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## **A THEORY OF REGIONAL CONFLICT COMPLEXES**

arthur silve and Thierry Verdier

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## Abstract

Civil conflicts spill over to neighboring countries. This paper proposes a theory of the contagion of civil wars, emphasizing two main channels of diffusion of a conflict. First, weak territorial control facilitates the emergence of a regional market for war inputs in the “porous frontier”. Second, refugees fleeing a conflict zone may unwittingly destabilize their host country. In both cases, the contagion effect is nonlinear and creates multiple equilibrium situations of regional complexes of civil conflicts. This helps explain observed patterns of regional clustering of conflict and state capacity, and raises identification issues in the measurement of the contagion effect. We also derive a positive spillover of civil wars: governments are sometimes in a position to avoid contagion by improving their institutions. Finally, we explore policy implications for military intervention, military and institutional cooperation, and the international coordination of refugee policy.

JEL Classification: D74, N40, P48

Keywords: civilwar, contagion, porous frontier, state capacity, military intervention, institutional cooperation, Refugees

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Acknowledgements

# A theory of regional conflict complexes

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March 11, 2017

## Abstract

Civil conflicts spill over to neighboring countries. This paper proposes a theory of the contagion of civil wars, emphasizing two main channels of diffusion of a conflict. First, weak territorial control facilitates the emergence of a regional market for war inputs in the “porous frontier”. Second, refugees fleeing a conflict zone may unwittingly destabilize their host country. In both cases, the contagion effect is nonlinear and creates multiple equilibrium situations of regional complexes of civil conflicts. This helps explain observed patterns of regional clustering of conflict and state capacity, and raises identification issues in the measurement of the contagion effect. We also derive a positive spillover of civil wars: governments are sometimes in a position to avoid contagion by improving their institutions. Finally, we explore policy implications for military intervention, military and institutional cooperation, and the international coordination of refugee policy.

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## 1 Introduction

On 16 January 2012, The National Movement for the Liberation of Azawad (MNLA), an organization fighting to make Azawad in Northern Mali an independent homeland for the Tuareg people, began fighting a campaign against the Malian government for independence or greater autonomy. In the midst of a political crisis and a coup ousting the president in place Amadou Toumani Touré, the MNLA quickly overrun the three largest northern cities—Kidal, Gao and Timbuktu. On April 6 2012, it proclaimed

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Azawad's independence from Mali. Initially backing the Tuaregs in the rebellion against the Malian government, the Islamist group Ansar Dine and a number of smaller Islamist groups turned afterwards their way against the MNLA in order to impose strict Sharia law in the northern territories. By mid-July 2012, they gained control of most of northern Mali's cities and started moving in the direction of Bamako the capital. With help from an international coalition led by the French military and other African Union states, the Malian government stopped them and recovered the Islamist-held territory by 8 February 2013.

Clearly, the 2012 insurgency in northern Mali was associated to a series of domestic factors related to the Malian historical political situation. After an unsuccessful uprising in 1962, Tuaregs rebelled again in 1990 and 2007, in response to political marginalization by the Southern government in Bamako and to economic hardships: episodes of local droughts and food shortages exacerbated social tensions and contributed to their incentives to revolt.

As noted by several observers (DiCarlo, 2012; Ki Moon, 2012), the occurrence of the Mali's civil war was also connected to the broader regional context, and in particular the Libyan Civil War that culminated in late 2011. Indeed, the porous border in the Sahel region certainly enabled a number of cross-border destabilizing factors, such as hundreds of thousands of traumatized and impoverished returnees, trained ex-soldiers and mercenaries from the Qaddafi regime, and an unspecified amount of weapons and ammunition from the Libyan arsenal flowing into the region.<sup>1</sup>

The example of the 2012 insurgency in Mali reflects a general pattern of conflicts in the world: civil wars and state failures tend to cluster in time and in space. Beside Mali, illustrations abound, from the Balkan countries and Central Asian regions after the fall of the Communist block, to the Great Lakes region in Central Africa, the Horn of Eastern Africa, and recently the Arab Spring wave in the Maghreb and the Middle East region.

Importantly, the Malian example also highlights a typical tension encountered in the literature to explain this pattern. On the one hand, the focus on domestic factors suggests that regional clusters of civil wars is just an artifact of clustered states with similar domestic attributes (geographical or social characteristics, resource endowments, and climatic conditions).<sup>2</sup> On the other hand, the discussion of the broader regional context emphasizes cross-border contagion effects occurring through various mechanisms<sup>3</sup>:

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<sup>1</sup>According to the International Organization for Migration, 420,000 people fled Libya, 30,000 of which returned to Mali (Ki Moon, 2012, p. 6). These migrants included Tuareg combatants who aided the Qaddafi regime and returned to Mali trained and armed. A notable example is Mohammed Ag Najim, a former colonel in Qaddafi's army, who became the head of the MNLA.

<sup>2</sup>See Hegre et al. (2001); Elbadawi and Sambanis (2002); Gleditsch (2002); Fearon and Laitin (2003); Collier and Hoeffler (2004); Bosker and de Ree (2014).

<sup>3</sup>see Salehyan and Gleditsch (2006); Buhaug and Gleditsch (2008); Braithwaite (2010); Forsberg (2014).

cross-border ethnic networks of rebelling groups, emergence of violent non-state actors (militia, mercenaries, organized crime), or displacement of refugee populations.

One reason for the absence of consensus in the literature comes from the way scholars tend to assess the causes of civil conflict in a given country. Domestic factors are typically pinned down against diffusion factors as if the two are independent and alternative sources of conflicts. This approach implicitly discounts the importance of local interactions and feedback effects across countries. While convenient, it reflects the lack of models emphasizing how patterns of civil wars can be the outcome of joint processes at the regional level (on this point, see Gersovitz and Kriger, 2013). Such models however, by investigating the interactions of country level domestic factors intermediated by regional diffusion channels could help reconcile the two perspectives of the literature on regional clusters of civil wars.

The purpose of this paper is to provide a theoretical framework that highlights such “general equilibrium” systemic considerations, emphasizing explicitly how internal factors (locally correlated or not) and diffusion mechanisms interact and complement each other in their destabilizing effects at the regional level.

For this, we construct a simple two-country model of civil conflict and repression embedding the following features. In each country, a group in power (the *government*) is able to exploit a resource which may be disputed by another group (the *challenger*). Fighting over the resource is costly to all parties, and the challenger may prefer not to dispute the control of the resource. The government may in turn discourage a rebellion, thanks to two instruments: redistribution and deterrence. Redistribution is associated to a transfer that rewards peaceful behavior of the other group, while deterrence is obtained through some investment in a warfare technology that increases the cost of a possible conflict. In each country, the political regime is governed by two domestic factors of interest: the opportunity cost of fighting for the challenger, and the capacity of the government to commit to resource sharing. Civil conflict occurs for low opportunity costs and low government credibility. As either gets higher, the domestic political outcome is likely to turn to peace, and the government to favor redistribution over deterrence.

Opening the black box of the contagion mechanism, the model considers different important microeconomic channels of cross-border effects. The first one is the emergence of non-state actors, such as warlords, terrorist organizations, organized crime (Mincheva and Gurr, 2010a,b, 2013; Hübschle, 2011), weapon trafficking and intermediaries. Such agents, so-called “problems without passports” (Picciotto et al., 2005), thrive at the “porous frontier” between countries and are beyond the control of governments,<sup>4</sup> and fuel the conflict by providing war inputs to potential belligerents. As the extent and efficiency of this war non-state sector depends on the size of the market for violence, this creates a natural channel of cross-border diffusion of civil conflict at the regional

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<sup>4</sup>Wolff (2010) and DCAF and Geneva Call (2011) describe them as important facilitators of cross-border conflict spillovers. For a recent database on non-state actors see Cunningham et al. (2013, 2016).

level. The second channel is the existence of ethnic networks that facilitate the cross border cooperation of rebel groups. The third one is cross-border migrating refugees that put pressure on the allocation of local resources inside the host country. In all cases, domestic violence in one country has consequences for the political economy of domestic violence in the other country, and one channel tends to reinforce the contagion effect of another channel.

In this context, our analysis provides several results. First as a benchmark, we describe the equilibrium types of political economy regimes that may arise in each country in isolation, and in particular the conditions for civil conflict because of pure domestic factors.

Second, the existence of mechanisms of violence contagion (whether through the emergence of non-state actors emerging as war suppliers at porous borders, the existence of ethnic networks facilitating cross-border cooperation across rebel groups, or the triggering of refugee flows), induces a basic regional complementarity between governments choosing their own national political regime. The incentives for one national government to choose a peaceful internal social settlement with his challenger group is positively affected by the choice of neighboring governments to do the same with their own opposition. This feature leads to a joint determination of regional political regimes that depends on the interaction of the domestic factors of each country.

Importantly enough, the feedback effects associated to this interaction creates the possibility of multiple regional political regime equilibria in which, for the *same* domestic factors configuration, one may get both countries at peace or both countries in a civil war. Because of strategic complementarities in their domestic political incentives, countries in the same regional complex may end up in to very different situations for the same *observable* fundamentals.

From an empirical perspective, this feature highlights the importance of taking a full “regional perspective” of joint civil conflicts, and the role of feedback and expectation effects on the formation of regional clusters of civil wars. It may also explain why an approach looking only at countries as separate units subject to some exogenous diffusion process may miss a crucial interaction factor in the genesis of local civil conflicts. From a policy perspective, a fully endogenous “regional approach” highlights the crucial coordination role that regional institutions may have on national policies to avoid regional clusters of civil conflicts.

A third contribution of our analysis is to highlight how civil war clustering translate into institution building clustering at the regional level. More precisely, a government’s incentive to invest into *state capacity* (ie. the institutional capacity to credibly commit to a certain policy regime), is going to depend on the degree of institutional fragility of its neighbor, and the size of the potential spillover effects associated to civil conflicts. Large spillovers of civil conflicts abroad result into negative incentives to invest into domestic state capacity (ie. a negative institutional spillover), while interestingly small

regional conflict spillovers lead eventually a national government to invest more into its own level of state capacity as a defense mechanism to avoid a civil war regime at home (ie. a positive institutional spillover). This interesting feature of our model is supported by Braithwaite (2010) and McBride et al. (2011). More generally speaking, our analysis argues that the possible contagion of civil conflict favors a spatial clustering of state capacity institutions as well.

Finally, our model naturally provides a framework to investigate the rationale for external intervention by a government in a neighboring country. Such intervention may take different forms, going from international aid and institutional cooperation (ie. helping the other government to implement better institutions, to military assistance or intervention (ie. increasing the opportunity cost of conflict there). Again, we show that whatever the specific details of these different options, the contagion effect is nonlinear. A state can avoid contagion altogether when the civil conflict spillover is small enough. In doing so, it can even prevent a civil war from happening in a neighbor country. When the spillover is large enough, however, this may not be possible anymore.

The plan of the paper is the following. The next section examines the related literature. Section 3 introduces the market for violence, and defines the various feasible political regimes in the case of an isolated country. Section 4 extends naturally the analysis to the case of two countries interconnected by a common market for violence operating in their porous frontier. Section 5 extends our previous analysis to additional cross-border externalities: cross border ethnic groups and refugee flows to neighboring countries. Section 6 considers investment in state capacity as endogenous, and uncovers how spillovers of conflict translate into institutional spillover effects. Section 7 explores the ways one government may intervene to avoid a civil war in its neighbor to prevent the threat of contagion. In section 8 and 9, we discuss the model's predictions to the domestic, regional, and international responses to the rise of AQIM in Mali, of ISIL in Syria and Iraq, and the civil unrest in Morocco. Section 10 concludes.

## **2 Related literature**

Our paper relates to different strands of the literature. First, we connect to the very large literature on the country level determinants of civil conflicts (see Sambanis, 2002, and for instance Blattman and Miguel, 2010, for detailed reviews of the literature, and Besley and Persson, 2011, for a theoretical approach linking generally state capacity to conflicts).

