The Logic of Child Soldiering and Coercion[*]

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Abstract:

Why do armed groups recruit large numbers of children as fighters, often coercively? The international community has tried to curb these crimes by shaming and punishing leaders who commit them—in short, making the crimes costlier. Are these policies effective and sufficient? The answer lies in more attention to the strategic interaction between rebel leaders and recruits. We adapt theories of industrial organization to rebellious groups and show how, being less able fighters, children are attractive recruits if and only if they are easier to intimidate, indoctrinate and misinform than adults. This ease of manipulation interacts with the costliness of war crimes to influence rebel leaders' incentives to coerce children into war. We use a case study and a novel survey of former child recruits in Uganda to illustrate this argument and provide hard evidence not only that children are more easily manipulated in war, but also how—something often asserted but never demonstrated. Our theory, as well as a new "cross-rebel" dataset, also support the idea that costliness matters: foreign governments, international organizations, diasporas, and local populations can discourage child recruitment by withholding resources or punishing offenders (or, conversely, encourage these crimes by failing to act). But punishing war crimes has limitations, and can only take us so far. Children's reintegration opportunities must be at least as great as adults' (something that demobilization programs sometimes fail to do). Also, indoctrination and misinformation can be directly influenced. We observe grassroots innovations in Uganda that could be models for the prevention and curbing of child soldiering and counter-insurgency generally.

1. Introduction

The elimination of child soldiering has been an international cause célèbre for fifteen years, after a 1996 United Nations (UN) report galvanized advocacy and action.[1] In this time, the UN and other international organizations have striven to build and enforce a new set of international norms, standards and laws against the conscription or enlistment of children.[2] They have been remarkably successful. To take two high-profile examples, child recruitment is the main charge against Thomas Lubanga in the International Criminal Court's first case, and it is a central charge in the Special Court of Sierra Leone's pursuit of Liberian ex-President Charles Taylor.

International organizations have gone further, negotiating with and cajoling armed forces, and naming and shaming governments. Peacekeeping operations now include child rights training and protection in their missions.[3] Western governments have also restricted aid to governments who recruit children, such as the 2007 U.S. Child Soldier Prevention Act. Collectively, these efforts seem to have been successful in reducing state recruitment. The UN body charged with protecting the rights of children in conflict has negotiated, or begun a transition path, with every state accused of enlisting children.[4] International organizations also count many successes among non-state groups. Yet child soldiering persists among insurgents, terror groups, and other armed forces. Between 2004 and 2007 alone, armed groups in 21 countries recruited children.[5] At present, children continue to be recruited in a familiar list of fragile states and territories, including

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[1] Machel (1996)

[2] The UN Secretary-General appointed a Special Representative for Children and Armed Conflict in 1997, and the Security Council passed a series of resolutions against the use of child soldiers in the late 1990s and early 2000s. The Rome Statute of the International Criminal Court signed in 1998 lists the use of child soldiers under the age of 15 as a war crime. In 2000, the Optional Protocol to the Convention on the Rights of the Child on the Involvement of Children in Armed Conflict defined a child soldier as under age 18 and accumulated 142 state parties by 2011.

[3] UN (2011)

[4] Interview with the UN Special Representative, Radikha Coomeraswamy, 3/30/2011.

[5] CSUCS (2008)

Afghanistan, Iraq, eastern Congo, South Sudan, Darfur, and Somalia.[6] New conflicts in 2011 brought worrying reports of new child recruitment, including Ivory Coast and Libya.

Scholars of international relations study emergent norms like that against child recruitment, and the forces that drive transnational advocacy networks to adopt them.[7] We use new theory and data to suggest how these norms might be enforced and aims achieved. Clearly third parties can limit recruitment (of children and adults) by helping to prevent conflict in the first place, or by achieving durable settlements, and it is here most international relations scholarship has focused.[8] But assuming states and international organizations cannot eliminate warfare entirely, how might they mitigate recruitment, especially child soldiering?

