Civilian Victimization and Forced Recruitment*

Simon Hug†
Livia I. Schubiger‡

Paper prepared for presentation at the ENCoRe Conference Geneva
(January 21-22, 2016)

First version: August 2015, very preliminary version: January 16, 2016

Abstract

Recent theoretical work on violence against civilians and armed group recruitment assumes that a rebel leader (or government) simply faces some incentive structures in the local civilian population as well as environmental constraints (including those imposed by adversaries), from which more or less technological benefits from specific strategies of violence and recruitment result. Empirical work, however, suggests that the strategies adopted by governments and rebel leaders are dynamic and interdependent, and that the strategies of violence pursued by one group influence the recruitment practices adopted by the other. Based on this observation we propose a game-theoretical model taking into account the interactions between a rebel group leader and a government (and/or possibly another armed group leader) as they consider their relationship with the civilian population. The model highlights the importance of these interactions and as a consequence sheds new light on the observed interdependencies in forced recruitment among and violence against civilians.

*Financial support by the Swiss Network for International Studies is gratefully acknowledged.

† Département de science politique et relations internationales, Université de Genève, 40 Bd du Pont d'Arve, 1211 Genève 4; Switzerland, phone +41 22 379 83 78, email: simon.hug@unige.ch.

‡ London School of Economics and Political Science (LSE), Department of Government, Houghton Street, London WC2A 2AE, UK, email: L.I.Schubiger@lse.ac.uk

1 Introduction

The extent to which civilians are systematically targeted in armed conflict differs considerably across countries and civil wars (e.g., Eck and Hultman, 2007; Valentino, 2014; Balcells, 2015), as well as between armed actors and noncombatant victim groups (e.g., Wood, 2008; Fjelde and Hultman, 2013). Recent work has not only documented the prevalence and intensity of deliberate lethal violence against civilians, but also explored various drivers of this wide variation in civilian victimization in war (e.g., Hultman, 2012; Schneider, Bussmann and Ruhe, 2012; Schneider and Bussmann, 2013; Balcells and Kalyvas, 2014; Salehyan, Siroky and Wood, 2015; Carnegie and Mikulaschek, 2016). Still little is known, however, about how such campaigns of one-sided violence affect subsequent conflict dynamics, and more specifically the mobilization strategies of state actors and non-state armed groups. Indeed, the link between civilian targeting and different modes of combatant recruitment remains strikingly unexplored. In particular, that armed groups often rely on coerced in addition to voluntary recruitment has been overlooked in the literature on the effects of violence against civilians on patterns of mobilization in war.

We develop a formal theoretical model that clarifies the ramifications of violence against civilians for the incentives of armed groups to engage in different strategies of recruitment. Our model implies that violence against an armed group's civilian constituency will not only affect voluntary mobilization — as is well established in the civil war literature (Mason and Krane, 1989; Goodwin, 2001; Wood, 2003; Kalyvas and Kocher, 2007) — but that it can also affects coerced recruitment as armed conflict wears on.

Recent advances in research on civilian victimization and forced recruitment have been mostly empirical. At the theoretical level, progress has been more limited. While several scholars have advanced theoretical arguments explaining the strategic use of one-sided violence and forced recruitment, they have been limited to simple decision-theoretic accounts that neglect the broader strategic context of armed conflicts (e.g., Beber and Blattman, 2013), and/or that remain confined to a very limited set of interactions between a government and one single rebel group. As many campaigns of armed violence against civilians and forced recruitment, including child soldiering, occur in conflicts with multiple insurgent groups[1] existing theoretical models can at best give a partial account of these important dynamics. We propose a flexible framework that allows to assess the consequences of various configurations of rebel-government interactions on civilian victimization and forced recruitment in civil war. In the current version, one-sided violence, whoever the perpetrator, increases personnel support, while at the same time decreasing material support. If one-sided violence does not cross constituencies, each actor will optimize its level of one-sided violence regardless of its opponent. If, however, insurgents target the civilian constituency of the government (or vice-versa), then both actors adjust their behavior, with significant implications for the level of one-sided violence.

In what follows, we first briefly review the literature on one-sided violence and forced recruitment in civil wars. We then present a game-theoretic model dealing with actors engaged in a conflict who may use one-sided violence against their enemy's social constituency or their own civilian support base. This interaction is embedded in an economy generating material support for armed groups. We analyze the equilibrium characteristics of this game and derive a first set of preliminary implications of the model, and contrast them with existing accounts of one-sided violence and forced recruitment. We conclude by discussing further steps in our modeling exercise and by sketching possible empirical tests of our implications.