Our focus on civil war and fragility clustering associated to cross-border contagion effects borrows from several literatures. For instance, there is a long standing tradition in political science that emphasizes the transnational dimension of civil conflicts (see Most and Starr, 1980; Starr and Most, 1983; Anselin and O'Loughlin, 1992; Ward and Gleditsch, 2002; Gleditsch, 2002, 2007; Braithwaite, 2005, 2006; Hegre and Sambanis,

2006; Black, 2013; Bara, 2014). In economics, Chauvet and Collier (2004) highlights the importance of cross border economic effects associated to fragility and shows that proximity to a low-income country under stress (LICUS) tends to lead to a loss of about 1.6 percentage points of economic growth. The development policy literature provides also ample discussions of the regional dimension of state fragility (see for instance for West Africa Vallings and Moreno-Torres, 2005, and Moreno-Torres and Anderson, 2004, or for the region of the Great Lakes OECD, 2004). Our emphasis on regional institutional interdependences in state building capacity connects to the notion of "regional security/war complexes" as expanded for instance in Lemke (2002); Buzan and Wæver (2003); Rubin (2002, 2006); Mincheva (2005) and Ansorg (2011) in the international security literature.<sup>5</sup>

Our micro-founded model of civil conflict spillovers relates to the literature focusing on the micro channels of cross-border contagion effects. For instance, the importance of cross-border ethnic networks in the diffusion of conflict has been highlighted by Gleditsch (2007); Buhaug and Gleditsch (2008); Forsberg (2008); Cederman et al. (2009); Salehyan (2011); Cederman et al. (2013); Bara (2014), and Weidmann (2015), while recently Bosker and de Ree (2014) estimated that ethnic links to a neighbor country at ethnic civil war increase the probability of an outbreak of ethnic civil war at home by 6 percentage points. Our modeling of the role of violent non-state actors and markets for war inputs in regional conflicts is consistent with Rubin (2001); Armstrong and Rubin (2005); Adamson (2005); Wolff (2010); DCAF and Geneva Call (2011); Cunningham et al. (2013, 2016) and with the fact that the cross-border proliferation of small arms is widely recognized as a major element of regional instability.<sup>6</sup> There is also a significant literature that indicates the establishment of refugee movements crossing borders as alternative vectors of diffusion of conflict in neighboring states (Adelman, 1998; Rufin, 1999; Salehyan and Gleditsch, 2006; Atzili, 2006; Salehyan, 2007; Rügger, 2013b).<sup>7</sup> Connected to our emphasis on non-state actors and markets for war inputs, Rügger (2013a) and Camarena (2016) provide recent evidence of how refugee camps may also extend the networks of rebel groups and enable the transnational diffusion of combatants, weapons and ideologies.

Our focus on the interaction between state capacity and conflict connects to the wide literature on state capacity building. With a narrow definition of state capacity as the capacity to raise taxes, Tilly (1985); Levi (1988) and Brewer (1989) argued that war was key in the development of European states. Conversely, Besley and Persson (2008, 2009, 2010) provide models of the investment in state capacity where the risk of a civil war is a negative determinant of state capacity.<sup>8</sup>

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<sup>5</sup>See also the recent book edited by Olowu and Chanie (2016).

<sup>6</sup>See for instance : <http://www.smallarmssurvey.org/publications/by-type/yearbook.html> for an analysis of changing trends in small arms from 2001-2010.

<sup>7</sup>Ansorg (2011) provides a good recent survey of the literature.

<sup>8</sup>Also see Sobek (2010) and Thies (2010) who argue that conflict undermines state capacity.

In our analysis, we consider state capacity as a general mechanism to formulate credible policies. To paraphrase McBride et al. (2011), we therefore abstract from distinguishing between the various concepts or dimensions which defines a government's ability to commit: the credibility of its promises, its good governance, the institutional structure of check-and balance and constraints on the executive, the state administrative capacity, and even the implicit bureaucratic norms and social capital. For our purpose, these terms can be used interchangeably as a general notion of state capacity. Many scholars have identified state capacity to be an important determinant of conflict, such as Fearon and Laitin (2003); Keefer (2008); Fjelde and De Soysa (2009); Braithwaite (2010); Hendrix (2010) and McBride et al. (2011). Several of these works include military capacity as an element of state capacity. Here, *state capacity* refers only to the government's credibility. *Military capacity* is considered as a separate dimension.

Finally, our discussion of external policy options to mitigate the emergence of regional fragility clusters connects to the international relations literature that argues that a state may improve its capacity through international audience costs. International agreements and the supervision of multilateral organizations is supposed to help countries signal their commitments to their own population. The argument dates back at least to Keohane (1984). Mansfield and Pevehouse (2006) show that international organizations help governments signal their commitment to democratization, and Böhnke and Zürcher (2013) that aid helps support a state's legitimacy.<sup>9</sup> Also, our discussion on military intervention to prevent a civil conflict in a neighbor country, is consistent with the findings of Kathman (2010, 2011) showing that a state may help a neighbor quell a rebellion, in order to avoid a possible contagion effect.

### 3 Deterrence, redistribution and the market for violence

We consider an economy composed of two groups, indexed by  $G$  and  $C$ , for Government and Challenger, respectively. The model assumes that each group behaves as a unitary agent. The two groups may contest a resource  $R$  and engage respectively  $M_G \geq 0$  and  $M_C \geq 0$  into the conflict. Following Azam (2006), the technology of conflict is described by the probability of the government being overthrown:<sup>10</sup>

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<sup>9</sup>Bird (2002) also discusses the role of the IMF's conditionality as a commitment mechanism for countries under IMF programs.

<sup>10</sup>Note that this way of modeling the conflict technology is akin to the S-shaped probability function assumed by Skaperdas (1992), albeit with discontinuities. Given this warfare technology, the government can either fight with the excluded group, threaten to fight or pay the price of peace, in line with Azam (2001).

$$\begin{aligned}
\Pi &= 1, \text{ if } \gamma M_C \geq M_G \text{ and } M_G < \bar{M} \\
&= \pi, \text{ with } 0 < \pi < 1, \text{ if } \gamma M_C \geq M_G > \bar{M} \\
&= 0, \text{ if } \gamma M_C < M_G
\end{aligned} \tag{1}$$

The parameter  $\gamma$  represents the fighting efficiency of group  $C$  relative to the government.  $C$  is more efficient at fighting than  $G$  if  $\gamma > 1$ , and less efficient otherwise. This parameter characterizes the warfare technology, more favorable to the government or to a guerrilla, the terrain conditions, the degree of political mobilization, or the morale in the army. The parameter  $\bar{M}$  captures a scale effect in the defense technology of the government. A minimum defense expenditure is required, to avoid being ousted by any challenger. The parameter  $\pi$  captures the probability that conditional on there being a rebellion, it will be successful.  $\pi$  captures therefore a certain degree of contextual effectiveness of the rebel group once in conflict. It can be affected by conditions of the warfare technology and notably the access capacity of the rebels to weapons and mercenaries.

We consider that the technology of conflict in each country between rebels and the government is an explicit function of war inputs provided by non-state actors (landlords, terrorist organizations, organized crime, weapon trafficking and intermediaries). Such agents, so-called “problems without passports” (Picciotto et al., 2005), thrive at the porous frontier between countries and are beyond the control of governments.<sup>11</sup> More precisely, we pose :

$$\begin{aligned}
\pi(W) &= \pi_0 + (1 - \pi_0)(1 - e^{-W}) \\
&= 1 - (1 - \pi_0)e^{-W} \\
\text{with } W &= \left( \sum_{i=1}^{i=n} w_i \frac{\sigma-1}{\sigma} \right)^{\frac{\sigma}{\sigma-1}} \text{ and } \sigma > 1
\end{aligned} \tag{2}$$

where  $w_i$  is an input provided by a non-state actor  $i \in (1, \dots, n)$  and  $W$  is an aggregate index of conflict efficiency. We assume that non-state actors are in monopolistic competition on the market for war inputs, each of them producing one differentiated input, with the same technology with marginal cost  $c$  and a fixed cost of entry  $F$ . We normalize  $c = \frac{\sigma-1}{\sigma}$  for convenience.

When a rebel group goes to conflict against his government, he can buy war inputs to improve his technology of war against the government. This feature reflects the weapon

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<sup>11</sup>Wolff (2010) and DCAF and Geneva Call (2011) describe them as important facilitators of cross-border conflict spillovers. For a recent database on non-state actors see Cunningham et al. (2013, 2016).

trafficking industry that typically develops in areas ("porous borders") where weakly institutionalized state cannot impose their monopoly of violence and order.

Both  $G$  and  $C$  can allocate the labor endowments  $N_G$  and  $N_C$  between production and conflict. The output levels of the two groups are very stylized:

$$Y_G = N_G - M_G \text{ and } Y_C = a(N_C - M_C)$$

$N_G$  and  $N_C$  are the resources available to each group, and  $M_G$  and  $M_C$  the resources they respectively invest into conflict. When not overthrown, the government remains in control of the contestable resource  $R$ . When it loses the conflict, the control of the resource  $R$  shifts to the other group. It may account for instance for mineral resources, whose produce accrues to the group in power. The parameter  $a$  represents the productive efficiency of group  $C$  relative to the government.  $C$  is more efficient at producing if  $a > 1$ , and less efficient otherwise.  $a$  depends on the relative productivity of each group, but also on the relative prices they face, when the government and the challenger face different trade shocks.

The game takes place in four stages:

1. The government first engages irreversibly  $M_G \geq 0$ , and offers the other group a *social contract*, which consists of a transfer  $T \geq 0$  conditional on the other group not entering into conflict:  $\Pi = 0$ , which comes down to  $\gamma M_C < M_G$ .
2. The challenger engages  $M_C \geq 0$ .
3. If  $\gamma M_C \geq M_G$ , a civil war erupts. When a civil war occurs,  $n$  non-state actors decide to enter to propose war inputs  $w_i$  and compete monopolistically. The rebels buy the war inputs that maximize their expected payoffs.
- 3'. Otherwise, peace prevails, the government transfers  $T$  with probability  $\theta$  (for now, given exogenously).  $\theta$  measures the capacity of the state to undertake credible commitments.
4. Production and consumption take place, and the two groups derive the following payoffs:

$$\begin{cases} U_G = N_G - M_G + (1 - \Pi)R - \theta \chi T \\ U_C = a(N_C - M_C) + \theta \chi T + \Pi R - (1 - \chi) \sum_i p_i w_i \end{cases}$$

$\chi$  is an indicator of peace. It is equal to 0 if the two groups fight, and to 1 if they are at peace. These payoffs capture in a reduced form the essence of the redistributive stakes for civil conflict in various developing countries endowed with natural resources which are generally under the control of the state. Note as well that  $\theta$ , our operational notion of state capacity, defined as the credibility of the state's promises of transfers, captures only one dimension of what economists describe as state capacity. In particular

we do not account for other dimensions such as fiscal or legal capacity, as for instance emphasized by Besley and Persson (2009) and their impact on the economic incentives of the two groups.

The government is subject to a budget constraint (BC): it can never credibly promise more than what it produces in times of peace:

$$N_G + R - M_G - T \geq 0 \quad (\text{BC})$$

Let us now turn to the incentive constraint of the challenger. To simplify we assume that the minimum deterrence level  $\bar{M}$  is small enough that the government always has an incentive to invest  $M_G \geq \bar{M}$ .<sup>12</sup> When it expects a conflict, this reduces the probability to lose the resource from 1 to  $\pi$ . Investing in the same military capacity level also helps achieve a peaceful outcome and deter an unruly group from contesting  $R$ .

It is straightforward to see that if the challenger accepts the contract in stage 2, then it does not put any resource in the conflict and  $M_C = 0$ . Under conflict, the problem of the rebel group requires more careful consideration. It chooses its demand for war inputs  $w_i$  to maximize  $a(N_C - M_G/\gamma) + \Pi(W)R - \sum_i p_i w_i$ , where  $p_i$  is the price of the war input  $w_i$ . This program yields the demand for each war input supplied by a non-state actor

$$w_i = w(p_i) = W \left( R(1 - \pi_0)e^{-W}/p_i \right)^\sigma$$

Given the symmetry of the problem, we consider symmetric Nash equilibria in monopolistic prices: a given non-state actor chooses his optimal price to maximize

$$\max_{p_i} w(p_i)(p_i - c) - F$$

whose solution gives the equilibrium price  $p_i = p = \frac{\sigma}{\sigma-1}c = 1$ . From this we obtain the input demand  $w_i = w = W \left( R(1 - \pi_0)e^{-W} \right)^\sigma$  and the efficiency index of war  $W = n^{\frac{\sigma}{\sigma-1}} w = \ln(R(1 - \pi_0)) + \ln(n)/(\sigma - 1)$ . The equilibrium probability of a rebellion being successful is

$$\pi(W(n)) = 1 - n^{-\frac{1}{\sigma-1}}/R \quad (3)$$

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<sup>12</sup>In the case of a civil war, the government maximizes  $N_G - M_G + (1 - \Pi)R$  with  $\Pi = 1$  if  $M_G < \bar{M}$ , and  $\Pi = \pi(W(n^*))$  otherwise, where  $n^*$  is the equilibrium number of non-state actors entering the sector. In the case of peace, the government maximizes  $N_G - M_G + R - \theta T$  subject to the incentive constraint. As long as  $\min_{n^*} (1 - \pi(W(n^*)))R \geq \bar{M}$ , it is worth investing  $M_G \geq \bar{M}$  in both cases and even in the case of peace, the government invests at least  $\bar{M}$  in the conflict, so as to deter a rebellion. Given that in all equilibrium configurations (0, 1 or 2 countries in civil wars)  $n^*$  takes a finite number of potential values, the expression  $(1 - \pi(W(n^*)))R$  is bounded from below and  $\min_{n^*} (1 - \pi(W(n^*)))R \geq \bar{M}$  can be satisfied when  $\bar{M}$  is small enough.