Any answer requires a theory of why armed groups recruit children in the first place. To illuminate the problem and solutions, this paper adapts theories of industrial organization to rebellious groups and explores new in-depth qualitative and survey evidence from Uganda, plus cross-national evidence on child soldiering. We have four aims: to highlight the systematic links between competing theories; identify the core incentives for groups to recruit children; weigh which mechanisms dominate in practice; and reexamine what policies can reduce conflict, coercion, and child soldiering. The results illustrate how important it is for advocates, policymakers and military leaders (domestic or international) to understand the internal logic of armed groups—between leaders and recruits, and leaders and civilians—when setting policy, and suggest new approaches for norm enforcement and counterinsurgency.

But first, what exactly are we to explain? It is perhaps unsurprising that military forces routinely use children as servants, scouts and support. Many forces, however, recruit large numbers of children as fighters, and these child recruits can be shockingly young and numerous. Consider the twelve armed groups for which survey data are available, in Liberia, Sierra Leone,

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[6] UN (2011)

[7] Carpenter (2007), Price (1998), Keck and Skikkink (1998)

[8] Walter (1997), Hartzell et al. (2001), Fortna (2004)

Colombia, and Uganda.[9] In half the groups, at least 20% of recruits were 14 or younger (the definition of a child for purposes of a war crime) and at least 40% of recruits were 17 or younger (the definition of a child in much international human rights law). In three of the twelve groups, children 17 or younger were the *majority* of fighters. This pattern is puzzling. In a physical contest between a 21- and a 13-year old, the adolescent is clearly the inferior fighter. So why do some armed groups systematically prefer children over adults, while others do the opposite?

Advocates and academics have also observed that recruits, especially child recruits, are often threatened, abducted, and abused. Indeed, new data on African rebel groups, presented here, suggest that coercion and child recruitment go hand in hand: All groups that forcibly recruit also employ child soldiers, on average two to three times as many as groups that do not forcibly recruit. Thus this paper also asks: under what circumstances is recruitment coercive, and why is coercion often directed at children?

Several explanations are especially influential, almost canonical. One stresses that the worldwide proliferation of light automatic weapons is partly to blame. Another highlights the sheer abundance of young recruits, as overpopulation has made children a cheap, limitless, and renewable resource.[10] Correct or not, these explanations do little to explain the variation since 1980 or 1990, or (more importantly) variation across armed groups exposed to the same demographic and technological trends.

Another canonical accounts stresses the brutality and irrationality of "new wars", especially in reports on Africa.[11] Child soldiers, the story goes, are a manifestation of the growing barbarity of war. We argue, however, that barbaric acts are not necessarily illogical ones. Too many armed groups recruit large numbers of adolescents for long periods of time for irrationality to be a full or satisfactory explanation. We look instead for the logic in child coercion, and find method in the madness.

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[9] These figures are based on authors' calculations using survey data from Liberia (Pugel 2006), Colombia (Arjona and Kalyvas 2008), Sierra Leone (Humphreys and Weinstein 2004), and Uganda (this paper).

[10] See, for instance, Dallaire (2011) or Singer (2005) for particularly influential accounts.

[11] e.g. Kaldor (1999), Honwana (2005)

Recruitment, especially coercion, requires us to understand the incentives of the rebel leader as well as the recruit. We start from the notion that rebel leaders are minimally rational—that is, calculating, self-interested, and maximizing—and ask under what circumstances child recruitment and coercion will be optimal strategies. One answer is obvious: children will be recruited if they are more effective fighters than we suppose. Scholars commonly argue that children lack the fortitude to fight.[12] Nevertheless, scattered accounts, including testimony from rebel officers, attest to children's bravery, stamina and stealth.[13] If children are as effective at fighting as adults then, given the disproportionate number of young people in poor countries, we shouldn't be surprised to find a disproportionate number in armed groups.

We do not find this argument to be compelling, and instead concentrate on a second set of possibilities: that children are easier and cheaper to retain, or more responsive to coercive methods. Journalists, advocates, and academics have voiced dozens of arguments along these lines. Many note that remuneration will be lower if children have relatively poor civilian employment and educational opportunities.[14] Others suggest that children are more willing to fight for non-pecuniary rewards such as honor and duty, revenge, a sense of purpose, or protection.[15] Finally, some argue the young are more malleable, adaptable, and obedient; hence they are easily indoctrinated and deceived, and so simpler to control and retain.[16] Developmental psychology provides some support for these claims: lab experiments suggest that adolescent social and brain development may lead them to be more conformist and easily influenced.[17]