2 Violence against Civilians

Research on armed conflict has long amalgamated conflict with violence (for critical overviews see Kalyvas, 2006; Valentino, 2014), failing to distinguish between conflict and violence and among different types of violence in civil war. Only recently have political scientists adopted a more nuanced assessment of violence against civilians in war. We review both empirical and formal-theoretical areas of research as it they pertain to our contribution.

[1] See http://tbinternet.ohchr.org/Treaties/CCPR/Shared_Documents/NPL/INT_CCPR_NGO_NPL_14605_E.pdf, pp. 16, 18 and 24.

2.1 Empirical studies on violence against civilians and forced recruitment

While empirical research on one-sided violence has considerably increased our understanding of the determinants of civilian targeting by armed actors (Downes, 2006; Downes, 2008; Humphreys and Weinstein, 2006; Balcells, 2010; Balcells, 2011; Raleigh, 2012; Schneider, Bussmann and Ruhe, 2012; Schneider and Bussmann, 2013; Weintraub, 2013; Valentino, Huth and Balch-Lindsay, 2004; Huth and Valentino, 2008; Fjelde and Hultman, 2013), this literature has generally treated the incentives of warring parties to engage in one-sided violence as relatively stable and in isolation of the strategies of their opponents. Little attention has been given to the close interactions and mutual influence of the strategies and incentives for one-sided violence of state forces and rebel groups. Moreover, the consequences of this type of violence remain poorly understood.

Most studies on the *consequences* of civilian victimization have examined the effects of indiscriminate violence by state actors. Focusing on different dependent variables such as the insurgent attacks (Lyall and Wilson, 2009; Condra and Shapiro, 2012), insurgent fragmentation (Schubiger, 2014), rebel support (Wood, 2003) or rebel territorial control (Kocher, Pepinsky and Kalyvas, 2011), they vastly disagree in their conclusions. Some of these scholars argue that the targeting of noncombatants can be an 'effective' strategy to undermine the offensive military capacity of opposing actors (Lyall and Wilson, 2009; Merom, 2003; Wood and Kathman, 2013), yet others claim that it will increase the rebels' mobilization capacity, territorial control, and civilian support (e.g., Goodwin, 2001; Wood, 2003; Kocher, Pepinsky and Kalyvas, 2011; Condra and Shapiro, 2012; Nillesen and Verwimp, 2009). Strikingly, however, the existing literature on the effects of violence against civilians on armed group mobilization has ignored the fact that armed groups often rely on coerced in addition to voluntary recruitment, a strategy that – as we will argue – is likewise affected by civilian victimization in war.

Indeed, research on child soldiering and forced recruitment has developed largely in isolation from the literature on civilian victimization.[2] Most studies fo-

[2]Empirical studies on forced recruitment often focus on the systematic abduction of children as one of the most extreme forms of conscription (see for example Gates and Reich, 2010), partially because the empirical distinction between forced and voluntary recruitment is not as clear-cut in many other scenarios.

cus on the conditions under which forced recruitment is adopted by armed actors and the circumstances that facilitate the conscription of children in war (e.g., Achvarina and Reich, 2006; Lasley and Thyne, 2015; Richards, 2014). Other studies have explored the effects these recruits have on a conflict's possible recurrence (e.g. Haer and Bhmelt, 2015), and on what the longer-term consequences of such forced recruitment are (e.g., Blattman, 2009).

2.2 Theoretical models of violence against civilians and forced recruitment

Much of the theoretical work on violence against civilians and forced recruitment finds, either directly or indirectly, inspiration in Grossman's (1991) study of insurrections (for a related model on political violence more generally, see Besley and Persson, 2011). Azam (2002) presents a model in which foot soldiers of rebel forces may engage in looting, while warlords attempt to set optimal incentives to fight. The model highlights the importance of credible commitments in the redistribution of resources. Closely related to this general argument is Esteban, Morelli and Rohner's (2015) theoretical model, which also focuses on the restribution of resources as a main mechanism in explaining violence against civilians.

In two related papers, Azam and Hoeffler (2002) and Azam (2006) further develop Azam's (2002) framework. Azam and Hoeffler (2002) develop a model of warring parties' decisions on the forces allocated to fighting or to violence against civilians. Azam (2006) offers a partial equilibrium analysis of why some warlords inflict violence on their own civilians, taking the other side's action as given. The most explicit consideration of the interactions between opponents in a civil war appears in Gates (2002). He considers, in a principal-agent framework, the interaction between a rebel leader and his combatants. For forced recruits the participation constraints of the typical PA-theories is assumed to be automatically fulfilled, while the incentive compatibility constraint has to be respected for all recruits. The probability of a detection of shirking and the possibility for punishment is assumed to decrease with distance in space. This model, based on work by Polo (1995), allows for extensions by including a government (direct competition and a competition over recruits) or a competing rebel group (which requires a certain distance among the actors). The model assumes away, however, the strategy of forced recruitment as it is assumed that the threat of violence is always credible. While in this model ideology is already considered as an important factor in retaining recruits, Gates and Nordås (2010) extend this to cover non-material benefits for recruits more generally. In addition, the extension also more explicitly envisions an interaction with a government.