The likelihood of a rebellion being successful increases with the number of non-state actors  $n$  and the size of the contested resource  $R$ .<sup>13</sup> Under conflict, the expected utility of the rebels can therefore be written:

$$U_C = a(N_C - \frac{M_G}{\gamma}) + R - \Gamma(n)$$

where  $\Gamma(n) = n^{-\frac{1}{\sigma-1}}(1 + \ln(R(1 - \pi_0)) + \ln(n)/(\sigma - 1))$  is a decreasing function of  $n$ .<sup>14</sup>

The challenger accepts the social contract iff its utility under the social contract with uncertain transfer exceeds its expected utility in a civil war, eg.

$$\theta T \geq R - \Gamma(n) - \alpha M_G \quad (\text{IC})$$

The left-hand side of this condition is the transfer expected from the government if it accepts the contract. The right-hand side of this condition is the expected gain of civil war. The parameter  $\alpha = a/\gamma$  represents the comparative advantage of the challenger at producing vs. fighting. Intuitively,  $\alpha$  is a proxy for the opportunity cost of conflict for group  $C$ , in terms of the foregone production. The transfer necessary to ensure that  $C$  accepts the contract is lower for higher values of  $\alpha$  and  $M_G$ , and lower values of  $\pi$  and  $R$ . On the one hand, the amount of resources  $R$  up for grab increases the temptation of conflict, and the more likely a rebellion is to succeed, the more costly it is for the government to discourage it.<sup>15</sup> On the other hand, the higher the opportunity cost of conflict  $\alpha$  and the resources invested in warfare technology  $M_G$ , the less tempting a conflict is, and the less costly it is for the government to discourage it.

Jointly, (BC) and (IC) define the set of feasible contracts. The optimal *peaceful* contract for the government results from the following program:

$$\begin{aligned} & \max_{M_G, T} N_G - M_G + R - \theta T \\ \text{s.t. } & \begin{cases} N_G - M_G + R - T \geq 0 & (\text{BC}) \\ \theta T \geq R - \Gamma(n) - \alpha M_G & (\text{IC}) \end{cases} \end{aligned}$$

This is a simple linear programming problem. It has the following solution:

**Lemma 1** *Assume a supply of  $n$  war inputs, and define*

$$\bar{\theta}(n, \alpha) = \frac{R - \Gamma(n) - \alpha \bar{M}}{R + N_G - \bar{M}}. \quad (4)$$

<sup>13</sup>We assume that  $R$  is large enough for such probability to be always positive ( $R \geq 1$  is a sufficient condition for that).

<sup>14</sup>Formally, it is so iff  $n^{-\frac{1}{\sigma-1}}R(1 - \pi_0) > 1$ . Such a restriction ensures that war inputs are useful (ie.  $W(n) > 0$ ) and  $\pi(W(n)) > \pi_0$ .

<sup>15</sup>This comes from the fact that  $R - \Gamma(n) = \max_{w_i} \Pi \left( \left( \sum_{i=1}^n w_i \frac{\sigma-1}{\sigma} \right)^{\frac{\sigma}{\sigma-1}} \right) R - \sum_i w_i$  and the envelope theorem applied to the parameter  $R$ .

The optimal peaceful contract for the government is given by:

1. If  $\alpha < 1$  and  $\theta \geq \bar{\theta}(n, \alpha)$ , then  $M_G = \bar{M}$  and  $T = (R - \Gamma(n) - \alpha\bar{M})/\theta$ .
2. If  $(R - \Gamma(n))/(R + N_G) \leq \alpha < 1$  and  $\theta < \bar{\theta}(n, \alpha)$  then  $M_G = (R - \Gamma(n) - \theta(R + N_G))/(\alpha - \theta)$  and  $T = (\alpha(R + N_G) - R + \Gamma(n))/(\alpha - \theta)$ .
3. If  $\alpha > 1$  then  $M_G = \max[\bar{M}, (R - \Gamma(n))/\alpha]$  and  $T = 0$ .

Both the opportunity cost for the government and the benefit for the rebel group of a unit of transfer  $T$  is  $\theta$ , because the government may renege with a probability  $1 - \theta$ . The marginal opportunity cost of military spending is 1 for the government, but matching an increase of one unit of military spending  $M_G$  would cost the rebel group  $\alpha$ . To deter a rebellion, the government would therefore rather resort to transfers when  $\alpha < 1$ , and to military spending when  $\alpha > 1$ .

When  $\alpha < 1$ , the government may not be in a position to credibly replace all military spending by a transfer: it cannot commit beyond the budget constraint (BC). When the state capacity  $\theta$  is high enough (eg.  $\theta \geq \bar{\theta}(n, \alpha)$ ), then any unit of military spending above the minimum  $\bar{M}$  can be advantageously replaced by  $\alpha$  unit of transfer. When the state capacity is not high enough, the state would like to resort to transfers instead of military spending, but it cannot promise transfers beyond its resources.

Finally, notice that for  $\alpha < (R - \Gamma(n))/(R + N_G)$  and  $\theta < \bar{\theta}(\alpha)$ , there is no feasible contract that can allow the government to achieve a peaceful outcome.

Lemma 1 conveniently defines three peaceful regimes. Regime 1 corresponds to a *redistributive* state that ensures peace, relying on a transfer to the other group, eg.  $T > 0$  and without having recourse to military deterrence. Thus military spending is set at its minimum, eg.  $M_G = \bar{M}$ . This regime under peace is optimal when the opportunity cost of conflict  $\alpha$  of the rebel group is low enough (eg.  $\alpha < 1$ ) and the degree of credibility  $\theta$  of the government is large enough (eg.  $\theta \geq \bar{\theta}(\alpha)$ ). Regime 2 corresponds to a *repressive* state that relies on both the transfer, eg.  $T > 0$ , and military spending to deter a rebellion, eg.  $M_G > \bar{M}$ . It is optimal when the credibility of the government is weak and the opportunity cost of conflict  $\alpha$  of the rebel group is low enough (eg.  $\pi R/(R + N_G) \leq \alpha < 1$  and  $\theta < \bar{\theta}(\alpha)$ ). Finally regime 3 can be described as a *praetorian* regime,<sup>16</sup> relying exclusively on force, eg.  $T = 0$  and  $M \geq \bar{M}$ . It is optimal when the rebel's opportunity cost is high (eg.  $\alpha > 1$ ).

To avoid a tedious taxonomy discussion, in the sequel we will focus on the case  $\alpha < 1$  where the optimal peaceful social contract is a redistributive or a repressive regime. The frontier separating redistribution and repression, when (BC) becomes binding, is characterized by the frontier  $\theta = \bar{\theta}(\alpha)$ .  $\bar{\theta}$  decreases with  $\alpha$  and  $\bar{M}$  and

<sup>16</sup>We use here the terminology of Azam (2006), and do not repeat his discussion of the praetorian regime.

increases with  $n$  and  $R$ . The fact that  $\bar{\theta}$  decreases with  $\alpha$  illustrates the fact that in that region both the ability for the government to commit and the opportunity cost of fighting are favorable to a redistributive solution. A higher  $\theta$  may compensate for a lower  $\alpha$ , and reciprocally. Similarly, an increase in the minimum deterrent military capacity  $\bar{M}$  of the government tends to favor the redistribution regime. On the other hand, an increase in the contested stakes  $R$  of the conflict reduces the scope for a redistributive regime as a peaceful solution, in line with the evidence in Bazzi and Blattman (2014). Finally, an increase in the number of non-state actors  $n$  improves the war technology of the rebel group, and makes it more difficult to reach an optimal redistributive peaceful contract.<sup>17</sup>

To determine whether we are in a peaceful regime or that civil war emerges, we compute the indirect payoffs of the government in the different regimes. These are given as follows:

1. [Redistributive regime]  $V_G = N_G + \Gamma(n) - (1 - \alpha)\bar{M}$
2. [Repressive regime]  $V_G = (1 - \theta) \frac{\alpha(N_G + R) - (R - \Gamma(n))}{\alpha - \theta}$
3. [Prætorian regime]  $V_G = N_G + R - M_G$
4. [Civil war]  $V_G = N_G - \bar{M} + n^{-\frac{1}{\sigma-1}}$

A simple comparison of the payoffs reveals that a peace regime is always better than civil war for the government when this is implemented either as a redistributive regime or as a prætorian regime. However, it may not be always the case that the government prefers a repressive regime to civil war. It prefers civil war iff

$$\theta < \underline{\theta}(n, \alpha) = \frac{(1 - \alpha)(R + \bar{M} - n^{-\frac{1}{\sigma-1}}) - \bar{M} + n^{-\frac{1}{\sigma-1}} - \Gamma(n)}{(1 - \alpha)(N_G + R) - \bar{M} + n^{-\frac{1}{\sigma-1}} - \Gamma(n)} \quad (5)$$

Assuming that  $n$  is large enough (ie.  $n\sigma F > 1$ )<sup>18</sup>, the threshold function for a civil war rather than a repressive state declines with  $\alpha$  and  $\bar{M}$ , and increases with  $n$  and  $R$ . A higher ability for the government to commit and a larger opportunity cost of fighting help reaching a peaceful solution. A larger government's military advantage makes it also easier to achieve peace. As well, in line with the literature emphasizing the role of "incentives" or "greed", larger civil conflict stakes makes it less likely to get the peaceful outcome more difficult to achieve. Finally, the larger the supply of war inputs to rebels, the more likely a civil war is to prevail.

The following proposition summarizes this discussion:

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<sup>17</sup>Notice that as a result, the interpretation of  $\alpha$  is slightly more tricky. Indeed, the opportunity cost is affected by the inputs available. To be more precise, we should speak of  $\alpha$  as a rebel group's *propensity for conflict*. To simplify the discussion, we will dispense with such a distinction.

<sup>18</sup>This will always be the case at a free entry equilibrium number in non-state actors when  $R$  is large enough (see footnote 10).

**Proposition 1** For a given available supply of  $n$  war inputs,

1. [redistributive regime] if  $\alpha < 1$  and  $\theta \geq \bar{\theta}(n, \alpha)$  then  $M_G = \bar{M}$ ,  $M_C = 0$ ,  $T = (R - \Gamma(n) - \alpha\bar{M})/\theta$  and  $V_G = N_G + \Gamma(n) - (1 - \alpha)\bar{M}$ .
2. [repressive regime] if  $(R - \Gamma(n))/(R + N_G) \leq \alpha < 1$  and  $\underline{\theta}(n, \alpha) \leq \theta < \bar{\theta}(n, \alpha)$ , then  $M_G = (R - \Gamma(n) - \theta(R + N_G))/(\alpha - \theta)$ ,  $M_C = 0$ ,  $T = (\alpha(R + N_G) - R + \Gamma(n))/(\alpha - \theta)$  and  $V_G = (1 - \theta)(\alpha(N_G + R) - R + \Gamma(n))/(\alpha - \theta)$ .
3. [praetorian regime] if  $\alpha \geq 1$ , then  $M_G = \max[\bar{M}, (R - \Gamma(n))/\alpha]$ ,  $M_C = 0$ ,  $T = 0$  and  $V_G = N_G + R - M_G$ .
4. [civil war] if  $\theta < \min[\underline{\theta}(\alpha), \bar{\theta}(\alpha)]$ , then  $M_G = \bar{M}$ ,  $M_C = \gamma\bar{M}$ ,  $T = 0$  and  $V_G = N_G - \bar{M} + n^{-\frac{1}{\sigma-1}}$ .

Beyond the analysis of the previous Lemma, notice that civil war erupts when state capacity  $\theta$  and the opportunity cost of conflict  $\alpha$  are low. When state capacity increases (ie. when the government is increasingly able to commit to transfer resources to the other group), civil war can be more easily avoided. When  $\alpha$  is larger, however, deterrence finds some bite against transfers and, thanks to a mix of deterrence and redistribution, the government implements peace through a repressive regime when  $\theta$  takes intermediate values. As  $\theta$  gets larger, deterrence becomes however unnecessary and a transfer to the other group is all that is needed to avoid the challenger to invest into conflict. Finally, the supply of war inputs makes a redistributive regime harder to achieve relative to a repressive regime or civil war, and a repressive regime harder to achieve than civil war. In other words, the two functions  $\theta = \underline{\theta}$  and  $\theta = \bar{\theta}$  shift upwards. Fig. 1 illustrates Prop. 1.

Also notice that when  $\theta$  is low, starting from an initial state of civil war, an increase in  $\alpha$  allows the state to avoid a civil war and to achieve peace through a repressive regime. As  $\alpha$  grows yet larger, the government switches to a praetorian regime. It does not need to share its resource with the other group, whose opportunity cost of conflict is too high to credibly threaten the government.

## 4 Regional contagion of civil conflicts and the porous frontier

In this section, we explicitly consider how non-state actors can be a natural source of regional instability spillovers between countries that cannot fully control their territory. Taking an industrial organization perspective, we indicate here how the market for violence displays a market size effect.

