and Brockhoff et al. (2015). In a country with adverse social, economic, political and institutional conditions, education can increase frustration if the situation of educated people does not improve, especially since they may be more aware of the limits of their government.

This conclusion can be extrapolated to democracy which seems to give more voice to discontented groups, thereby increasing violence as in Eubank and Winberg (1998) and Li and Schaub (2004) in some cases. This means that when some fragile developing countries go from authoritarianism to democracy, they can face more civil unrest**.** Democracy also does not seem to allow for conflict resolution and a reduction in violence in most of our groups (Eyerman, 1998; and Li, 2005), which leaves open the question of the impact of improving democratic institutions on violence.

6.2. *Sub-sample specificities*

A more detailed analysis shows interesting differences between our groups of countries. The relationship of conflict to income, although relatively stable in most groups and specifications, seems stronger in countries with more than one main religion (and to a lesser extent in Muslim countries, Tables 2 and 4). This is an interesting finding which could indicate that public

[17] Results are available on request

[18] Results of these regressions are available on request.

policies aimed at improving people's incomes and living conditions could be more effective in these particularly poor and fragile developing countries (Table A2.4).

The results are more diverse for the justice system. The improvement in the justice efficiency is more strongly related to the decrease in violence in Muslim countries than in the other groups (Table 2). This is interesting because some countries in this group may be less involved in long-term and high-intensity violence than those in the group of countries affected by major conflicts (Tables A.2.2 and A.2.3). Improving the justice system, in addition to incomes, and more generally institutions could therefore prevent the escalation of violence in those fragile countries characterized by a relatively poor governance environment compared to the countries of the other groups (Table A.2.2). As for countries with more than one main religion, the results are more difficult to interpret because they vary according to the specification. However, the justice efficiency may also play an important role in reducing violence in some cases (Table 4).

The results for education are more constant from one specification to another and significant mainly for two groups (total fragile countries and countries affected by major conflicts, Tables 1 and 3). This may be related to the fact that ethnic tensions (and religious tensions in some groups) are an important factor in most of our fragile countries. In this case, education could serve the cause of terrorists by allowing certain segments of the population to be more involved in violence. Although education does not appear to fuel violence in Muslim countries and countries with more than one main religion, these findings should be viewed with caution. Human capital seems to participate in the escalation of violence in Muslim countries when one considers the Penn World Tables proxy.[19]

As for political liberalization, democratic experiences seem to be part of increased violence in most of our fragile developing countries (as in Eubank and Winberg, 1998, and Li and Schaub, 2004), except in the group of countries with more than one main religion, perhaps because some countries in this group have historically experienced a relatively long presence of democratic institutions (Table A2.4). Administrative and political disorganization and the social, political, ethnic or religious polarization in most of the countries affected by conflicts, probably does not allow them to benefit from the political reforms which should allow the people to express their demand, to dialogue and to find solutions to their differences. These experiments, which give voice to opponents and result in an upsurge in violence, should probably take place in more stabilized political, social and institutional contexts.

6.3. *Role of the other control variables*

The role of our other control variables does not seem to be validated, in a general and robust way, by the data.

Ethnic tensions appear to participate in the dynamics of conflicts only in the non-instrumented specification for the total sample and for the countries affected by major conflicts, which weakens the result. In a single configuration, that of countries with more than one main religion, characterized by a comparatively higher level of religious and ethnic tensions (Table A2.4), the ethnic tensions variable's role seems robust.

The same conclusion can be drawn for income inequalities, religious tensions, and natural resources whose role is never demonstrated, except for countries with more than one main religion, also characterized by a comparatively higher level of inequalities (Table A.2.4.), in a number of specifications.

[19] Results are available upon request.

This result highlights, once again, the specificity of countries with more than one main religion whose conflict dynamics seem to follow a somewhat different path from that of the average for other fragile developing countries. Inequalities on the one hand, and ethnic and religious tensions the role of which has been highlighted in violence by many authors (Collier and Hoeffler, 2004; Basuchoudhary and Shughart, 2010; Bandyopadhyay and Younas, 2011; Danzell et al., 2019) on the other hand, seem important dimensions that governments could take into account in order to reduce the violence in this group.

However, our more general results do not seem to validate the role of inequalities, as studied by Piazza (2011) and Krieger and Meierrieks (2019), nor of natural resources, which part of the literature has also highlighted (notably Collier and Hoeffler, 2004, Lujala, 2010, or Farzanegan et al., 2018) in the violence in our sample of fragile countries.