To study the forced recruitment of child soldiers Beber and Blattman (2013) — contrary to Gates and Nordås (2010) — propose a simple decision-theoretic model of a rebel leader faced with a potential recruit. According to their model, what needs to be offered to an adult or a child differs. Consequently, and especially through indoctrination, recruiting children and retaining them is often "cheaper."

As this very brief and partial review of theoretical work highlights, it is generally assumed that a ruler takes the lead by setting the incentives for potential recruits (e.g., Gates, 2002; Beber and Blattman, 2013), following mostly Grossman's (1991) perspective. Moreover, in most models interactions between rebel groups and/or governments with the population are hardly embedded explicitly. If the models deal with forced recruitment, most often it is assumed, to use Gates's (2002) formulation, that the participation constraint is automatically met.

3 A model

In what follows, we develop a very general framework that is amenable to extensions addressing many of the shortcomings we believe exist in current theoretical accounts of civilian victimization and forced recruitment. We consider the interactions among various actors in a population of size N. This population is divided in two subsets with shares p^g and p^r corresponding to population shares more in support (or under the control) of the government g and another more in support (or under the control) of rebels r.[3] The $p^{\cdot} \times N$ members of these two subpopulations, following Azam (2002), can be arrayed along the unit-interval of the real line according to their skill level.[4] In the absence of any war and recruit-

[3]Note that we will allow for the existence of several rebels groups r_1, r_2 etc. If there is no risk of confusion we will use r in its generic form.

[4]For simplicity's sake, as Azam (2002), we assume that the distribution of the skill levels is uniform.

ment of soldiers,[5] the average output is, given the skill levels and the appropriate scaling, equal to 0.5. In peacetime the government may impose a tax with tax rate t_g on the total output $N \times 0.5$ to finance public and private goods.

In wartime we assume that war activities impose fixed insecurity costs $i^{\cdot} \in [0, 1]$ on members of the two populations who are engaged in productive activities.[6] Consequently, for the population share p^g taxed with tax-rate t_g, each individual j with skill level s_j will assess whether her output after taxation $((1 - t_g) \times s_j)$ exceeds the insecurity costs i^g.[7] Individuals j for which $(1 - t_g) \times s_j < i^g$ holds will leave the economic sector and engage in military activities in support of the government.[8]

Following the same logic, rebel groups in wartime will be formed by individuals j for which $(1 - t_r) \times s_j < i^r$ holds, where t_r corresponds to the share of output produced by the population share p^r that is confiscated or rendered voluntarily to the rebel forces.

So far we assumed that only war activities, i.e. collateral damage, affects the security level of the population N. In most conflicts, however, insecurity for the civilian population comes more about by one-sided violence against civilians.[9] We assume that both g and r can engage in one-sided violence against population shares p^g and p^r. Consequently, each population share is subject to one-sided violence equal to $o^g_{\cdot}$ resp. $o^r_{\cdot}$.[10] Consequently in the case of war and the presence of one-sided violence individuals engaging on the government's or the rebels' side are formed by those for which the following inequality holds:

$$(1 - t_{\cdot}) \times s_j \quad < \quad (i^{\cdot} + o^{\cdot}) \tag{1}$$

From this setup it follows that both r and g have a fighting force f_i determined

[5]We assume implicitly that the government has some standing army exogenously determined in peacetime. In future versions we might consider the choice of a standing army as also part of the choices of the goverment g.

[6]This implies that by joining armed forces, these insecurity costs are no longer borne.

[7]Again, we assume that the skill levels among each of the two subpopulations to be uniformally distributed over the unit interval. This implies that the two populations do not differ in terms of their average economic productivity.

[8]This might be conceived of as voluntary recruits of the government army or recruitment into pro-government militias.

[9]While we label this element insecurity it might very well also cover grievances of the population more generally speaking.