This paper begins by systematizing these disparate accounts into a principal-agent model with imperfect information, with rebel leaders as the principal and a civilian as the agent. In order to capture the main theories of child and coercive recruitment, our model departs from standard

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[12] Gutiérrez (2006), Wessells (2006)

[13] Cohn and Goodwin-Gill (1994), ILO (2003), Boyden and de Berry (2004)

[14] Honwana (2005), Machel (1996)

[15] Rosenblatt (1984), Brett and Specht (2004)

[16] Boyden (2003) Peters et al. (2003), Gutiérrez (2006)

[17] O'Donoghue and Rabin (2000), Andvig and Gates (2006)

models in several ways: we allow punishments to be used as an incentive; we allow for the possibility that a rebel leader can "indoctrinate" recruits, so that they have a lower disutility of fighting; and we allow for the possibility that the principal can shape a recruit's expectations through misinformation.

A formal model is useful for a few reasons. Most of all, it is helpful to see that seemingly disparate explanations of child soldiering are actually different facets of a single unified model. This gives us and future researchers a useful way to simulate and understand armed organization and recruitment. It also facilitates tests of some mechanisms over others. We do not model all possible explanations for child recruitment (or recruitment in general) but hope that our model becomes a point of departure for further theorizing on armed organization and action.

Our model also yields several crucial insights and predictions. First, so long as children are less able guerillas than adults, child recruitment is never optimal under basic principal-agent assumptions; we need at least one "non-standard" assumption to hold true: children must be easier to indoctrinate, or they must have a lower outside option, e.g. because they are more easily misled or have a lower probability of successful escape. Second, punishment or coercive recruitment is more likely when recruits have poor outside options and coercion is "cheap"—as when there is little civilian support to lose, or foreign powers insensitive to human rights violations fund the movement, or when militaries fail to protect civilians.[18] Finally, we see that these margins—relative ease of manipulation, difficulty of escape, cheapness of coercion, and poverty of outside options—are not only crucial, but also mutually reinforcing.

These mechanisms and margins are plausible in theory, but which, if any, are important in practice? The second half of the paper explores new empirical evidence on child soldiering and tries to weigh which of the mechanisms are most influential in reality. We mainly draw upon a case study and new micro-level data in Uganda, where the Lord's Resistance Army (LRA) forcibly recruited thousands of youth and plied them with threats and violence in order to make them stay. The evidence suggests that child recruits were less able than adult ones, so superior

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[18] Only evidence for the latter exists; Achvarina and Reich (2006) show that child recruitment is inversely associated with military protection of refugee and displacement camps.

ability is not a driving force of child soldiering in this case. Rather, the Uganda data and interviews suggest that children were retained because they were more easily indoctrinated and misinformed than adults, and had more difficulty escaping—with ease of indoctrination being especially influential.

Finally, we look across conflicts, developing a new database of African rebel groups and running 'cross-rebel regressions'. Cross-rebel analysis is in its infancy, most of all because of the scarcity of data, and so we treat our findings as provisional, to be expanded in future research. But initial data from a random sample of groups display two relationships consistent with our model. First, where we observe child recruitment we also tend to observe forcible recruitment (one of the most easily measured forms of coercion). Second, forced child recruitment is most common when punishment is cheap.

Both the theory and empirics suggest several new strategies to counter insurgency and discourage child recruitment, including the importance of relative reintegration opportunities (for children versus adults), and also a more novel strategy: counter-propaganda and escape training. International policy has been mainly concentrated on a single margin: increasing the cost and risk to rebel leaders of committing war crimes. We show that this approach is effective but probably not sufficient, and that there are other margins being ignored, such as the ability to counter the indoctrination and misinformation strategies that rebels employ. Several grassroots innovations in Uganda exemplify these new approaches, and could be replicated and scaled internationally. They succeeded because they understood local incentives and conditions, and recognized that recruitment is a strategic interaction between rebel leaders and civilians, that leaders respond to incentives, and that victims have agency and can be empowered—important lessons, we argue, for international policymaking and advocacy in general.