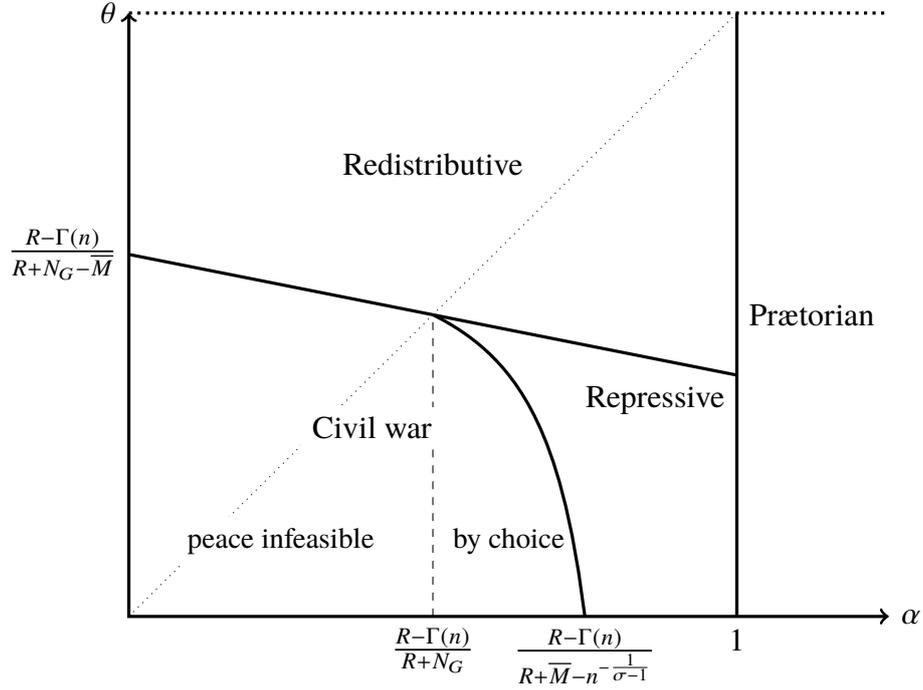


Figure 1: Typology of equilibria

Consider two countries  $A$  and  $B$ . Whenever we need to differentiate the two countries, we add an  $A$  or a  $B$  superscript to any variable. Conversely, when we wish to speak of a generic situation, we will omit the superscript. This should leave no place for ambiguities.

#### 4.1 A market size effect in the market for violence

To discuss the supply of war inputs, a convenient assumption is that of free entry in the market. This determines an equilibrium number of non-state actors, each supplying a unique war input, in the two situations we wish to compare, namely when rebellion touches one only country or both countries simultaneously. To simplify notations,  $n$  will designate by default the equilibrium number of non-state actors when one country is in a civil war, so respectively  $n^A$  and  $n^B$  for countries  $A$  and  $B$ .  $n^{AB}$  will designate the equilibrium of non-state actors in the *porous frontier* when both countries are in a civil war.

Consider first the case of one country in isolation. The free entry condition in such a case can be written  $w(p - c) = F$ , which yields  $w = \sigma F$ . To ensure that free entry provides an equilibrium, the contestable resource  $R$  must be large enough, eg.  $R(1 - \pi_0) > e^{\sigma F}$ . We assume that this is the case thereafter. Going back to

the expression of the efficiency index, the equilibrium number of war inputs  $n$  is then uniquely determined by the equation

$$n^{\frac{\sigma}{\sigma-1}} \sigma F = \ln(R(1 - \pi_0)) + \frac{\ln(n)}{\sigma - 1} \quad (6)$$

Thanks to the implicit function theorem, we can write  $n$  as a function  $n = n(R, F, \pi_0)$ , which is increasing in  $R$ , and decreasing in  $F$  and in  $\pi_0$ .<sup>19</sup> Notice that in equilibrium,  $\Gamma(n) = n^{-\frac{1}{\sigma-1}} + \sigma F n$ , which also simplifies the expression of  $\theta$ .

Suppose now our setting with two countries  $A$  and  $B$  with both rebel groups engaged in a civil war with their respective government; In such a case, the non-state actors sell their war inputs to both groups through the porous frontier. The supply of war inputs is now determined by the free entry condition in the porous frontier. In equilibrium,  $n^{AB}$  is therefore given by:

$$(n^{AB})^{\frac{\sigma}{\sigma-1}} \sigma F = \sum_i \ln(R^i(1 - \pi_0^i)) + \frac{2 \ln(n^{AB})}{\sigma - 1} \quad (7)$$

Comparing this to Eq. 6 shows that  $n^{AB}$  is larger than both  $n^A$  and  $n^B$ .<sup>20</sup> When both countries are in conflict, there is a larger demand for war inputs and therefore more entry of non-state actors to provide such inputs. A rebellion is cheaper than if only one country is in a civil war. The size effect on the war market creates therefore a channel of regional diffusion of civil conflict across countries with weakly institutionalized state structures.

## 4.2 Regional contagion of civil conflict

We are now in a position to discuss the issue of regional clustering of political regimes and civil wars. To ensure that our setup allows for contagion, we suppose that the following condition holds in both countries, so that either country may be the source of the contagion:

$$\alpha < \frac{R - \Gamma(n^{AB})}{R + \bar{M} - (n^{AB})^{-\frac{1}{\sigma-1}}} \quad (A2)$$

To clarify,  $R$  and  $\bar{M}$  are country-specific. The framework is therefore adequate to examine a wealth of symmetric or asymmetric country dyads. The countries may be resource-rich (high  $R$ ) or not, and they also may display different military technology (materialized by different levels of  $\bar{M}$ ). Let us introduce the following intuitive notations:

<sup>19</sup>When  $R$  is large enough (ie.  $\ln R(1 - \pi_0) > \frac{\ln(\sigma F)}{\sigma-1} + (\sigma F)^{-\frac{1}{\sigma-1}}$ ) it is easy to see that  $n(R, F, \pi_0) \sigma F > 1$ .

<sup>20</sup>Both sides of both equations are increasing functions of  $n$ . The left-hand side is convex, and both right-hand sides are concave. For any value of  $n \geq 1$ , the right-hand side of Eq. 7 is larger than that of Eq. 6. This means that  $n^{AB}$  is larger than both  $n^A$  and  $n^B$ .

$$\begin{cases} \underline{\theta}_W = \min[\bar{\theta}(n^{AB}, \alpha), \underline{\theta}(n^{AB}, \alpha)] & \bar{\theta}_W = \bar{\theta}(n^{AB}, \alpha) \\ \underline{\theta}_P = \min[\bar{\theta}(n, \alpha), \underline{\theta}(n, \alpha)] & \bar{\theta}_P = \bar{\theta}(n, \alpha) \end{cases}$$

They account for the respective thresholds for a civil war and for a redistributive regime, with a bad and a good neighbor. Notice that if  $\alpha \leq (R - \Gamma(n^{AB})) / (R + N_G)$ , then  $\underline{\theta}_W = \bar{\theta}_W$ , and if  $\alpha \leq (R - \Gamma(n)) / (R + N_G)$ , then  $\underline{\theta}_P = \bar{\theta}_P$ . Since the functions  $\underline{\theta}(\cdot)$  and  $\bar{\theta}(\cdot)$  are both decreasing in the number of war inputs,  $\bar{\theta}_W > \bar{\theta}_P$  and  $\underline{\theta}_W > \underline{\theta}_P$ : a civil war abroad raises the level of state capacity necessary to implement a redistributive state, as well as the state capacity necessary to avoid a civil war. Hence a country which would have been at peace without a bad neighbor may be forced into a civil war, and a redistributive regime may be turned into a repressive one. Possibly, when the spillover is large enough, eg. when  $\bar{\theta}_P < \underline{\theta}_W$ , a redistributive regime may even be turned into a civil war by a nearby conflict.

Fig. 2 shows the different political regimes for a given country depending on whether or not the neighboring country is in civil war or not. The full lines characterize the different regimes when the neighbor is not at war (with a supply of  $n$  war inputs), while the dashed lines reflect the limits of the same regimes when the neighbor is facing a civil conflict (with a supply of  $n^{AB}$  war inputs). The figure illustrates clearly that a bad neighbor expands the zone of parameters  $(\alpha, \theta)$  under which there is institutional fragility (whether by moving from repressive regime towards having civil war or moving from a redistributive regime to a repressive regime).

From this it follows:

- Proposition 2**
1. *Country A is at peace while B is at war if and only if  $\theta^A \geq \underline{\theta}_W^A$  and  $\theta^B < \underline{\theta}_P^B$  (and reciprocally).*
  2. *Regional peace is an equilibrium when  $\theta \geq \underline{\theta}_P$  in both countries.*
  3. *Regional conflict is an equilibrium when  $\theta < \underline{\theta}_W$  in both countries.*

Since a bad neighbor may improve the chances of a successful rebellion, civil war in any country may diffuse over to the whole region. A weakly institutionalized country, such that  $\theta < \underline{\theta}_P$ , cannot escape a civil war, regardless of what happens in the neighboring countries. Conversely, if the government has a high ability to commit, such that  $\theta \geq \bar{\theta}_W$ , it is immune to contagion from a civil war in a neighboring country. Therefore, civil war and peace may only coexist in a single region for very disparate abilities to commit. When countries have comparable levels of state capacity, clusters of conflict and peace are likely to appear (item 1 of the proposition).

For comparable levels of state capacity, the two countries are either both at peace (item 2) or both in a civil war (item 3). The negative spillovers of a neighboring civil war are felt at intermediate levels of institutional development, eg. when a country is

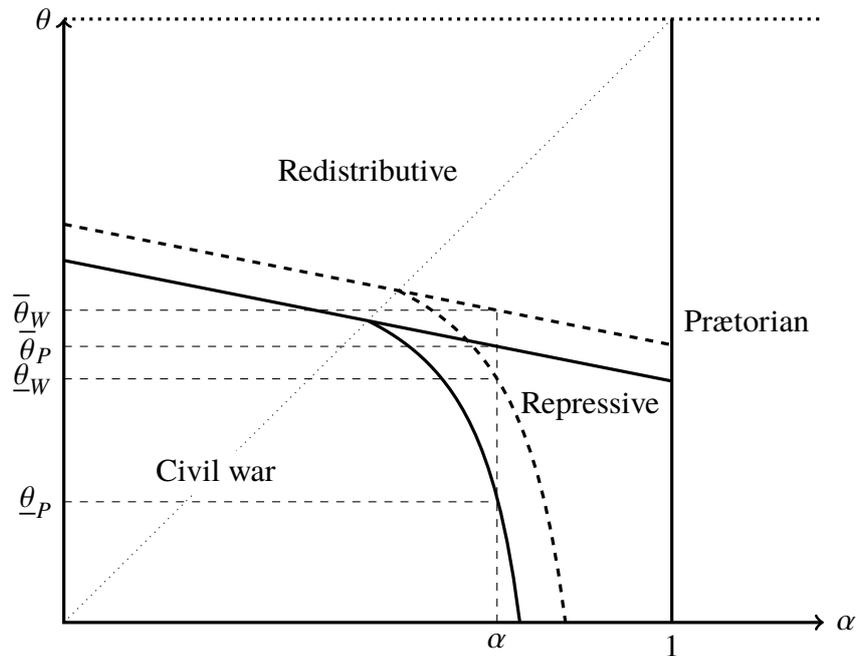


Figure 2: Contagion due to size effect in the war market. Full line: without spillovers, Dashed line: with spillovers.

such that  $\underline{\theta}_P \leq \theta < \underline{\theta}_W$ . In that range, a country is vulnerable and can be destabilized by a neighboring conflict. With a peaceful neighbor, the country will manage to remain in peace, while with a neighbor enduring a civil conflict, the country will follow suite and get itself also into conflict. The market size effect associated to non-state actors creates a cross border spillover and a strategic complementarity between the political choices of regimes across governments. Because of this, for the same observable regional fundamentals, multiple policy regimes may arise.

Interestingly, which type of equilibrium emerges (all peaceful or all in internal strife) depends on how the different countries coordinate their expectations about the institutional stability of each other. Under pessimistic expectations about each other's capacity to implement a peaceful regime within its national territory, both governments may be ready to accept civil war domestically. Conversely under optimistic expectations about the institutional stability of the region, each country may succeed into avoiding civil conflict. Fig. 3 illustrates the proposition.

While the model cannot account for which regional equilibrium might emerge, it does account for the pattern of clustering of civil wars. It also suggests that there are parameter configurations for which the institutional stability of a region is highly sensitive to small extrinsic factors not directly related to observable economic fundamentals. Indeed the possibility of multiple equilibria when both countries display intermediate values of

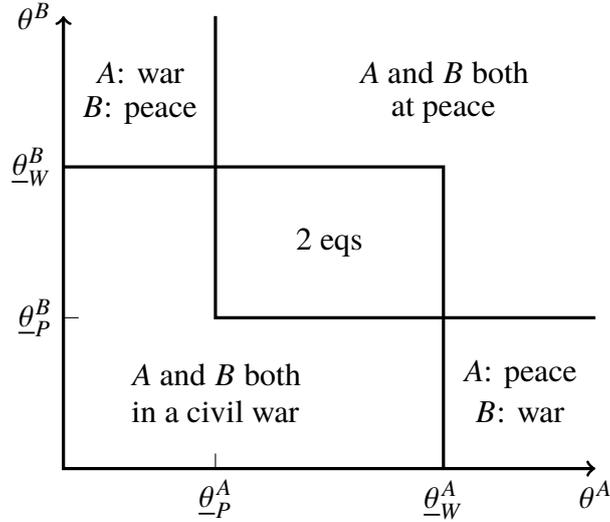


Figure 3: Regional equilibria with spillovers

institutional development suggests some considerations for policy. First it might be difficult to predict ex-ante the regime in which countries may end up. Second, a specific regional situation at a given point of time may be fragile to shifts in expectations by the different regional agents and lead quickly to a much different situation through diffusion effects. Third, international exchange of information and communication at the governmental level can be useful to coordinate expectations on the peaceful regional equilibrium.