[10]These two elements are composed of o^g_g and o^g_r resp. o^r_g and o^r_r.

by $t_\cdot$, $o_\cdot^\cdot$ and $i^\cdot$ all of which are assumed to be endogenous, except the last one which is assumed to be exogenously determined. Thus we have[11]

$$
\begin{aligned}
f_g &= p_g \times N \times \frac{i^g + o^g}{1 - t_g} && (2)\\
f_r &= p_r \times N \times \frac{i^r + o^r}{1 - t_r} && (3)
\end{aligned}
$$

The remaining economically active populations will have average output of $\frac{1-t_g+i^g+o^g}{2-2\times t_g}$, resp. $\frac{1-t_g+i^g+o^g}{2-2\times t_g}$. Given that the active populations are equal to $p_g \times N \times \frac{1-t_g-i^g-o^g}{1-t_g}$, resp. $p_r \times N \times \frac{1-t_r-i^r-o^r}{1-t_r}$ the tax rates imposed on the two economically active population shares will generate material support $m_\cdot$ in the following amounts:

$$
\begin{aligned}
m_g &= t_g \times p_g \times N \times \frac{1 - t_g + i^g + o^g}{2 - 2 \times t_g} \times \frac{1 - t_g - i^g - o^g}{1 - t_g} && (4)\\
m_r &= t_r \times p_r \times N \times \frac{1 - t_r + i^r + o^r}{2 - 2 \times t_r} \times \frac{1 - t_r - i^r - o^r}{1 - t_r} && (5)
\end{aligned}
$$

We assume that material support and fighting forces generate fighting capabilities according to a Cobb-Douglas production function of the following form:[12]

$$
\begin{aligned}
c_g &= a_g \times f_g^{\alpha_g} \times m_g^{\beta_g} && (6)\\
c_r &= a_r \times f_r^{\alpha_r} \times m_r^{\beta_r} && (7)
\end{aligned}
$$

And finally, we assume that, again following Azam (2002, 144), a contest success function, based on the capabilities of the two actors, determines the

[11] As is easy to see from this setup, whoever commits one-sided violence against a civilian population, increases the fighting forces. o_r^r as well aso_g^g might, however, reflect the actions taken to forcefully recruit fighers, while o_g^r as well as o_r^g might reflect strategies of intimidation that also, as we will see below, reduce economic activities on the opponents side. In the appendix we briefly expose an alternative way to cover forced recruitment in the framework proposed here, while relying on the implausible assumption that some unmodeled action makes that some individuals join by force a fighting force, as in gates Gates's (2002) model.

[12] We assume that all generated income $m_\cdot$ enters this production function, even if, for instance a government, might want to use part of the taxes to provide other public (and/or) private goods. Our setup also assumes that the two population shares are only taxed either by g or r. This implies that the various actors have clearly defined territories that they control. It is easy to conceive of an extension in which this assumption is relaxed.

likelihood of, for instance g, succeeding in the war:[13]

$$p_g \;=\; 1 - e^{-\gamma \frac{c_g}{c_r}} \tag{8}$$

This implies that $p_r = e^{-\gamma \frac{c_g}{c_r}}$. In this very general formulation, r and g, by choosing their tax rates $t_.$ and level of one-sided violence against the population shares g and r ($o^r_.$, respectively $o^g_.$) jointly determine their chances of success in the conflict. Assuming that both g and r aim at maximizing this probability we will assess what affects their best response strategies when aiming to achieve this goal.[14]

This general setup is flexible enough to accommodate a large array of situations. First, even though the setup is symmetric among opponents, both regular and irregular wars can be covered. The asymmetry between rebel group and government can come about in our model either by different sizes of the population (i.e., p_g resp. p_r) or different abilities to convert fighting forces and material support into capabilities (i.e., α_r and β_r, resp. α_g and β_g, or even the scaling parameters a_g and a_r in the Cobb-Douglas production function).

Second, the level of interactions among various actors can be very flexibly adjusted (see also below). For instance, if one-sided violence is only directed at ones own support base, then the choices of, for instance a government and a rebel group, fail to influence each other. As one sided violence can also be targeted at the opposing population, the optimal choices become interdependent.

Third, while recruitment in the model occurs through increased insecurity (and the respective tax rates), the insecurity due to one-sided violence can cover different types of elements. It is also easy to make these different recruitment strategies more or less costly and more or less efficient (e.g., one-sided violence

[13]We keep this formulation from Azam (2002, 144) even though it has the inelegant feature that $1 - e^{-\gamma \frac{c_g}{c_r}} \neq 1 - (1 - e^{-\gamma \frac{c_r}{c_g}})$ except for one real value γ that is a function of the ratio $\frac{c_r}{c_g}$. Consequently, what is gained with the more flexible specification of the contest success function of Azam (2002, 144) (for instance compared to the more traditional form relying simply on the share of fighting forces, as done by Gates, 2002), is lost by its awkward functional form. As we show below that both g and r will attempt to maximize their respective fighting capabilities $c_.$, the exact functional form of the contest success function is largely irrelevant.