2. Modeling child and coercive recruitment

For simplicity, we focus on a rebel leader's marginal recruitment decision and the strategic interaction between the leader and the potential recruit, taking a principal-agent approach. Previously, civil war scholars tended to concentrate on the citizen's voluntary decision to fight, and

the collective action problem therein: why do citizens engage in risky fighting when they could stand back and still enjoy the fruits of victory?[19] While crucial to our understanding of popular revolts, the approach has limitations: it does not help us explain forced recruitment; it focuses on the citizen's decision to participate but ignores his or her decision to exert effort; and it does not address the leader's ability to choose recruits and incentivize performance.

To model both illicit organizations and the recruitment of children, we extend and simplify a moral hazard model proposed by Chwe (1990) and Gates (2002). Our motivation is simple: by understanding this strategic interaction, one can better plan counter-action and predict the consequences of policy.

While economists have long studied coercion, slavery and indentured labor, the strategic logic of coercion was largely ignored. Recently, however, researchers have applied principal-agent theory to understand coercive contracts. For instance, Acemoglu and Wolitsky (2011) show how lords and slave-owners can use force to reduce the reservation utilities of serfs and slaves (i.e., their payoffs if they were to escape), making it optimal for these agents to stay. Chwe (1990) examines child workers in England's Industrial Revolution. He notes that children were more likely to be beaten than adults, and asks under what circumstances contracts will employ pain as an incentive. Using a principal-agent model, Chwe shows that the optimal contract will provide money rather than pain when a worker's reservation utility is high; otherwise those workers will run away. Children, who had poor outside options, would suffer punishment and still participate.

These models have three drawbacks in the context of rebellion. First, they focus on how principals use punishment to lower the *outside* options of their agents. This simplification makes sense when the principal—industrialist, lord or slave-owner—has the state on her side and can exert some control over the payoffs of agents that are not directly overseen by the principal. Illicit organizations, however, like rebel groups, seldom control territory or institutions; they have power only over incentives and expectations within the organization. Second, these models treat agents as fully rational and informed. This assumption may be reasonable when modeling adults and employment, but we are hesitant to assume the same of children. Third, these models

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[19] Scott (1976), Popkin (1979), Lichbach (1995), Wood (2003), Humphreys and Weinstein (2008).

do not allow for the difficulty or costliness of coercion to vary, as might occur through institutional and technological change, or through domestic and international advocacy and action.

We develop a model that brings coercion into the "inside" option, so that violence is used as an incentive. We allow ability, ease of manipulation, and reservation utilities to vary by type (in this case, children and adults). We also include a parameter that represents the costliness of war crimes—in our case, the use of coercion and punishment in recruitment—which could in principle vary across time and place.

Structure and equilibrium of the model

A rebel leader can choose between two kinds of agents—children and adults—who can have different abilities. (We focus the narrative and our data analysis on battlefield tasks, such as fights and raids, where the use of children is most puzzling. For a given task, the leader chooses both the type of agent she wants and the optimal incentive to offer (rewards or punishments). Given this incentive, the agent chooses whether to exert effort). Both the agent's effort and ability affect the success of that task. But the leader only observes whether the task was successful or not, and not the agent's effort. The leader thus faces a moral hazard problem.

To model 'indoctrination', we allow the disutility of effort to be lower for children over adults (in that they can be pushed to value the same goals as the rebel leader). Also, to allow for the fact that children's outside opportunities may differ from that of adults, we endogenize reservation utility, allowing it to vary by age. Both extensions, we will see, are central to the child soldiering story. Indeed, many of the theories of child soldiering discussed in the introduction can be located in this partial equilibrium model. To keep matters straightforward, we ignore the general equilibrium effects (e.g., endogenous wages in the non-rebel economy) and the role of the opposing force (the government counterinsurgency), leaving both for future research.