The previous discussion focuses on civil war vs. peace. A more careful consideration of peaceful equilibria, namely redistributive and repressive, uncovers a few additional mechanisms. Notice as well that when the regional spillovers are small, eg. when  $\bar{\theta}_P \approx \bar{\theta}_W > \underline{\theta}_W$ , then whenever there are multiple equilibria, the peaceful equilibrium must be repressive. The choice is between an equilibrium where both countries are in their own civil war, and an equilibrium where both countries are deterring conflict through demonstrations of police strength. On the contrary, when spillovers are large, eg. when  $\bar{\theta}_P < \underline{\theta}_W$ , then the peaceful equilibrium does not necessarily entail repression: indeed when the state capacity  $\theta \geq \bar{\theta}_P$ , the peaceful equilibrium will be redistributive.

Interestingly, this analysis yields yet one more type of diffusion of fragility. When  $\underline{\theta}_W, \bar{\theta}_P \leq \theta < \bar{\theta}_W$ , then a country which, alone, would have been in a redistributive regime, is forced into a repressive regime by a bad neighbor.

To summarize, an open conflict may diffuse across borders. Conflict may also diffuse by lack of coordination, even though the region could otherwise have been at peace. Finally, conflict may induce repression in a neighbor country. Later on, when we allow the state to invest in its own capacity, yet another type of spillovers (ie. institutional)

will emerge.

**Comparative statics.** Economic shocks in one country may have repercussions for the region's stability. For instance, consider a country whose institutions are good enough to immunize it against contagion ( $\theta \geq \underline{\theta}_W$ ). An increase in the price of the resource controlled by the government  $R$  would result in a higher  $\underline{\theta}_W$ , thus possibly taking away that country's immunity. The country would find itself vulnerable to contagion, but not necessarily a source of instability itself ( $\underline{\theta}_P \leq \theta < \underline{\theta}_W$ ). A further increase in the value of  $R$  would however possibly destabilize the country. In that case, the country would become a source of instability for the region ( $\theta < \underline{\theta}_P$ ).

A change in the government's military incumbent advantage  $\overline{M}$  has the converse effect. Such an effect may derive from several sources. The military technology to quell rebellions may be made cheaper, or there may be externalities from the state's defense expenditures. Foreign military assistance may also provide a disproportionate advantage to a government facing rebels. A restless group may be discouraged to start a civil war if the government gains a higher military advantage  $\overline{M}$ . An increase in  $\overline{M}$  may therefore turn a country from a source of instability for the region ( $\theta < \underline{\theta}_P$ ) into a country where conflict could happen if conflict spilled over from outside ( $\underline{\theta}_P \leq \theta < \underline{\theta}_W$ ), and even further into a country immune to contagion ( $\theta \geq \underline{\theta}_W$ ).

## 5 Extensions with other cross-border externalities

The previous section highlighted a simple mechanism through which political regimes interact at the regional scale: a market size effect for war inputs provided by non-state actors located at porous borders. Our framework can easily be extended to take into account two other often-cited types of externalities: rebel groups that take refuge in a neighboring country, and cross-border flows of refugees who flee persecution and who impose pressures on local resources in the host country.

### 5.1 Cross-border rebel networks

A factor often emphasized as a major driver of regional instability is the existence of cross-border ethnic groups and communities whose territories cross over *porous borders* that cannot be effectively monitored by national governments (Checkel, 2014).<sup>21</sup> Through the use of their cross-border social networks, members of a rebel group in a given country may then enjoy substantial coordination, protection and support from fellow members located on the other side of the border. This feature naturally creates an important channel of regional spillovers of conflict across weakly institutionalized states. Moreover when such cross-border rebel connections interact with other conflict

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<sup>21</sup>See also Isoke (2015) for a case study on Uganda and Rügger (2013a) for a survey.

spillovers, one may get a destabilization spiraling effect in the whole region that would not have happened absent the existence of these networks.

One simple way to capture this in our model is to assume that the challenger group  $C^A$  in country  $A$  is part of the same ethnic group as the challenger group  $C^B$  in country  $B$ , and that the groups can decide jointly their actions across national borders. In particular the two groups can freely hire resources from the other side of the border and share the spoils jointly on the captured resources in case of success. Given this and the free mobility of resources across the network, the opportunity cost of conflict for a challenger group in a given country is then simply given by the smallest opportunity cost of conflict across the two countries  $\alpha = \min[\alpha^A, \alpha^B]$ . To fix ideas assume without loss of generality that  $\alpha^A < \alpha^B$ . Then the existence of a cross-border ethnic network between country  $A$  and  $B$  clearly creates a negative spillover from country  $A$  on country  $B$ . Specifically when country  $B$  institutional capacity  $\theta^B$  is such  $\underline{\theta}_W^B < \theta^B < \min[\underline{\theta}^B(n^{AB}, \alpha^A), \bar{\theta}^B(n^{AB}, \alpha^A)]$ , the existence of a cross-border rebel network brings that country  $B$  in open conflict, which would not have happened without the existence of the cross-border network. Interestingly this outcome may occur when the neighboring country  $A$  would have had enough institutional capacity to prevent a domestic civil conflict with members of his own challenger group, eg. when  $\underline{\theta}_P^A(\alpha^A) < \theta^A$ . However, civil war in  $B$  may generate a negative spillover effect in country  $A$  when  $\theta^A < \underline{\theta}_W^A$ .  $A$  is also be affected by a civil conflict due to the feedback effect of the civil conflict induced by the rebel network on the neighboring country  $B$ . Ironically while country  $A$  may in isolation have enough institutional capacity  $\theta^A$  to be immune against a conflict emanating directly from his own challenger group, it could still be driven into a civil conflict because of the feedback effect of the conflict that members from that very group have induced on the neighboring country  $B$  through cross-border networks. Cross-border rebel networks then tend to magnify other contagion spillovers and as a result increase even more the likelihood of regional clusters of fragility and conflicts.

## 5.2 Cross border effects of migration of refugees

As discussed in the introduction, the literature also identifies war refugees as an important vector of contagion of civil conflicts across regions. Abrupt cross-border movements of populations can create important pressure on local resources and environments, leading to social, ecological and economic tensions inside the receiving region. Again our framework can be easily extended to understand the implications of such spillovers. We take the following setup as most illustrative of the issues at stake.

Let us consider that in each country, besides the government and a rebel group, there is a population of individuals which are neither in the government nor directly active in the rebellion, who face exactions in a civil war. Assume for simplicity that the size of such group of civilians size is normalized to 1. In times of peace, each civilian produces

domestically a resource  $\omega$  that he/she consumes. When there is a civil war in the country, a fraction  $1 - \lambda$  of this resource is destroyed. Assume that individuals are differentiated in terms of this destruction cost, and that the fraction  $\lambda \in [0, 1]$  of resource not destroyed is a random variable distributed iid across civilians. Denote  $F(\lambda)$  the cumulative function of  $\lambda$ . A civilian initially located in a conflict place may decide to migrate as a refugee to the other country. In such a case, he gets a subsistence resource  $\varpi \in (0, \omega)$  regardless of whether the host country is itself in thrall to a civil war.

Since civilians are not warriors themselves, their departure does not have a direct impact on the civil war in their home country. In the host country, however, it is well documented that war refugees exert pressure on the allocation of local resources.<sup>22</sup> This can be captured in the following way. A population  $\mu^i$  of war refugees moving into a host country  $i$  creates congestion effects on local resources such that the productivity of the host country rebel group is reduced: ie.  $a^i$  in country  $i$  is a decreasing function of  $\mu^i$ . For analytical simplicity assume a simple linear form  $a^i(\mu^i) = a^i - b^i \mu^i$  (with  $a^i > b^i$  to ensure that  $a^i(\mu^i) > 0$  for all admissible values of  $\mu^i \in [0, 1]$ ). The opportunity cost of conflict in a given country  $i$  with a flow of refugees  $\mu^i$ , is then rewritten as  $\alpha^i(\mu^i) = \alpha^i - (b^i/\gamma) \mu^i$  with  $\alpha^i = a^i/\gamma$ .<sup>23</sup>

Given this, it is then a simple matter to see that the level of refugees hosted by country  $i$  is given by:

$$\begin{aligned} \mu^i &= F(\varpi/\omega) \text{ when country } j \neq i \text{ is in war} \\ &= 0 \text{ when country } j \neq i \text{ is in peace} \end{aligned} \quad (8)$$

Consequently, from (8), when refugees move to country  $i$ , the opportunity cost of conflict in that country is reduced by a term  $\beta^i = (b^i/\gamma) F(\varpi/\omega)$ . For instance, refugees from country  $B$  lower the opportunity cost of conflict in country  $A$  from  $\alpha^A$  to  $\alpha^A - \beta^A$ .

In this context, the timing of the game between the two countries is as before with simply the additional feature that in stage 4 when a civil conflict prevails in a given country, local civilians decide whether or not to migrate as refugees to the other country and refugee flows are realized.

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<sup>22</sup>This pressure can be captured by two different channels. First, they may impose a cost on public finances. Sparse documentation exists for Western countries (see for instance Ruist, 2015), and even less for other regions. As an example, Turkey is the country that hosts the largest refugee population in the world in 2017. To reduce the cost for local authorities, the European Union funded the Facility for Refugees in Turkey over the years 2016 and 2017, and coordinates the Emergency Social Safety Net with the help of the World Food Programme and the Turkish Red Crescent. Both projects aim at reducing the cost of refugees for local authorities. Second channel, refugees may impact the opportunity cost of conflict of the challenger in the host country. This intuition may not extend to Western countries (Foged and Peri, 2016). Though the exposition of the two channels is slightly different, they yield the same intuition. For the sake of simplicity, let us focus on the latter channel.

<sup>23</sup>As before, to avoid a discussion of the praetorian regime, we assume that  $\alpha^i < 1$ .

Proceeding in the same way as in section 3, and omitting the country superscript when not necessary, the equilibrium policy regime in a given country, with a bad neighbor and migrants seeking refuge, can then be described as

- Proposition 3**
1. When  $\theta \geq \bar{\theta}(n^{AB}, \alpha - \beta)$ , there is a peaceful redistributive regime
  2. When  $(R - \Gamma(n^{AB})) / (R + N_G) \leq \alpha - \beta$  and  $\underline{\theta}(n^{AB}, \alpha - \beta) \leq \theta < \bar{\theta}(n^{AB}, \alpha - \beta)$ , there is a peaceful repressive regime.
  3. When  $\theta < \min[\underline{\theta}(n^{AB}, \alpha - \beta), \bar{\theta}(n^{AB}, \alpha - \beta)]$ , there is civil war.

The regional policy equilibrium between the two countries is then easily obtained taking into account two conditions : i) the free entry condition for non-state actors (as described by (6) or (7) depending on the equilibrium market size for war inputs) and ii) the equilibrium flows of refugees across countries. Notice that the equilibrium opportunity cost of conflict in a given country can only take two values:  $\alpha$  when the neighboring country is in peace, and  $\alpha - \beta$  when the neighboring country is in civil war.

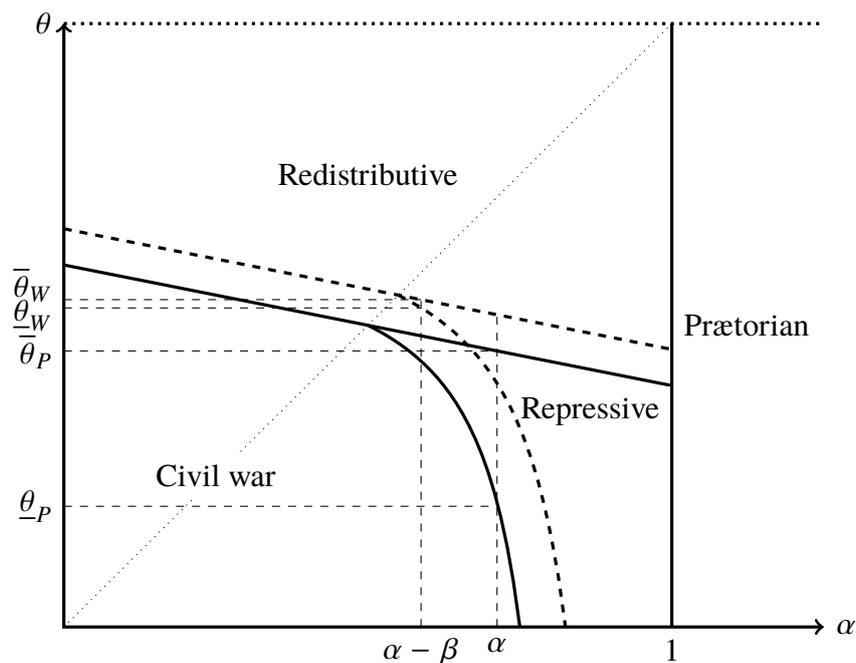


Figure 4: Contagion taking into account both the size effect in the war market and refugee flows. Full line: without spillovers, Dashed line: with spillovers.