6.4. Robustness checks

As robustness tests, we re-estimated our model on a sample of less fragile countries (with a fragility index higher than 60), as well as on a sample of more fragile countries (whose fragility index is higher than 80). This sensitivity analysis, which includes different panels of countries with different levels of fragility, confirms our results. Most of our explanatory variables are significant and have the same sign as for our initial estimates, which shows the robustness of our initial findings.[20]

A certain number of specificities are nevertheless interesting to highlight. We note in particular that the populations of the most fragile countries are more sensitive to an increase in their income than in the case of less fragile countries. In each of our subgroups, the estimated coefficient of the per capita GDP variable is higher than in our initial regressions. This constitutes an interesting result in terms of economic policy insofar as an improvement in the standard of living of the populations would contribute to a de-escalation of violence in these particularly fragile developing countries. Another interesting result concerns the impact of demographic pressure which would also be felt more in this group. Countries that are both more fragile and more populous seem more prone to escalating violence.

With regard to our sub-groups, it would appear that the most fragile Muslim countries are particularly vulnerable to political reforms, inequalities, and religious tensions, which would require the authorities to take great care and precautions in setting up policies. Political freedom seems to give even more voice in the case of these countries to extremists who instrumentalize religion, in a context of already strong religious tensions. The fight against inequalities could offer, at the same time as the general improvement of the standard of living, a more efficient lever than in the less fragile Muslin countries to answer the frustrations and the demands of the populations, and so at the same time contribute to the de-escalation of violence.

This last finding could be extrapolated to our most fragile countries with more than one main religion, for which countering inequalities and improving the standard of living of populations seem to be effective levers in the fight against violence. An interesting result concerning these countries could also be the role, more than in the other groups, of political reforms. We have already pointed out that the presence of countries with a more democratic tradition could explain that political freedoms do not seem to contribute, according to our previous estimates, to the escalation of violence in this group of countries. For the most fragile of them, it would seem from our new findings that democratic institutions could even help resolve tensions and

[20] Results are available upon request

therefore conflicts, although our results must be taken with caution because of a lower number of observations in this new set of regressions.

As for our sample which incorporates less fragile countries, our results do not seem significantly different from those obtained on our initial sample.

7. Concluding observations and policy implications

In this article, we have focused on the role of institutions in reducing violence in fragile developing economies. We have shown that weak institutions (weak justicial system and more generally bad governance) are important dimensions positively related to violence in our samples of fragile countries. Our results confirm in particular the deterrent effect of the threat of sanctions and the opportunity cost linked to an effective justice, as highlighted by Dezhbakhsh et al. (2003), LaFree et al. (2009) and Freytag et al. (2011).

Our findings also show that policies aiming at improving the standard of living of populations could contribute to mitigating conflicts in fragile developing countries. When poverty is high, disadvantaged people are more likely to resort to violence, in part because the opportunity cost of using force and the cost of recruiting extremists are low, as shown by Collier and Hoeffler (2004), Lai (2007), and Ostby (2008).

Our results also highlight that education and democratic reforms do not have the desired effects on conflict reduction in fragile developing countries. This may also be the case for economic reforms, since our indicator of trade openness does not seem related to conflict reduction.

Although this general pattern is valid for most of our country groups, some groups experience somewhat different situations. This is the case for countries with more than one major religion, where the improvement of incomes and the efficiency of institutions on the one hand, the reduction of economic inequalities and of ethnic and religious tensions on the other hand, appear to be more effective in reducing violence than in other groups. For inequalities and level of income, this is particularly the case for the most fragile of them. These are interesting findings which governments could take into account to reduce the escalation of violence in these particularly fragile developing countries.

Muslim countries also appear to be particularly sensitive to the deterrent effect of sanctions and, to a lesser extent, to the improvement of income, notably in the most fragile ones, like for inequalities, which, for governments, could be effective means of combating violence.

In addition, countries with more than one main religion seem sensitive to the destabilizing effect of trade liberalization, and Muslim countries, particularly the most fragile ones, to democratic openness. These issues should also be taken into account when implementing political and economic reforms so as not to fuel violence in these particularly fragile countries.

Conflicts in fragile developing countries cause significant human suffering and development delays. The World Bank (2018) predicts that if nothing is done, nearly half of the world's poor will live in conflict-torn developing countries by 2030. This study highlights some tools that governments could possibly use to try to limit violence in fragile countries. Restoring strong and reliable institutions, the justice system notably, and improving people's standard of living are measures that could bear fruit in most fragile countries. These results are in line with the work of Freytag et al (2011) who show that public spending and social protection policies can reduce violence, and George (2018) who suggests that in failed states, an effective counter-terrorism measure is to build reliable institutions.