Specifically, we consider a strategic interaction between a rebel leader and a recruit of type θ (which captures the recruit's effectiveness as a soldier) where the recruit can be either an adult with $\theta = 1$ or a child with $\theta = y$. Let $0 < y \leq 1$. The leader has to make two choices: he decides whether to recruit a child or an adult, and he schedules rewards or punishments that are given to the recruit once a "good" or "bad" outcome has obtained for the leader. He specifically chooses u_G, which the recruit receives if the leader achieves the "good" outcome, and u_B, which the

recruit receives after a "bad" outcome. Both u_G and u_B can be positive (a reward) or negative (a punishment). Simultaneously providing costly punishments and rewards for the same outcome cannot be optimal because the leader can lower u_G or u_B by cutting back on rewards instead of paying for an offsetting punishment.[20]

The recruit chooses his effort level $a \in [0,1]$. The "good" outcome G for the leader (e.g. a victory on the battlefield, or a successful raid) obtains with probability θa, which is increasing in (unobserved) effort and the recruit's type. The "bad" outcome B occurs with probability $1 - \theta a$. Expected utility for the recruit is the expected reward/punishment minus the disutility of effort:

$$\theta a u_G + (1 - \theta a)u_B - \theta^n a^2 \tag{1}$$

where the cost of effort takes a quadratic form, and $n \geq 0$ is an "indoctrination" parameter that, for $n > 0$, implies that a child can be indoctrinated to provide effort at a lower cost than an adult.[21] We normalize the leader's payoff from the "good" outcome to 1 and from a "bad" outcome to 0, and assume that the leader's cost of rewards and punishments is also quadratic. We do not explicitly assume a budget constraint, but the normalization of the leader's payoff from his preferred outcome implies a bound on the leader's ability to absorb costs (i.e., the leader never incurs costs greater than 1).

The leader's expected utility is simply the expected value of each outcome minus the cost of rewards/punishments:

$$\theta a(1 - u_G^2) + (1 - \theta a)(-\hat{k} u_B^2) \text{, where}$$
$$\hat{k} = \begin{cases} k & if \quad u_B < 0 \\ 1 & otherwise. \end{cases} \tag{2}$$

The parameter $k \leq 1$ captures the extent to which punishment ($u_B < 0$) is cheaper to provide than rewards.[22] This cost of punishment could vary over time because of changing technologies of

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[20] Chwe (1990)

[21] A coefficient on the cost of effort that is invariant in θ could also proxy for the degree of popular support that the rebel group enjoys.

[22] The fact that we do not introduce a cost of punishment multiplier on u_G is without loss of generality, because the leader will never optimally choose $u_G < 0$ (see Appendix).

punishment versus reward. The more interesting and relevant variation, however, would be across place, due to the constraints that populations or institutions place on rebel leaders domestically, or across time and place according to the existence and application of international pressure or punishments (or, conversely, neglect and encouragement).

The recruit determines his optimal effort a by equalizing his marginal cost and marginal benefit of effort, known as the incentive compatibility constraint,

$$u_G - u_B = 2\theta^{n-1}a,$$ (IC)

and by checking if minimal ($a = 0$) or maximal ($a = 1$) effort are optimal.

We also assume that a participation constraint has to be met for the recruit in order for him to be retained by the rebel group at all. The recruit's utility has to be at least as high as his reservation value $\underline{u}(\theta)$:

$$\theta a u_G + (1 - \theta a)u_B - \theta^n a^2 \geq \underline{u}$$ (PC)

where $\underline{u} \in \nabla$.[23] We abbreviate $\underline{u}(\theta = 1) = \underline{u}_H$ and $\underline{u}(\theta = y) = \underline{u}_L$ and let $\underline{u}_L \leq \underline{u}_H$. Here the recruit's outside option captures earnings that a recruit could obtain in the non-rebel economy (including aid), the probability that a recruit can escape successfully, and misinformation about the outside world propagated by the rebel leader.

The leader's problem is to choose the recruit's type, incentives, and (indirectly) agent effort, subject to the incentive compatibility constraint (IC) and participation constraint (PC). We assume that the leader can choose to refrain from recruitment entirely and obtain a payoff of zero, and we assume that the leader prefers this strategy over others that yield the same utility. We also assume that the leader makes a correct forecast of the cost of punishment. We eliminate equilibria that contain weakly dominated strategies. We illustrate the solution and comparative statics graphically, below, and provide a solution and proofs in the Appendix.

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[23] A negative reservation value implies that a recruit is willing to submit to punishment inflicted in the rebel group in order to avoid even harsher conditions elsewhere, such as the prospect of hunger.