In the same way as before, Fig. 4 shows in the space of parameters  $(\alpha, \theta)$  the different policy regimes for a given country, depending on whether or not the neighboring country

is in civil war. As we already know, the market size effect of wars inputs implies that for given value of  $\alpha$  the civil war region expands when the neighboring country is at war. With the additional consideration of refugees, a civil war in the neighboring country triggers another spillover effect. Indeed the opportunity cost of conflict in a given country moves from  $\alpha$  to  $\alpha - \beta$ . This in turn further increases the range of state capacity levels  $\theta$  under which the host country ends up into civil conflict. Formally with the intuitive notations:

$$\begin{cases} \underline{\theta}_W = \min[\bar{\theta}(n^{AB}, \alpha - \beta), \underline{\theta}(n^{AB}, \alpha)] & \bar{\theta}_W = \bar{\theta}(n^{AB}, \alpha - \beta) \\ \underline{\theta}_P = \min[\bar{\theta}(n, \alpha), \underline{\theta}(n, \alpha)] & \bar{\theta}_P = \bar{\theta}(n, \alpha) \end{cases}$$

one has the following result:

**Proposition 4** 1. *Country A is at peace while B is at war if and only if  $\theta^A \geq \underline{\theta}_W^A$  and  $\theta^B < \underline{\theta}_P^B$  (and reciprocally).*

2. *Regional peace is an equilibrium when  $\theta \geq \underline{\theta}_P$  in both countries.*

3. *Regional conflict is an equilibrium when  $\theta < \underline{\theta}_W$  in both countries.*

The possibility of refugees increases the scope for multiple regional policy equilibria. Indeed, such a feature reinforces the strategic complementarity of political regime across countries. As a consequence, the range of institutional capacities  $(\theta^A, \theta^B)$  for which one may obtain two different types of regional clusters of policy regimes (one with both regions in peace or one with both regions in civil war) is increased.

## 6 State capacity building and cross-border contagion

So far, the institutional state capacity  $\theta$  of each country was exogenous. In this section we investigate the incentives for governments to invest in state capacity to eventually change this institutional parameter. This extension will highlight new implications of regional contagion mechanisms not only at the level of policy regimes, but also at the level of institutional structures across countries. To simplify the exposition, we focus on a single channel of contagion, the market size effect on the market for violence. It would be straightforward to extend the conclusions to include consideration of refugees.

### 6.1 A simple model of state capacity building

Let us return to the simple framework of section 2 and consider now that the government can invest in its capacity to credibly commit  $\theta$ , at a cost  $C_1(\theta)$ . Consider first the case of a country in isolation. Thanks to Prop. 1, we can write the indirect payoffs to the government depending in particular on the parameters  $\alpha$ ,  $\theta$  and  $n$ :

$$V(\theta) = \begin{cases} N_G - \bar{M} + n^{-\frac{1}{\sigma-1}} & \text{when } \theta < \underline{\theta}(n, \alpha), \\ \frac{1-\theta}{\alpha-\theta}(\alpha(N_G + R) - R + \Gamma(n)) & \text{when } \underline{\theta}(n, \alpha) \leq \theta < \bar{\theta}(n, \alpha) \text{ and} \\ N_G + \Gamma(n) - (1-\alpha)\bar{M} & \text{when } \bar{\theta}(n, \alpha) \leq \theta. \end{cases}$$

The government does not benefit from a higher value of  $\theta$  both when the country is in civil war and when it implements the peaceful redistributive regime. In the intermediate case of a peaceful repressive regime, the government's payoff is increasing and convex in  $\theta$ . Taking  $n$  as given, these properties are illustrated in Fig. 5.

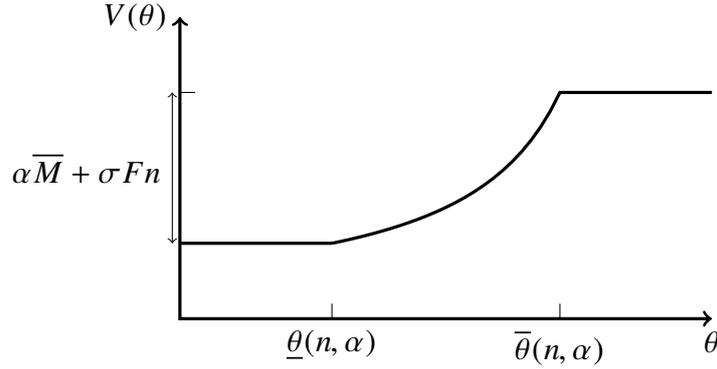


Figure 5: The government's indirect payoffs

The government then sets  $\theta_{opt}$  so as to maximize  $V(\theta) - C_1(\theta)$ . To simplify, we assume that the cost of investing into better institutions is linear:

$$C_1(\theta) = s\theta. \quad (\text{A3})$$

The parameter  $s$  reflects then the marginal cost of investing in state capacity. In that context, we obtain easily the following result:<sup>24</sup>

**Lemma 2** For a given supply of  $n$  war inputs, define

$$\underline{\alpha} = \frac{s(R - \Gamma(n)) - \sigma F n (R + N_G - \bar{M})}{\bar{M} (R + N_G - \bar{M} + s)}$$

Under (A3), the optimal investment in state capacity is

$$\theta_{opt} = \begin{cases} \bar{\theta}(n, \alpha) & \text{if } \alpha \geq \underline{\alpha}(n) \\ 0 & \text{otherwise.} \end{cases}$$

<sup>24</sup>The proof is obtained by comparing the corner payoffs of the government at  $\theta = 0$  and  $\theta = \bar{\theta}(n, \alpha)$  or  $V(0) = N_G - \bar{M} + n^{-\frac{1}{\sigma-1}}$  to  $V(\bar{\theta}(n, \alpha)) = N_G + \Gamma(n) - (1-\alpha)\bar{M} - s\bar{\theta}(n, \alpha)$ . Therefore investment occurs at  $\theta = \bar{\theta}(n, \alpha)$  iff  $\alpha\bar{M} \geq s\bar{\theta}(n, \alpha)$  which is equivalent to the condition expressed in the Lemma.

This lemma states that the government does invest into institutions if the opportunity cost of conflict of the challenger is too low. In that case, the propensity of that group to enter into conflict is too high for the government to contain it at a reasonable cost. The best option of the government in such a case is to accept a civil conflict, something which makes institutions superfluous. Conversely, if the opportunity cost of conflict is high enough, eg.  $\alpha$  above the threshold  $\underline{\alpha}$ , then it is profitable for the government to invest into institutions. Again, the parameters may all be country specific, which would be accounted for by the appropriate superscripts on  $s$ ,  $n$ ,  $N_G$ ,  $\bar{M}$  and  $\underline{\alpha}$ .

Conditional on investing in state capacity, the government sets  $\theta_{opt} = \bar{\theta}(n, \alpha)$ : this is the minimum level of commitment that allows the implementation of a redistributive regime. Recall that  $\bar{\theta}$  decreases with  $\alpha$  and  $\bar{M}$ , and increases with  $R$  and  $n$ : a higher opportunity cost of conflict  $\alpha$  or a higher military advantage  $\bar{M}$  allow a lower investment in state capacity. Conversely, a higher conflict stake  $R$  or a larger scope of war inputs would give the government an incentive to invest in stronger institutions.

Interestingly, investment in state capacity is non-monotonic in  $\alpha$ . The intuition for this is as follows: for low enough levels of  $\alpha < \underline{\alpha}$ , the government prefers to allow a civil war, and has no interest in developing state capacity. Conversely, above a certain threshold, eg. for  $\alpha \geq \underline{\alpha}$ , it prefers peace. However, as the opportunity cost of conflict  $\alpha$  further rises, the challenger is likely to accept a lower level of commitment from the government. As a result,  $\theta_{opt}$  decreases. This is illustrated in Fig. 6.

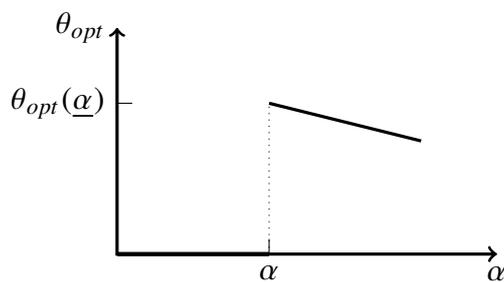


Figure 6: Investment in state capacity

Simple observation shows that  $\underline{\alpha}$  is increasing in  $s$ ,  $n$ , and  $R$ . First, a higher cost  $s$  of state capacity building makes it less profitable to accommodate the *marginal challenger*, eg. the challenger characterized by an opportunity cost of conflict  $\alpha$  close to  $\underline{\alpha}$ . Conditional on providing institutions, their provision  $\bar{\theta}$  does not depend on  $s$ , because our cost function for investment in state capacity is linear in  $\theta$ .

Second, a higher potential supply of war inputs  $n$  increases the likelihood that a rebellion is successful. This in turn also makes it less profitable to accommodate the marginal challenger. The threshold  $\underline{\alpha}$  over which the government does so increases, and conditional on providing institutions, the provision level  $\bar{\theta}$  is also increased.

Third, a higher value  $R$  of the contested resources raises the stakes of a civil war. To accommodate the challenger, the government must improve the redistribution of this resource. This is not profitable anymore for the marginal challenger. As a consequence the threshold  $\underline{\alpha}$  rises and again, as long as the government does provide institutions, it also provides better institutions when  $R$  increases.

## 6.2 Regional state capacity clusters

It is now time to reintroduce the two-country setup, and extend it to account for regional patterns of state capacity building. Remember that having a bad neighbor generates a market size effect on the market for violence, raising  $n$  to  $n^{AB}$ . To clarify the next section, we denote  $\underline{\alpha} = \underline{\alpha}(n)$ , an increasing function in  $n$ .

We have the following proposition:

**Proposition 5** *1. When  $\alpha \geq \underline{\alpha}(n^{AB})$ , the government avoids a contagion from a civil war abroad by investing into better institutions.*

*2. When  $\underline{\alpha}(n) \leq \alpha < \underline{\alpha}(n^{AB})$ , the country would not be able to avoid contagion from a civil war abroad. When the condition holds in two countries, they are either both at peace or both in a civil war.*

*3. When  $\alpha < \underline{\alpha}(n)$ , the country is in a civil war regardless of its neighbors.*

In the previous sections, we examined contagion in the absence of any institutional response from the government. This section introduces a first layer of policy response, in the form of state capacity building. With the possibility to invest into better institutions, the state is able to withstand a larger shock on the opportunity cost of conflict. Fig. 7 highlights the equilibrium pattern of state capacity building at the regional level, depending on the structure of opportunity cost of conflicts across countries. Recall that superscripts are used to clarify which country a variable refers to.

**Comparative statics.** When the opportunity costs of conflict are very asymmetric within a region, it may happen that a civil war erupts in country  $A$ , but that country  $B$  is still in a position to avoid contagion (and reciprocally). As long as the civil conflict in  $A$  does not discourage the government of  $B$  from implementing a peaceful regime, this actually may lead to improved institutions in this country. As a matter of fact, to ensure the participation of the challenger, the government of country  $B$  implements  $\theta_{opt}^B(n^{AB}, \alpha^B) > \theta_{opt}^B(n^B, \alpha^B)$ . This situation may exist when  $B$  has inherently a high level of stability (high  $\alpha^B$ ) or because of small spillovers  $n^{AB} \approx n^B$  from the civil war in country  $A$ . Given that in that case country  $B$  is not a source of instability for country  $A$ , the latter is in a civil war only if it is inherently unstable (low value of  $\alpha^A$ ). Interestingly in such a case, strong regional asymmetries in  $\alpha$  lead to even stronger asymmetries in state capacity. Indeed, the risk of contagion from a weak unstable neighbor translates

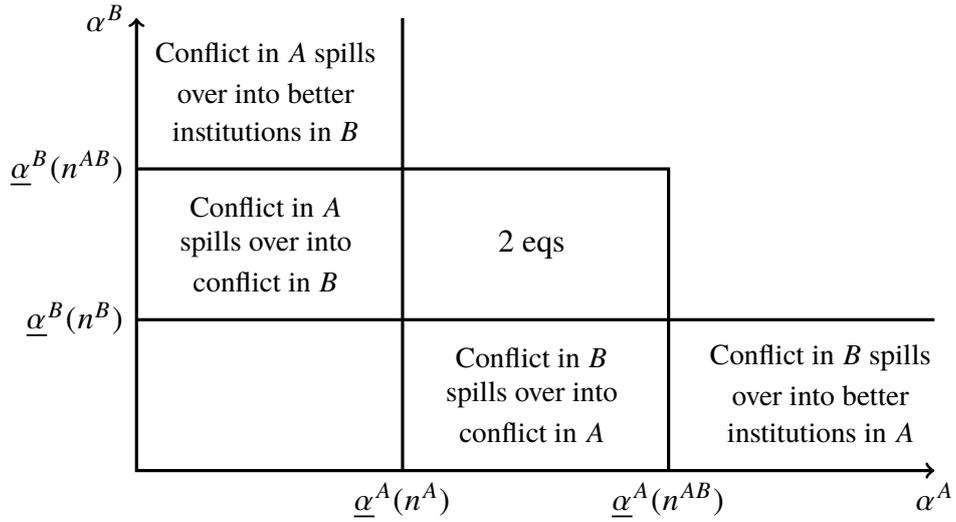


Figure 7: The spillovers of conflict and regional patterns of state capacity

into stronger incentives to invest into good institutions for a countries already resilient to internal conflicts (item 1 of the proposition). From this, we may expect that countries at the frontier of regional clusters of civil conflict should be characterized by higher, rather than lower, levels of state capacity.