[14]The very general formulation allows for easy extensions. By appropriate relabeling this setup can also cover the interaction between two (or more) rebel groups r_1 and r_2 or their interaction with a government. In that case p_r will be partitioned in p_{r_1} and p_{r_2} with $p_{r_1} + p_{r_2} = 1$ and appropriate relabeling of the actions.

directed against an opposing population might only have a limited effect on recruitment, while being stronger when directed against ones own population, or vice-versa).[15]

While these are only some of the situations and extensions that are amenable in this framework, there are obviously also limitations that we will discuss in the conclusion.

Analysis

In what follows we propose a few first steps of analysis. We assume first that $o_g^r = o_r^g = 0$, i.e. that one-sided violence is only targeted at ones one population. From this it is clear that both g and r will choose t_g and o_g^g, resp. t_r and o_r^r so that c_g resp. c_r is maximized (as neither g nor r can influence their respective opponent's capabilities).

Taking the derivative of c_g with respect to o_g and setting the result to zero yields two solutions:[16] either $a_g = 0$ or $\beta_g = \frac{\alpha_g \times (1 - i^{g2} - 2i^g o^g - o^{g2} + t_g^2 - 2t_g)}{i^{g2} + ti^g o^g + o^{g2}}$. The first of these solutions is trivial while the second, solving for o^g yields the following expression:

$$o^{g*} \quad = \quad -i_g \pm \frac{\sqrt{\alpha_g^2 t_g^2 + 2\alpha_g \beta_g t_g^2 - 2\alpha_g^2 t_g - 4\alpha_g \beta_g t_g + \alpha_g^2 + 2\alpha_g \beta_g}}{\alpha_g + 2\beta_g} \tag{10}$$

As o_g has to be positive (or zero) only $-i_g + \frac{\sqrt{\alpha_g^2 t_g^2 + 2\alpha_g \beta_g t_g^2 - 2\alpha_g^2 t_g - 4\alpha_g \beta_g t_g + \alpha_g^2 + 2\alpha_g \beta_g}}{\alpha_g + 2\beta_g}$ is a candidate for the optimal level of o^g, which leads to the following condition:

$$i_g^2 \times (\alpha_g + 2\beta_g)^2 \quad \leq \quad \alpha_g^2 t_g^2 + 2\alpha_g \beta_g t_g^2 - 2\alpha_g^2 t_g - 4\alpha_g \beta_g t_g + \alpha_g^2 + 2\alpha_g \beta_g \tag{11}$$

[15]As mentioned above, we provide in the appendix an additional extension assuming that each actor may designate a specific share of the population as forced recruits. Not surprisingly, the optimal share chosen will balance of the increase in the size of the fighting forces against the foregone material support through lost economic activities.

[16]In this very general setup the partial derivative with respect to the other choice variable t_g is quite convoluted and we refrain from discussing it here. In the special cases where we assume specific values for α and β that ensure diminishing return to scale, more simpler solutions obtain.

From this it easily follows (as $i_g \geq 0$) that

$$i_g \leq \frac{\sqrt{\alpha_g^2 t_g^2 + 2\alpha_g\beta_g t_g^2 - 2\alpha_g^2 t_g - 4\alpha_g\beta_g t_g + \alpha_g^2 + 2\alpha_g\beta_g}}{\alpha_g + 2\alpha_g\beta_g} \tag{12}$$

This upper limit for i_g[17] is binding if

$$\begin{aligned}
(1-\alpha_g-2\beta_g)^2 &\geq \alpha_g^2 t_g^2 + 2\alpha_g\beta_g t_g^2 - 2\alpha_g^2 t_g - 4\alpha_g\beta_g t_g + \alpha_g^2 + 2\alpha_g\beta_g \\
1+\alpha_g^2+4\beta_g^2-2\alpha_g-4\beta_g+4\alpha_g\beta_g &\geq \alpha_g^2 t_g^2 + 2\alpha_g\beta_g t_g^2 - 2\alpha_g^2 t_g - 4\alpha_g\beta_g t_g + \alpha_g^2 + 2\alpha_g\beta_g \\
1+4\beta_g^2-2\alpha_g-4\beta_g+2\alpha_g\beta_g &\geq \alpha_g^2 t_g^2 + 2\alpha_g\beta_g t_g^2 - 2\alpha_g^2 t_g - 4\alpha_g\beta_g t_g \\
1+4\beta_g^2-2\alpha_g-4\beta_g+2\alpha_g\beta_g &\geq t_g^2(\alpha_g^2+2\alpha_g\beta_g) - t_g(2\alpha_g^2+4\alpha_g\beta_g) \qquad (13)
\end{aligned}$$

Solving for t_g yields $t_g \in (\frac{\alpha_g - \sqrt{\alpha_g^2+2\alpha_g\beta_g}}{\alpha_g}, \frac{\alpha_g + \sqrt{\alpha_g^2+2\alpha_g\beta_g}}{\alpha_g})$. As the square-root in this expression is always larger that α_g it follows that the conditions on t_g, as it is by definition $\in [0,1]$, are never binding.