The question of the role of education, democratic institutions, and economic reforms is more complex to deal with. Since, in the short term, these instruments do not seem to contribute to the reduction of conflict and violence (except in the case of the most fragile countries with more than one

main religion where democratic institutions seem to help), it may be thought that the priority of fragile developing countries should be to provide their populations with a stable institutional, economic, social and political environment before these populations can benefit from more advanced reforms.

Acknowledgements

This work was sponsored by the Economic Research Forum (ERF) and has benefited from both financial and intellectual support. The views expressed in this work are entirely those of the author(s) and should not be attributed to ERF, its Board of Trustees gold donors.

This work was supported by the Agence Nationale de la Recherche of the French government through the program "Investissements d'avenir" ANR-10-LABX-14-01.

Appendix

Table A1, Table A2.1, Table A2.2, Table A2.3, Table A2.4, Table A3, Table A4:

Table A1
List of Variables and their Sources.

Variables	Sources
Confl: annual number of conflict-based incidents	Global Terrorism Database (GTD)
lgdpc: log of GDP per capita	World Development Indicators (WDI)
Contracts: Time for Enforcing Contracts indicator (days)	Doing Business
Gov: Governance indicator	International Country Risk Guide (ICRG)
Inequal: top 10% share of pre-tax national income	World Inequality Database (WID)
Edu: mean years of education	United Nation Development Program (UNDP)
H: Human Capital indicator	Penn World Tables (PWT)
Open: Trade Openness indicator	World Development Indicators (WDI)
Demo: Democratic Accountability indicator	International Country Risk Guide (ICRG)
lpop: log of population	World Development Indicators (WDI)
lPopDens: log of population density	World Development Indicators (WDI)
EthnTens: Ethnic Tensions indicator	International Country Risk Guide (ICRG)
ReligTens: Religious Tensions indicator	International Country Risk Guide (ICRG)
NatRes: Natural Resources indicator	World Development Indicators (WDI)

Table A2.1
Descriptive Statistics for Total Fragile Countries.

Variables	Obs	Mean	Std. Dev.	Min	Max
Conflict	812	78.81	280.4	0.00	3367
lgdpc	812	7.68	1.05	5.66	9.98
Contracts	812	1.86	0.84	0.62	4.00
Gov	812	0.00	1.28	-4.13	2.96
Edu	812	6.49	2.62	1.30	12.30
H	714	2.1	0.53	1.12	3.40
Open	812	0.58	0.30	0.12	2.21
Demo	812	3.38	1.37	0.04	6.00
Inequal	812	0.48	0.06	0.32	0.65
lPop	812	17.07	1.39	13.52	21.05
ReligTens	812	3.51	1.16	1.00	6.00
EthnTens	812	4.01	1.41	0.83	6.00
NatRes	799	12.14	13.59	0.00	67.92

Table A2.2
Descriptive Statistics for Fragile Muslim Countries.

Variable	Obs	Mean	Std. Dev.	Min	Max
Conflict	350	134.79	398.54	0.00	3367
Lgdpc	350	7.72	1.09	5.66	9.98
Contracts	350	1.78	0.70	0.65	3.95
Gov	350	0.00	1.38	-3.01	3.13
Edu	350	5.55	2.71	1.30	10.80
H	294	1.91	0.47	1.12	2.87
Open	350	0.52	0.21	0.12	1.23
Demo	350	3.13	1.29	0.04	5.50
Inequal	350	0.47	0.05	0.34	0.58
lPop	350	17.11	1.13	15.17	19.39
ReligTens	350	3.44	1.23	1.00	6.00
EthnTens	350	3.20	1.31	0.83	5.50
NatRes	340	15.04	15.98	0.00	67.92

Table A2.3
Descriptive Statistics for Fragile Countries Affected by Major Conflict.

Variable	Obs	Mean	Std. Dev.	Min	Max
Conflict	308	200.52	427.57	0.00	3367
lgdpc	308	7.82	0.99	5.66	9.61
Contracts	308	2.16	0.94	0.73	3.96
Gov	308	0.00	1.33	-3.16	2.71
Edu	308	6.54	2.37	1.60	12.00
H	280	2.12	0.49	1.16	3.40
Open	308	0.46	0.18	0.12	1.18
Demo	308	3.49	1.40	0.50	6.00
Inequal	308	0.48	0.05	0.38	0.58
lPop	308	17.82	1.23	15.17	21.02
ReligTens	308	3.05	1.29	1.00	6.00
EthnTens	308	3.03	1.32	0.83	5.50
NatRes	298	13.59	15.66	0.00	67.92

Table A2.4
Descriptive Statistics for Fragile Countries with More than One Main Religion.