When the asymmetries are less pronounced, the model predicts not only regional clusters of civil wars, but also clusters of state capacity. Except if country  $B$  is inherently very stable and spillovers are not too large, its government may prefer to allow a neighboring civil war to spread, instead of investing into state capacity. A civil war in  $A$  would then spillover into a civil war in  $B$ , and both countries would end up with no state capacity (and reciprocally).

For intermediate levels of  $\alpha$  in both countries, the spatial correlation is made especially obvious. Both countries may be at peace, and both invest into state capacity, or they are both at war, and don't invest into state institutions. Once again, the model does not predict which specific equilibrium emerges, it only predicts that the contagion of civil wars results in regional clusters of state capacity (item 2 of the proposition).

Finally, for low levels of  $\alpha$ , a country is in a civil war regardless of what happens in the region. This may generate spillovers regionally through two possible mechanisms. On the negative side, it may trigger a civil war for a vulnerable neighbor. Interestingly on the positive side, it may also induce better institutional building for more resilient neighbors that do not get into civil conflicts (item 1 of the proposition).

## 7 Policy implications

Given the regional externalities associated to civil war contagion effects, it is natural to expect gains to external intervention and regional cooperation mechanisms. This feature has been widely recognized in the international relation literature. For instance, about two thirds (97 out 150) of all civil wars over the period 1945-97 have been accompanied by intervention by foreign countries or international organizations (Regan, 2002). Several studies point out the fact that the risk of transnational spread of a civil war can make states with strong interests in a region intervene to contain the conflict (Salehyan and Gleditsch, 2006; Gleditsch, 2007, 2009; Kathman, 2011).

Our framework allows us to account for such policy interventions and to highlight some of their implications. A natural step in that direction is to identify the incentives for a given country to undertake such a policy process. For this, we consider the benefits for a given country of having a good neighbor (ie. in peace).

### 7.1 The benefits of a good neighbor

Once we have taken into account that the state may or may not invest into state capacity, we can write the government's indirect payoff when it has a good neighbor (Peace) as:

$$V_P(\alpha) = \begin{cases} N_G - \bar{M} + n^{-\frac{1}{\sigma-1}} & \text{when } \alpha < \underline{\alpha}(n) \\ N_G - \bar{M} + \Gamma(n) - s \frac{R-\Gamma(n)}{R+N_G-\bar{M}} + \alpha \Delta \cdot \bar{M} & \text{when } \alpha \geq \underline{\alpha}(n) \end{cases}$$

with  $\Delta = (R + N_G - \bar{M} + s)/(R + N_G - \bar{M})$ . Note that  $\Delta \cdot \bar{M}$  is the marginal gain of state capacity building when the opportunity cost of conflict  $\alpha$  increase. Similarly, when the country has a bad neighbor (War), the government's indirect payoff can be written

$$V_W(\alpha) = \begin{cases} N_G - \bar{M} + n^{AB-\frac{1}{\sigma-1}} & \text{when } \alpha < \underline{\alpha}(n^{AB}) \\ N_G - \bar{M} + \Gamma(n^{AB}) - s \frac{R-\Gamma(n^{AB})}{R+N_G-\bar{M}} + \alpha \Delta \cdot \bar{M} & \text{when } \alpha \geq \underline{\alpha}(n^{AB}) \end{cases}$$

These payoffs are plotted in Fig. 8. We also represent the difference between the two, which accounts for the benefits to the government of having good neighbors.

In Fig. 8,  $v_1 = n^{-\frac{1}{\sigma-1}} - n^{AB-\frac{1}{\sigma-1}}$  captures the extent of the spillover associated to a neighboring civil war in the presence of a porous frontier and the stimulated entry of non-state actors. Conversely  $v_2 = \Delta \cdot (\Gamma(n) - \Gamma(n^{AB}))$  denotes the additional cost of peace when the government is in a position to avoid contagion from the bad neighbor. In case of a civil war, the government needs to compensate its challenger who would benefit from the war inputs already present at the porous frontier.

Note that  $\Delta$  decreases with  $R$ , and increases with  $\bar{M}$  and  $s$ . Indeed, it is more costly for the government to bring the challenger when the stakes of conflict  $R$  are higher, and less costly when institutions are cheaper ( $s$ ) or when it has a better military advantage

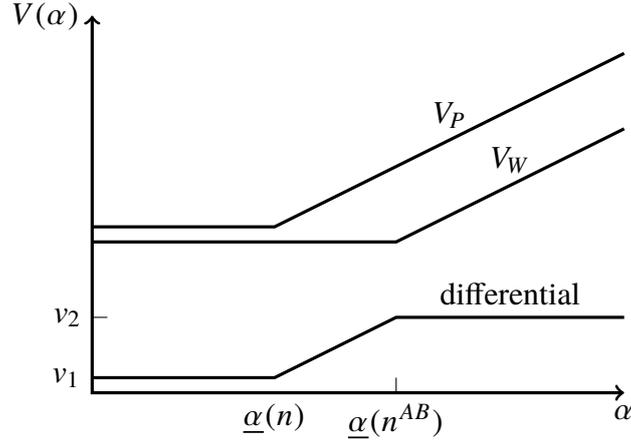


Figure 8: The government's indirect payoffs

$\overline{M}$ . Finally, the larger the negative spillover, that is, the difference between  $n$  and  $n^{AB}$ , the larger the benefits of peace in a neighboring country.

A government clearly benefits from not having bad neighbors, as the differential shown on Fig. 8 illustrates. For that reason, it may consider the option of directly affecting the policy regime of its neighbors. A country  $A$  may then undertake some intervention in country  $B$ , to avoid a civil war there, that would spillover into  $A$ . Our previous analysis suggests two natural channels to avoid a civil war in  $B$ . The government in country  $A$  may raise the opportunity cost of conflict  $\alpha^B$ , or it may lower the threshold  $\underline{\alpha}^B$  under which  $B$  does not invest into credible institutions ensuring peace.

## 7.2 Military intervention

Let us assume that  $A$ 's government can raise  $\alpha^B$ . The cost of raising it by an increment  $\epsilon$  is written  $C_2^A(\epsilon)$ , where  $C_2^A$  is an increasing function. It makes sense to pay for  $\alpha^B$  only insofar as it ensures that  $B$  is at peace. When there are multiple regional equilibria that depend on self-confirming expectations, a selection problem arises of which regional equilibrium policy regime is played. One way to resolve the issue is to consider different scenarios of belief formation under which the government operates. Typically a *pessimistic* (or risk-averse) government takes decisions based on the worst-case scenario. This assumes that in the context of multiple regional equilibria (one with peace everywhere and one with civil war everywhere), this government believes that only the civil war equilibrium will prevail. Conversely, an *optimistic* (or reckless, or confident) government takes decisions based on the best-case scenario, assuming that whenever a peaceful regional equilibrium exists, such equilibrium will necessarily prevail. As a simplified heuristic, let us assume more generally that the government in

country  $A$  believes that the peaceful equilibrium prevails with probability  $\phi$ , whenever multiple regional policy equilibria exist.<sup>25</sup> We obtain the following proposition:

- Proposition 6**
1. When  $\alpha^A \geq \underline{\alpha}^A(n^{AB})$ ,  $A$ 's government prevents a conflict in country  $B$  if  $v_2 \geq C_2^A (\underline{\alpha}^B(n^B) - \alpha^B)$ .
  2. When  $\underline{\alpha}^A(n^A) \leq \alpha^A < \underline{\alpha}^A(n^{AB})$ ,  $A$ 's government increases the opportunity cost of conflict in  $B$  up to  $\underline{\alpha}^B(n^B)$  if  $\phi(v_1 + \Delta \bar{M}(\alpha^A - \underline{\alpha}(n^A))) \geq C_2^A (\underline{\alpha}(n^B) - \alpha^B)$ , and even further up to  $\underline{\alpha}(n^{AB})$  if  $v_1 + \Delta \bar{M}(\alpha^A - \underline{\alpha}(n^A)) \geq C_2^A (\underline{\alpha}(n^{AB}) - \alpha^B)$ .
  3. When  $\alpha^A < \underline{\alpha}^A(n^A)$ ,  $A$ 's government prevents a conflict in country  $B$  if  $v_1 \geq C_2^A (\underline{\alpha}^B(n^{AB}) - \alpha^B)$ .

When  $\alpha^A$  is high enough,  $A$  is immune to contagion from a bad neighbor  $B$ . Still,  $A$ 's government would need to improve the quality of institutions to avoid such an outcome, at a cost. If country  $B$  is inherently unstable because of a low value  $\alpha^B$ , but close enough to the threshold  $\underline{\alpha}(n^B)$  which would prevent a civil war there, it might be less costly to avoid a civil war in the neighboring country there than to invest in better institutions (item 1 of the proposition).

For intermediate values of  $\alpha^A$ ,  $A$ 's intervention in  $B$  depends on the priors of  $A$ 's government. An optimistic government cares only about making a peaceful equilibrium possible, since it believes that whenever it is possible, it happens. As a result, the optimistic government of  $A$  intervenes in  $B$  only if  $\alpha^B$  is low, which makes  $B$  a likely bad neighbor. Indeed country  $A$  will intervene as long as the cost of the intervention is less than the expected utility gain of staying into peace and investing into redistributive institutions (item 2 of the proposition).

Conversely, a pessimistic government would intervene only to make sure that a bad equilibrium cannot happen in the region. As a result, the pessimistic government of  $A$  intervenes in country  $B$  when the intervention brings  $\alpha^B$  above the threshold  $\underline{\alpha}^B(n^{AB})$  which makes the bad equilibrium impossible, implying that it is less likely to intervene than an optimistic government. Notice that if the cost of foreign intervention is low, then country  $A$  at intermediate values of  $\alpha^A$  might still consider intervening even when  $\alpha^B < \underline{\alpha}^B(n^B)$ .

Finally, when  $\alpha^A$  is low enough,  $A$  is in a civil war (except if  $B$ 's government intervenes). It still suffers a (small) loss from a bad neighbor, due to the market size effect in the market for violence. It might therefore intervene to stabilize its neighbor as one facet of its strategy to address its own rebellion, if the cost of foreign intervention is low enough.

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<sup>25</sup>The special case of an optimistic (resp. pessimistic) government is then simply  $\phi = 1$  (ie.  $\phi = 0$ ).

A number of features are worthwhile mentioning. First, proposition 6 is based on the premise that  $A$ 's government can intervene in  $B$ , and can increase the opportunity cost of conflict there. This is in line with Kathman (2010) who considers the possibility of military intervention in another country, so as to quell a rebellion. In Kathman (2011), the argument is extended to the regional level. It is argued that a military intervention in  $B$  does not only make sense when  $A$  fears contagion from  $B$ , it only makes sense if  $A$  fears that the civil war in  $B$  might diffuse to other countries in the region. This channel might indirectly pose a threat to  $A$ 's stability, and it makes sense to stop the spread of civil conflicts as early as possible.

The intermediate case (item 2 of the proposition) also indicates that the extent of foreign policy intervention may depend on factors going beyond standard socio-economic characteristics of the targeted country and the external intervening country. Indeed, it points out that the nature of the beliefs and doctrines (optimistic vs pessimistic) that the intervening outside government has on the range of plausible international outcomes may matter for the decision to intervene and the scale of this intervention. Interestingly, the current literature on motivations to intervene focus on a number of well defined characteristics such as third party's security interests (i.e. proximity to conflict), humanitarian concerns (i.e. casualties, refugees), ethnic and colonial ties to a conflict, or economic factors (rents and presence of natural resources).<sup>26</sup> Our analysis suggests that beyond such socio-economic characteristics, there are contexts in which other more subjective and immaterial dimensions such as worldviews, doctrines and expectations may also be important elements explaining patterns of external interventions.

Finally note that in our set-up, direct military intervention in country  $B$  changes the opportunity cost of conflict  $\alpha^B$  of the rebel group. Since we have defined  $\alpha^B = a^B/\gamma^B$ , this would correspond to a decrease in  $\gamma^B$ , the absolute advantage of the challenger in the conflict technology. The model also suggests that an alternative to a military intervention might be to act upon  $a^B$ , in other words to change the terms of trade in country  $B$  in favor of the challenger and against the government. Our model suggests therefore that economic aid policies favoring structural market access and economic opportunities to the rebel group may to some extent be substitutes to direct military intervention.<sup>27</sup>

### 7.3 Improving the neighborhood

Quelling a rebellion in a neighboring country might involve substantial fixed costs. There are other policy options, some of which may sometimes be most expedient. Let us now assume that instead of raising  $\alpha^B$ ,  $A$ 's government has the option of lowering  $\underline{\alpha}^B$ . Recall that

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<sup>26</sup>See for instance Regan (1998, 2000); Findley and Teo (2006); Koga (2011); Bove et al. (2016).