Consequently, the solution derived from 9 allows for some interesting comparative statics. As the derivative with respect to t_g, we can state that with increasing taxrate t_g the optimal level of one-sided violence decreases. We also note that with higher levels of insecurity due to the war itself, one-sided violence decreases as well. Consequently, if the civilian population is well protected against the enemy, one-sided violence against ones own population becomes more profitable (and possible, given a fixed taxrate).

Cross-camp one-sided violence

So far we have assumed that only g commits one-sided violence against the population share p_g. resp. r against population share p_r. Let us consider for a moment, again under the assumption that one-sided violence is costless, that r is a Stackelberg leader in this game and chooses a level of one-sided violence against g. If $o_r^g = o^{g*}$ then g will not have to commit any one-sided violence against its own population share p_g. If r chooses $o_r^g < o^{g*}$ then g will "compensate" and adopt $o_g^g = o^{g*} - o_r^g$. Finally if $o_r^g > o^{g*}$ then g will "compensate" by lowering t_g. The same logic applies to g as a Stackelberg-leader. For a full equilibrium

[17] It is also easy to see that the derivative of this upper limit with respect to t_g is negative for all $t_g < 1$.

analysis g's optimal tax rate t_g would have to be derived, which is cumbersome in the current very general setup.

4 Extensions and Discussion

The analysis so far is still quite limited, but already demonstrates the flexibility of the general framework. The last result we offered regarding a version of the game with a Stachelberg-leader is simplified by the fact that we assumed so far that committing one-sided violence is costless. A first (and the simplest) relaxation of this assumption is to consider that while one-sided violence against the opponent is part of the overall military strategy (and thus implicitly factored into the contest success function and the Cobb-Douglas production function), one sided violence against ones own camp reduces, proportionally, the fighting forces (as it is needed to "recruit" and guard these fighters). One way to model this is by assuming that the fighting forces equal the following expressions:

$$f_g = p_g \times N \times \frac{i^g + o_r^g + o_g^g / r_g}{1 - t_g} \quad (14)$$

$$f_r = p_r \times N \times \frac{i^r + o_g^r + o_r^r / r_r}{1 - t_r} \quad (15)$$

$$(16)$$

The values of $r_.$ indicate how much manpower is needed to forcefully recruit a new soldier, resp. rebel. As $r_.$ increases the costlier such recruitment strategies become.

We have also assumed so far that each population share is "taxed" only by one actor. Especially in asymmetric conflicts, however, the population supporting the rebels might well be "taxed" both by the government and the rebel forces. Again, this is an addition that is easily amenable in the current framework.

5 Conclusion

How one-sided violence affects conflict escalation is still poorly understood. In particular, while the literature on civilian victimization has made important progress, its role in combatant recruitment has not been studied in detail yet.

We have argued that one component of sided-violence is the forced recruitment of fighting forces. Based on this we propose a very general framework to explore the interaction among various actors. Not surprisingly, we find that rebel leaders, when engaging in one-sided violence, need to balance the advantages such a strategy might have in terms of recruitment against the costs that such violence generates.

In addition to these very simple first insights, we have also discussed easy extensions that allow the model to address other elements deemed important. Consequently, several further steps of model building are still necessary before we can offer more definite conclusions on the important relationship between civilian victimization and forced recruitment.

Appendix

Extension with explicit forced recruitment

In an extension we assume that both g and r forcefully recruit a share $q_.$ of the economically active population. Thus the two fighting forces become

$$
\begin{aligned}
f_g &= p_g \times N \times \frac{i^g + o^g}{1 - t_g} + q_g \times p_g \times N \times \left(1 - \frac{i^g + o^g}{1 - t_g}\right) \quad (17) \\
f_r &= p_r \times N \times \frac{i^r + o^r}{1 - t_r} + q_r \times p_r \times N \times \left(1 - \frac{i^r + o^r}{1 - t_r}\right) \quad (18)
\end{aligned}
$$

As in both equations the expression in the last parenthesis is positive, the derivative of f_i with respect to $q_.$ is always positive. At the same time forcing individuals to join armed forces also reduces the material support that can be generated by taxes:

$$
\begin{aligned}
m_g &= t_g \times p_g \times N \times \frac{1 - t_g + i^g + o^g}{2 - 2 \times t_g} \times \frac{1 - t_g - i^g - o^g}{1 - t_g} \times (1 - q_g) \quad (19) \\
m_r &= t_r \times p_r \times N \times \frac{1 - t_r + i^r + o^r}{2 - 2 \times t_r} \times \frac{1 - t_r - i^r - o^r}{1 - t_r} \times (1 - q_r) \quad (20)
\end{aligned}
$$

As both fractions in the two equations are striclty positive the derivatives of $m_.$ with respect to $q_.$ are both negative. Consequently, forced recruitment generates a tradeoff between generating more fighting forces and reducing material support.