Comparative statics in equilibrium

Minimum conditions for child soldiering

A key insight of the model is that, if children's ability is less than that of adults, one of two conditions have to be met in order for child soldiering to be optimal: either leaders must be able to indoctrinate children so that they contribute effort at a relatively lower cost, or the reservation value for children is lower than that for adults and this ease of retention compensates for a child's relative lack of ability.

To see this, observe that child soldiering is never optimal if neither of these conditions is met. Figure 1 plots the leader's utility against the ability level of any potential child recruit. We display the leader's utility for low ($k = .05$) and high ($k = 1$) costs of punishment, where a higher k could be consistent with domestic or international penalties for war crimes. The figure indicates that the leader prefers to recruit an adult for any possible level of children's productivity (with the exception of the upper bound $y = 1$, at which point children and adults are indistinguishable). This is true even in a domestic or international environment that makes war crimes costly.

Role of indoctrination

Next, consider the case where the leader can indoctrinate children ($n > 0$). Figure 2 plots the leader's utility for different child ability levels, but here we have indoctrination parameter n on the horizontal axis. For positive n, children can engage in rebel activities at a relatively lower cost of effort than adults. As n gets large, child soldiering becomes the leader's optimal strategy. The ability to indoctrinate less able recruits can turn them into attractive targets for recruitment.

The relationship between the ability to indoctrinate and child soldiering is strengthened if punishment becomes cheap (i.e. it is not penalized). Figure 3 plots the leader's utility against indoctrination parameter n, as before, but for different values of k and different values of child ability y. Child soldiering becomes optimal at the points at which the curved lines intersect the horizontal line (the leader's payoff from recruiting an adult).

Note that more able children (higher y) lead to relatively more child soldiering. Child ability is not simply a function of physiology but can also be influenced by technology. For instance, we

could view the invention or increased availability of light automatic weaponry in the late 20th century as causing an upward shift in *y*.

If children are sufficiently effective fighters and the leader can inflict punishment at low cost, then even small amounts of indoctrination can translate into child soldiering. By bringing a child's values and effort in line with the rebel leader's objectives (modeled here by a lower disutility of effort) indoctrination makes it easier for the rebel leader to satisfy both the incentive compatibility and the participation constraints.

Relative outside options

We can also consider the case where adults and children have different outside options, which can lead to child soldering even if the leader is unable to indoctrinate recruits at all. Figure 4 plots the leader's utility against the distance in reservation values between adults and children.

A difference in outside options could correspond to a real difference in opportunities, such as differential education and employment opportunities for adolescents versus adults (the reservation age), but also different reintegration programs, or different abilities to reintegrate into the community and family. These differences could also be *perceived*—for instance, if children are more easily misled about their outside prospects than adults. As we move along the horizontal axis, children are more and more easily retained in comparison to adults because of a greater difference in real and perceived outside options. At the point at which the two plotted lines cross, the ease with which a child's exit from the rebel group can be deterred outweighs the child's lower ability relative to an adult recruit.

Note that cheap punishment—such as an absence of international or domestic penalties— compounds this effect and decreases the size of the gap between reservation values that is necessary for child soldiering to be an optimal strategy for the rebel leader. Figure 5 illustrates this result and repeats the previous graph for different values of *k* and different values of *y*. For sufficiently low *k*, child soldiering becomes the leader's preferred strategy when it would not be the case otherwise. The intuition is as follows: Suppose punishment is as costly as rewards. Then a decline in children's outside options makes them relatively more desirable for recruitment by the leader, because he is now less constrained in punishing children for outcomes that the leader considers bad. But this is only true to a point: If the reservation value for children drops low

enough, the leader is not constrained by it any longer but is instead worried about the additional cost he would incur if he further increased punishment. In other words, at some point the leader cannot afford to punish more, even if it was possible in terms of reservation values, and so any additional decrease in reservation values will not make the leader any more likely to recruit children instead of adults. So what happens if k is small and punishment cheap? Now the leader can afford to inflict additional punishment and exploit the additional decline in reservation values, i.e. children continue to become relatively more attractive targets.

The model implies that advocates and policymakers must pay close attention to the relative opportunities for adults versus children, not merely absolute opportunities. If adult employment or wages grows faster than those for adolescents, or if school reconstruction lags, or if (as has sometimes been the case) demobilization programs are more generous to adults, then policymakers could unwittingly increase the incentives for rebels to shift to younger recruits. As we see below, policymakers may also be able to do more to shift perceived options than commonly believed, adding a new policy lever.