<sup>27</sup>This idea was at the heart of USAID's Alternative Development policy in Colombia. See Vargas Meza (2011).

$$\underline{\alpha}^B(n) = \frac{s^B [R^B - \Gamma(n)] - \sigma F n [R^B + N_G^B - \bar{M}^B]}{\bar{M}^B [R^B + N_G^B - \bar{M}^B + s^B]} :$$

$\underline{\alpha}^B$  increases with  $s^B$ ,  $n$  and  $R^B$ . It decreases with  $\bar{M}^B$  and  $N_G^B$ .  $A$ 's government may increase the military advantage  $\bar{M}^B$  of  $B$ 's government, or reduce the likelihood  $\pi^B$  that a rebellion would be successful, arguably through other forms of military cooperation or promises to support a struggling neighbor. It could also increase the public resources  $N_G^B$  of country  $B$  by providing budget support international aid.

$A$ 's government also has the option of favoring the emergence of good institutions in  $B$ , by lowering the cost  $s^B$  of building state capacity there. There are several ways through which it may do so. Regional agreements increase the costs associated with renegeing on the social contract (international "audience costs"). Regional cooperation may lower the costs of investing in good institutions. Formally we may assume that country  $A$ 's government can lower  $s^B$  so as to increase  $\underline{\alpha}^B$  by an increment  $\epsilon$  at at cost  $C_3^A(\epsilon)$ . This setup is exactly equivalent to the one we just considered in Prop. 6 except that instead of raising  $\alpha^B$  to reach either  $\underline{\alpha}^B(n^B)$  or  $\underline{\alpha}^B(n^{AB})$  as before, now the government of  $A$  wishes to lower  $\underline{\alpha}^B(n)$  or  $\underline{\alpha}^B(n^{AB})$  to reach  $\alpha^B$ , depending on the degree of optimism or pessimism it has on the regional situation. Prop. 6 can then be interpreted as accounting either for the effect of direct military intervention, or for the effect of institutional cooperation with a weaker neighbor. This new interpretation also clarifies the response of  $B$ 's government to  $A$ 's intervention. Peace building intervention by country  $A$  in the neighboring country  $B$  is framed just to the point at which the  $B$ 's government is indifferent between civil conflict and no conflict. So this government can always be marginally induced to cooperate with the intervention.

## 7.4 International coordination of refugee policies

In our setup, refugees have only one impact, and that impact is negative: they may help the contagion of civil wars across a border. Notice that while the porous frontier creates a regional complex of civil war and weak state capacity, refugees would be best characterized as a negative spillover of a civil war on its neighbors, even though there is a possible feedback effect. If refugee flows destabilize a country, it is possible that the host country, now itself in the thrall of a civil war, will be the source of reverse refugee flows. In turn, that makes a peaceful solution harder to reach in the country where the original civil war takes place.

To the extent that countries can control refugee inflows, one may therefore wonder why it would ever accept refugees. The right of asylum is an ancient concept, most recently recognized in the 1951 Convention Relating to the Status of Refugees. Why do

states accept refugees, if their impact is only negative. Considerations of humanity (the Convention builds on the 1948 Universal Declaration of Human Rights) and/or strategic use of international humanitarian aid fundings are generally regarded as some of the main reasons for accepting refugees. We argue that our framework emphasizes another, more pragmatic reason, why states may be willing to accept refugees, at a cost.

To illustrate the argument, let us briefly extend our framework to a context of three countries clustered in the following situation. Country *A* is in a civil war, which creates a large pool of refugees. Neighboring country *B* is vulnerable to contagion from country *A*. If refugees reach country *B*, the government of country *B* is unable (or unwilling) to accommodate the rebellion. Country *C* has the capacity to accommodate a fraction of the refugees coming from *A*. This would lower the burden on country *B*, and therefore would avoid a rebellion in such country. If the alternative is a civil war spreading to country *B*, the market for violent inputs at the porous border may expand so much and become so much destabilizing that the government of country *C* would have no other alternative but to face also a local civil conflict. In such a situation, it could be advantageous for country *C* to accept refugees from country *A* just to prevent an epidemics of civil conflicts in the region (going from *A* to *B* to finally *C*).

The current situation in Syria illustrates this strategy handsomely. In 2016, the United Nations High Commissioner for Refugees identified 4.8 million Syrian refugees outside of Syria, a large majority of which hosted in countries bordering Syria: Turkey, Lebanon, Jordan and Iraq. Countries around the World have pledged to help Syrian refugees, beyond their international commitments. The humanitarian motive is compelling, though we may suspect that the possible destabilization of the region is another powerful argument.

## **8 Third-party military intervention and international cooperation against AQIM**

At a higher scale, regional clusters of civil wars pose another sort of threat. Arguably, there are increasing returns to scale for terrorist groups and organizations to maintaining wider conflict zones. Larger uncontrolled territory means access to more diversified resources, deeper pools of potential followers, and easier logistics. Recently, several cases have highlighted how the spread of conflict is a major issue for the international community.

For example, the terrorist group al-Qaeda in the Islamist Maghreb (AQIM) was founded in 1998 (initially under the name Groupe Salafiste pour la Prédication et le Combat, GSPC) to contest the legitimacy of the Algerian government. However, their reach soon exceeded the boundaries of Algeria: they have regional links far beyond the borders in Algeria, throughout the Sahelian-Saharan zone in Africa, from Mauritania to

the Shabaabs in Ethiopia, and as far as Afghanistan and Iraq. They are associated with frequent abductions of Western tourists and aid workers, which they exchange for hefty ransoms, and with extensive weapons and drugs trafficking.

Regional cooperation takes multiple forms, in line with the predictions of the previous section. The African Union has adopted the Convention on the prevention and fight against terrorism in 2004. The WAEMU and ECOWAS have established institutions in charge of fighting the financing of terrorism. There has also been attempts at coordinating regional intelligence agencies to fight AQIM more effectively. Nevertheless, such regional cooperation remains limited, and the governments of the region do not have the military resources to intervene in their neighbors.

To tackle these issues, the international community has been involved alongside the governments in the region to fight AQIM. The model suggests that it has several policy options. It can act at the source of the conflict itself, but sometimes, avoiding its spread by acting at the frontier of the conflict zone can be sufficient. In each case, the model distinguishes three policy options for neighboring countries: it can provide military support to an incumbent government, it can help build more credible institutions of redistribution, or it can raise the opportunity cost of conflict for a rebel group. Interestingly, the involvement of the international community follows these lines. In the notations of the model, hotbeds of civil conflict are characterized by the superscript  $B$ , and are located in the Sahelian-Saharan band. Countries North and South of the band are denoted by the superscript  $A$ . Civil conflict in  $B$  might spill over into  $A$ , with global consequences.

France sent troops to fight AQIM in Mali through the high-profile 2012 Serval and 2014 Barkhane military operations. Incumbent regimes in that region, for all their flaws, have counted France as an ally since independence. This military intervention demonstrates that a rebellion there had to count not only the state's expenditure on military forces, but also on France's support to the state. This raised the opportunity cost  $\alpha^B$  of insurgent groups.

Meanwhile, in the same region, the United States founded the Pan-Sahel initiative in 2002, replaced in 2006 by the Trans-Saharan Counter-terrorism initiative to train regional military forces. While France acted at the root of terrorism, the United States preferred a strategy of containment. The Governance, Peace and Security Programme was set by the government of Mali and the UNDP to train local communities to take charge of their own security. We can also mention the Common Security and Defence Policy (CSDP) of the EU, which also contributed to training regional forces. Neither of these countries and organizations was ready to send fighting troops in the region, but their action contributes to supporting the military capabilities  $\overline{M}^A$  of neighboring countries.

Finally, the European Union intervenes in the region through the European Development Fund (EDF). It explicitly pursues cohesion, peace, security and stability in the

region, and for that purpose supports reforms aimed at decentralizing and reforming the state. Its purpose is to lower the cost  $c^A$  and  $c^B$  of state capacity building in the countries of the region.

To summarize, the fight against AQIM, which gathers several prominent international actors, illustrates three policy options for the international community. France offers military support to governments under attack. The United States, the UNDP and the CSDP prefer to strengthen the military forces of vulnerable neighbors. The EDF supports investment in good institutions in the region. What are the merits and drawbacks of these different approaches?

France's purpose was to eliminate civil conflicts from the region altogether. The model highlights two possible issues with that strategy. First, military support will prevent a conflict only when the opportunity cost of conflict is not too low (when  $\alpha^B$  is not too far below  $\underline{\alpha}^B$ ). On the contrary, mineral resources and a geography favorable to guerrilla warfare would favor conflict. Second, the belief that conflict might spread indicated the possibility of double equilibria. Military intervention in the Sahel may therefore be insufficient to avoid that conflicts develop in neighboring regions. Meanwhile, American, UNDP and CSDP's actions aim at insulating the rest of the world from what they perceive to be an inevitably unstable region. This may be a rather cynical reasoning, but the relative strength of the governments North and South of the Sahara (at least in Western Africa) make this a reasonable policy. Finally, the EDF's plan has two objectives: insulating neighboring countries from the civil conflict, and making the regional institutions more inclusive, so as to reduce possible grievances. While this is a hopeful and sensible approach on both accounts, this may actually be the slower, more costly solution.

## **9 The limits of international intervention under the light of the Arab Spring**

In the same vein, the spread of the Arab Spring across Northern Africa and the Middle East generated much instability in the region. In particular, the civil war which erupted in Syria in March 2011 favored the emergence of jihadi militant groups, such as the Islamic State of Iraq and the Levant (ISIL), also known as ISIS or Daesh, infamous for their publicized footage of the beheading of soldiers and civilians, sexual abuse and enslavement of women and girls, mass executions, destruction of cultural heritage sites among even more barbarity. As of mid-2015, they were claiming political control over a region which spanned half of Syria and a significant part of Iraq.

The fight against AQIM allowed us to highlight three different approaches to the threat of conflict diffusion: military intervention, military support, and regional cooperation. In the case of ISIL, not all options are equally enticing. The Syrian case is illustrative

of the conundrum off third-party countries when dealing with a civil conflict at risk of spreading. The spread of the Arab Spring brought hopes of a transition to Western-style liberal democracies in the region. The unexpected result was the rise of rebel groups claiming they seek to establish sharia law, viewed as a threat by the international community. The incumbents in several countries of the region had been denounced for corruption and human right violations. Bashar Al-Assad, the President of Syria, has been indicted by the International Criminal Court, and implicated in war crimes by the United Nations High Commissioner for Human Rights.

Supporting the regime of Al-Assad militarily or institutionally, or helping ISIL, were not an option. France and the United States have provided military support to the Free Syrian Army, a rebel group which cooperates with the National Coalition for Syrian Revolutionary and Opposition Forces. However, they remain an underdog in the civil war. After the failure to stabilize Iraq after the 2003 invasion, no large military power has been willing to intervene directly in the region. Finally, no figure of authority has had the legitimacy to attract institutional cooperation.

At the other end of the region, Morocco stands out as a rare example of immunity to the spread of the Arab Spring. Civil unrest did occur, in 2011-12. However, when it did, King Mohammed VI agreed to a constitutional reform to avoid outright riots, and did not have to request foreign military assistance or institutional support. The model predicts that to avoid contagion, a state has to invest in  $\theta$ , the credibility of the revenue-sharing agreement. Indeed, the 2011 constitutional reforms illustrates that exact mechanism. The reforms are mainly concerned with transfers of power as well as symbolic and substantial gestures towards minorities. On the first count, the King renounced several key discretionary powers in favor of the Parliament. For instance, the prime minister must now be named from within the largest party in the Parliament, and presides over the executive branch of government. The judiciary system is independent from the two other branches of the government. On the second count, the reforms grant new rights to women. It recognizes Berber as an official language, and protects Hassaniya Arabic as a national cultural heritage.

Both the Syrian and the Moroccan case illustrate the difficulty in third-party intervention in civil wars. The cost of contagion for Morocco was large, and they had an incentive to try and solve the issue peacefully. Syria was unable to check the increasing civil unrest, and the cost of intervening was too high for any significant outside military powers. The case of AQIM, examined in the previous section, offers more encouraging lessons: this may be partly due to the relative weakness of states in that region.

## **10 Conclusion**

This paper has introduced a simple theoretical framework to analyze some key issues in the mechanisms of conflict diffusion. Non-state actors supply war inputs to rebel group,

and benefit from the weak territorial control of the state. In particular, weak territorial control may create a porous frontier in which non-state actors operate. A market size effect on the market for violence generates spillovers of civil war in neighboring countries through the porous frontier. This paper also considers refugee flows as an alternative channel of contagion, through the pressure they exert on the host country's economy.

These spillovers have been shown to be non linear. A government may protect itself by investing in better institutions at home, as in the example of Morocco during the Arab Spring, but sometimes the cheapest solution to avoiding regional destabilization is to intervene in a weak neighbor. The paper has identified three main tools to intervene abroad: direct military intervention, military support and institutional cooperation. It also discusses the international coordination of refugee policies as a mechanism to limit the contagion of conflict.

This model provides strong theoretical grounds for several empirical findings of the literature, and it also invites future research. First, it predicts that one option to avoid a civil war in a neighboring country is to improve the terms of trade for the potential rebel, so as to increase the opportunity cost of conflict. Uncovering cases where a government has followed such a course of action would provide welcome support to the theory. Second, it identifies several other responses, based on stylized cost functions. It would be especially interesting to explore why different actors pursue different strategies in addressing a single source of regional instability, as we have documented in the case of AQIM. Third, it raises an unaddressed endogeneity issue in the contagion of civil conflicts. This should inform future empirical research.

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