References

Achvarina, Vera and Simon Reich. 2006. "No Place to Hide: Refugees, Displaced Persons, and the Recruitment of Child Soldiers." *International Security* 31(1):127–164.

Azam, Jean-Paul. 2002. "Looting and Conflict Between Ethno-Regional Groups: Lessons for State Formation in Africa." *Journal of Conflict Resolution* 46(1):131–153.

Azam, Jean-Paul. 2006. "On thugs and heroes: Why warlords victimize their own civilians." *Economics of Governance* 7:53–57.

Azam, Jean-Paul and Anke Hoeffler. 2002. "Violence against civilians in civil wars: looting or terror." *Journal of Peace Research* pp. 461–485.

Balcells, Laia. 2010. "Rivalry and Revenge: Violence against Civilians in conventional civil wars." *International Studies Quarterly* 54:291–313.

Balcells, Laia. 2011. "Continuation of Politics by Two Means: Direct and Indirect Violence in Civil War." *Journal of Conflict Resolution.* 55:397–422.

Balcells, Laia. 2015. Political Violence. In *Routledge Handbook of Comparative Political Institutions*, ed. Jennifer Gandhi and Rubn Ruiz-Rufino. Routledge.

Balcells, Laia and Stathis N. Kalyvas. 2014. "Does Warfare Matter? Severity, Duration, and Outcomes of Civil Wars." *Journal of Conflict Resolution* 58(8):1390–1418.

Beber, Bernd and Christopher Blattman. 2013. "The logic of child soldiering and coercion." *International Organization* 67(01):65–104.

Besley, Timothy and Torsten Persson. 2011. "The Logic of Political Violence." *Quarterly Journal of Economics* 126(3):1411–1445.

Blattman, Christopher. 2009. "From Violence to Voting: War and Political Participation in Uganda." *American Political Science Review* 103(2):231–247.

Carnegie, Allison and Christoph Mikulaschek. 2016. "The Promise of Peacekeeping: Protecting Civilians in Civil Wars." Paper prepared for presentation at the 9th Annual Conference on The Political Economy of International Organizations, Salt Lake City, January 7-9, 2016.

Condra, Luke N. and Jacob N. Shapiro. 2012. "Who Takes the Blame? The Strategic Effects of Collateral Damage." *American Journal of Political Science* 56(1):167–187.

Downes, Alexander B. 2006. "Desperate Times, Desperate Measures: The Causes of Civilian Victimization in War." *International Security* 30(4):152–195.

Downes, Alexander B. 2008. *Targeting civilians in war*. Ithaca: Cornell University Press.

Eck, Kristine and Lisa Hultman. 2007. "One-Sided Violence Against Civilians in War. Insights from New Fatality Data." *Journal of Peace Research* 44(2):233–246.

Esteban, Juan M., Massimo Morelli and Dominic Rohner. 2015. "Strategic Mass Killings." *Journal of Political Economy* 123(5):1087–1132.

Fjelde, Hanne and Lisa Hultman. 2013. "Weakening the Enemy: A Disaggregated Study of Violence against Civilians in Africa." *Journal of Conflict Resolution* 57(4):1–28.

Gates, Scott. 2002. "Recruitment and Allegiance: The Microfoundations of Rebellion." *Journal of Conflict Resolution* 46(1):111–130.

Gates, Scott and Ragnhild Nordås. 2010. "Recruitment and Retention in Rebel Groups." APSA 2010 Annual Meeting Paper.

Gates, Scott and Simon Reich, eds. 2010. *Child Soldiers in the Age of Fractured States*.

Goodwin, Jeff. 2001. *No Other Way Out. States and Reviolutionalry Movements, 1945 - 1991*. Cambridge University Press.

Grossman, Herschell I. 1991. "A General Equilibrium Model of Insurrections." *American Economic Review* 81(4):912–921.

Haer, Roos and Tobias Bhmelt. 2015. "Child soldiers as time bombs? Adolescents? participation in rebel groups and the recurrence of armed conflict." *European Journal of International Relations* .