Coercion and child recruitment go hand in hand

Finally, the model demonstrates that coercion is visited upon child soldiers to a greater extent than adult recruits. To see the intuition for this result, note that if child soldiering is possible, then cheap punishment will make it more likely, as suggested above. But this leads to a situation in which the leader's costs for a child soldier tend to generate more punishment than his costs for an adult soldier, with the consequence that the rebel leader motivates child soldiers more than adults by threatening (and imposing) punishment.

To summarize, we expect child soldiering to be the result of the ease with which children can be indoctrinated by rebel leaders and children's (often manipulated) perception that they have poor outside options. A reduction in the cost that the rebel leader pays for punishing his recruits exacerbates any trend toward child soldiering.

We can extend the logic of the model and offer plausible conjectures about other factors that we do not take into account explicitly. For example, we could incorporate popular ideological support for the rebel group among adults as a reduction in the cost of effort for an adult recruit. This would mitigate the effects of indoctrination and reduce the likelihood of child soldiering.

We highlight the indoctrination of children and the ease with which they can be retained not because these are the only determinants of child soldiering amenable to game-theoretic analysis, but because they offer a particularly compelling account of empirical patterns discussed below.

3. Empirical strategy

The theoretical framework above hinges on several crucial assumptions, each with a relatively weak and anecdotal base of evidence. One is that child fighters are less able than adult fighters. A second is that children are more susceptible to manipulation. A third is that coercive recruitment varies with the costliness of punishment. Data on labor coercion and child recruitment are rare, which is one reason why nearly all of the theoretical literature discussed above has remained theoretical, motivated mainly by historical narratives and cases.[24] This paper uses new data and three main empirical strategies to establish the reasonableness of these assumptions and the overall framework.

First, we intensively study the case of one rebel group, the Lord's Resistance Army, one of the most notorious child recruiters. We use dozens of interviews with former LRA recruits along with a representative survey of survivors to examine leader motivations as well as recruitment, command and control strategies.

Second, we use the unusual nature of LRA forced recruitment—a uniform, coercive strategy of abduction and violence offered nearly at random to youth of different ages—to assess the reasonableness of the "ease of manipulation" assumption at the center of the theory, as well as which forms of manipulation were especially effective and why. Our survey of LRA survivors collects self-reported measures of each of these mechanisms—belief in LRA ideology, disinformation received, and escape experiences—and compares responses by age of abduction.

Finally, a handful of the model's predictions are cross-national, helping to predict what types of groups and environments will lead to child soldiering. At least two determinants should vary

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[24] One of the few quantitative studies of child soldiering come from Achvarina and Reich (2006), who show that security forces in refugee and displacement camps diminish child recruitment. The finding suggests that rebel leaders respond to incentives, but leaves open why child recruits were sought in the first place.

across conflicts and groups: the cost of punishment, and reservation utilities for the average child and adult. We focus on the former, measuring the factors that influence cost of punishment across rebel groups, and look for correlations with child and coercive recruitment.

4. Case study: Child recruitment in northern Uganda

The LRA has fought a low-scale guerrilla war against the Government of Uganda since 1988. The rebels are led by Joseph Kony, a spirit medium of the Acholi tribe. They seek a spiritual cleansing of the nation and a return to the political dominance that northern tribes enjoyed for the two decades following independence.[25]

Civilian support for the LRA was meager from the start, even among Kony's fellow Acholi. Initially, Kony pulled together a few hundred hardened fighters, the remnants of other rebel groups. Unpopular and poorly equipped, these fighters raided the homesteads of their co-ethnics for food, medicine, and recruits, where small roving bands forcibly recruited youth in nighttime raids on rural homes. From 1988 to 1994 the LRA stole several thousand youth.