Variable	Obs	Mean	Std. Dev.	Min	Max
Conflict	224	66.21	166.75	0.00	929
lgdpc	224	7.00	0.91	5.66	9.09
Contracts	224	1.88	0.85	1.10	3.96
Gov	224	0.00	1.35	-3.23	2.61
Edu	224	5.62	2.32	1.30	11.00
H	224	1.91	0.49	1.12	2.90
Open	224	0.51	0.34	0.17	2.21
Demo	224	3.59	1.46	1.00	6.00
Inequal	224	0.50	0.05	0.41	0.65
lPop	224	17.55	1.36	15.17	21.02
ReligTens	224	3.73	1.49	1.00	6.00
EthTens	224	3.09	1.12	1.00	5.00
NatRes	214	9.81	7.10	0.00	28.57

Table A3
List of Countries.

Total countries		Countries with more than one main religion	Countries affected by major conflicts	Muslim countries
Algeria	Madagascar	Burkina Faso	*Algeria*	Algeria
Angola	Mali	Cameroon	*Bangladesh*	Azerbaijan
Azerbaijan	Mexico	Demo Rep. of Congo	Colombia	Bangladesh
Bangladesh	Moldova	Ethiopia	Demo Rep. of Congo	Burkina Faso
Belarus	Morocco	Ghana	*Egypt*	Egypt Arab Rep.
Bolivia	Mozambique	India	India	Gambia
Burkina Faso	Nicaragua	Indonesia	*Indonesia*	Guinea
Cameroon	Niger	Kenya	*Iran*	Indonesia
China	Nigeria	Lebanon	*Iraq*	Iran Islamic Rep.
Colombia	Pakistan	Mozambique	Kenya	Iraq
Demo Rep. of Congo	Paraguay	Nigeria	*Lebanon*	Jordan
Dominican Rep.	Philippines	Sierra Leone	*Libya*	Lebanon
Ecuador	Rep. of Congo	Sri Lanka	*Mali*	Libya
Egypt Arab Rep.	Russia	Syria	*Nigeria*	Mali
Ethiopia	Saudi Arabia	Tanzania	*Pakistan*	Morocco
Gabon	Senegal	Togo	Philippines	Niger
Ghana	Sierra Leone	Uganda	Russia	Nigeria
Guatemala	Sri Lanka	Vietnam	Sri Lanka	Pakistan
Guinea	Sudan		*Sudan*	Saudi Arabia
Guyana	Syrian Arab Rep.		*Syria*	Senegal
Honduras	Tanzania		*Turkey*	Sierra Leone
India	Tunisia		*Yemen*	Sudan
Indonesia	Turkey			Syria
Iran Islamic Rep.	Uganda			Tunisia
Iraq	Ukraine			Turkey
Jordan	Venezuela			Yemen Rep.
Kenya	Vietnam			
Lebanon	Yemen Rep.			
Libya	Zimbabwe			

Table A4
The Aggregate Governance Indicator Principal Component Analysis.

Principal components/correlation				
Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.627	0.675	0.407	0.407
Comp2	0.952	0.143	0.238	0.645
Comp3	0.809	0.196	0.202	0.847
Comp4	0.613	.	0.153	1.000

Principal components (eigenvectors)					
Variable	Comp1	Comp2	Comp3	Comp4	Unexplained
invfr	0.522	0.037	-0.751	0.403	0.000
corfr	0.617	-0.048	0.005	-0.785	0.000
lworfr	0.381	0.772	0.440	0.255	0.000
bcfr	0.449	-0.633	0.493	0.395	0.000

With ***invfr***: "Investment Profile," ***corfr*** "Control over Corruption," ***lworfr*** "Law and Order" and ***bcfr*** "Quality of Bureaucracy" (see Aysan et al., 2007). "Investment Profile" has three subcomponents: (i) contract viability/expropriation, (ii) profits repatriation, (iii) payment delays. "Control over Corruption" is an overall valuation of corruption within a country. "Law and Order" proxies impartial judiciary and overall observance of law. "Quality of Bureaucracy" shows how autonomous is bureaucracy to perform services without government pressure A higher value of these variables means a lower risk (ie a better governance). (See ICRG for more details on definitions and compositions of these variables)

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