Hultman, Lisa. 2012. "Attacks on Civilians in Civil War: Targeting the Achilles Heel of Democratic Governments." *International Interactions* 38(2):164–181.

Humphreys, Macartan and Jeremy Weinstein. 2006. "Handling and Manhandling Civilians in Civil War." *American Political Science Review* 100(3):429–447.

Huth, Paul and Benjamin Valentino. 2008. Mass Killing of Civilians in Time of War, 1945-2000. In *Peace and Conflict 2008*, ed. J. Joseph Hewitt, Jonathan Wilkenfeld and Ted Robert Gurr. Boulder, London: Paradigm Publishers pp. 79–92.

Kalyvas, Stathis N. 2006. *The Logic of Violence in Civil War*. Cambridge: Cambridge University Press.

Kalyvas, Stathis N. and Matthew Adam Kocher. 2007. "How 'Free' is Free Riding in civil wars?: Violence, insurgency, and the collective action problem." *World Politics* 59(2):177–216.

Kocher, Matthew Adam, Thomas B. Pepinsky and Stathis N. Kalyvas. 2011. "Aerial Bombing and Counterinsurgency in the Vietnam War." *American Journal of Political Science* 55:201–218.

Lasley, Trace and Clayton Thyne. 2015. "Secession, legitimacy and the use of child soldiers." *Conflict Management and Peace Science* 32(3):289–308.

Lyall, Jason and Isaiah Wilson. 2009. "Rage Against the Machines: Explaining Outcomes in Counterinsurgency Wars." *International Organization* 63:67–106.

Mason, T. David and Dale A. Krane. 1989. "The Political Economy of Death Squads: Toward a Theory of the Impact of State-Sactioned Terror." *International Studies Quarterly* 33:175–198.

Merom, Gil. 2003. *How Democracies Lose Small Wars: State, Society, and the Failures of France in Algeria, Israel in Lebanon, and the United States in Vietnam*. Cambridge: CUP.

Nillesen, Eleonora and Philip Verwimp. 2009. "Rebel Recruitmant in a Coffee Exporting Economy." Microcon Research Working Paper 11.

Polo, Michele. 1995. Internal cohesion and competition among criminal organizations. In *The economics of organised crime*, ed. Gianluca Fiorentini and Sam Peltzman. Cambridge: Cambridge University Press pp. 87–109.

Raleigh, Clionadh. 2012. "Violence against civilians: a disaggregated analysis." *International Interactions* 38(4):462–481.

Richards, Joanne. 2014. "Forced, Coerced and Voluntary Recruitment into Rebel and Militia groups in the Democratic Republic of Congo." *The Journal of Modern African Studies* 52:301–326.

Salehyan, Idean, David Siroky and Reed M. Wood. 2015. "External Rebel Sponsorship and Civilian Abuse: A Principal-Agent Analysis of Wartime Atrocities." *International Organization* .

Schneider, Gerald and Margit Bussmann. 2013. "Accounting for the Dynamics of One-Sided Violence: Introducing KOSVED." *Journal of Peace Research* 50(5).

Schneider, Gerald, Margit Bussmann and Constantin Ruhe. 2012. "The Dynamics of Mass Killings: Testing Time-Series Models of One-Sided Violence in Bosnia." *International Interactions* 38(4):443–461.

Schubiger, Livia Isabella. 2014. "One for All? State Violence and Insurgent Cohesion." Paper Prepared for Presentation at the Annual Meeting of the European Political Science Association, Edinburgh UK, June 2014.

Valentino, Benjamin A. 2014. "Why We Kill: The Political Science of Political Violence against Civilians." *Annual Review of Poliical Science* 17:89–103.

Valentino, Benjamin A., Paul Huth and Dylan Balch-Lindsay. 2004. "Draining the Sea: Mass Killing and Guerrilla Warfare." *International Organization* 58(2):375–407.

Weintraub, Michael. 2013. "Armed Group Competition and Civilian Abuse in Multiparty Civil Wars: Evidence from Colombia." Program on Order, Conflict, and Violence Yale University.

Wood, Elisabeth Jean. 2003. *Insurgent Collective Action and Civil War in El Salvador*. Cambridge: Cambridge University Press.

Wood, Elisabeth Jean. 2008. "The Social Processes of Civil War: The Wartime Transformation of Social Networks." *Annu. Rev. Polit. Sci. 2008* 11:539–561.

Wood, Reed M. and Jacob D. Kathman. 2013. "Too Much of a Bad Thing: Violence against Civilians and the Outcome of Civil Wars." *British Journal of Political Science* XX:forthcoming.