With few natural resources, and declining popular support, the rebellion might have died out were it not for the Government of Sudan, which in 1994 began providing the LRA with arms and territory. Their support invigorated the LRA, and attacks and abductions escalated. Tens of thousands of Ugandan youth, mainly adolescent males, were abducted after 1994. Young women were also taken to become fighters, servants, and wives.[26] The vast majority of abductees, roughly 82%, eventually escaped and survived. A few hundred abductees are thought to remain in the bush—less than 1% of the estimated 60,000 to 80,000 abductees.[27] The rest, tragically, are presumed perished.

LRA activity peaked in 2002 when the Ugandan army drove the LRA from Sudan into Uganda, and intense fighting continued through 2004. Defeat suffered since that time has kept

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[25] The account in this section draws on Omara-Otunnu (1994), Behrend (1999), and Allen (2005).

[26] Annan et al. (2009)

[27] Pham et al. (2007), Annan et al. (2006)

the LRA small and on the move, principally in the eastern Democratic Republic of the Congo (DRC) and southern Sudan. They ceased abduction in Uganda by 2005.

The LRA is sometimes held up as the archetypal barbaric, apolitical rebel force of Africa's so-called "new wars". Close observers of the LRA, however, see the method in Kony's madness.[28] While LRA tactics were undoubtedly distorted by spiritual beliefs and ideology, our evidence testifies to the strategic logic of LRA coercion and child recruitment.

Data

We conducted qualitative interviews with more than 100 former abductees, 20 community and clan leaders, and 25 commanders from the Ugandan armed forces and the LRA over ten months in 2005-07. Among the LRA, our subjects were foot soldiers and mid-ranking officers, including junior commanders, catechists, spies, 'wives', bodyguards, and even accountants. Interview subjects were contacted through key informants, such as village leaders, and are not necessarily representative of all rebels. Returned senior commanders were not interviewed as their colleagues had recently been indicted by the International Criminal Court and we believed their testimony would be compromised as a result.

We also conducted a population survey in concert with an NGO, a psychologist, and human rights scholars. A first survey, in 2005, targeted males born in the Districts of Kitgum and Pader between 1975 and 1991, and a second round in 2007 interviewed the same cohort of females. The survey collected self-reported, retrospective information on war and abduction experiences, as well as current well-being.

To minimize attrition from migration and mortality, we selected respondents retrospectively, from a sample frame of youth living in the region before escalation of the war. We randomly sampled 1,162 households in eight clusters, using the earliest sample frame available: UN World Food Programme lists compiled in 2002. 88% of sampled households were found. Enumerators worked with household heads to develop a roster of all youth living in the household in 1996, a year easily recalled as the date of the first election since 1980. Using these rosters, 881 surviving

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[28] e.g. Allen and Vlassenroot (2010), Finnström (2008)

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males were randomly selected and interviewed in 2005-06 and 857 females were selected in 2007. Former abductees were oversampled in both cases.

More than a third of target respondents had moved since 1996, and enumerators tracked them to their current locale. 741 males and 619 females were found, including 688 abductees. Thus there are two sources of attrition. A first is mortality (including not returning from abduction, which in nearly all cases implies death): 29% of male abductees and 12% of female ones perished since 1996. The second is failure to locate migrants: we tracked but were unable to locate 9.4% of male abductees and 18.3% of female abductees. Female absenteeism is higher because of migration for marriage; the return from displacement that began in 2006, and the time elapsed since the 2005 rosters.

Patterns of LRA recruitment, command, and control

Forced recruitment by the LRA was large-scale and indiscriminate. Rural Acholi households live in scattered rural homesteads at some distance from their neighbors. Typically, abduction parties of 10 to 15 guerrillas would swing down from their Sudanese bases to conduct military missions several weeks in length, raiding homesteads in their path for loot and recruits. Roughly two in five males and one in five females aged 14 to 30 report they were abducted for at least an hour. These abductions ranged in length from a day to ten years, averaging 8 months for males and females. The LRA would begin training abductees as fighters within a few weeks of abduction, including firearms training. Those who had not escaped within the first two weeks were entrusted with their own weapon after an average of 3.5 months.

The LRA focused on abducting young adolescents. Figure 6 illustrates the distribution of age at the time of recruitment. Three times as many youth aged 14 were abducted as those aged 9 or 23. The preference for adolescent boys holds true even after adjusting for the disproportionate number of young people in the population; a 14-year old youth in the study population had a 5% average chance of abduction—twice the risk faced by ages 9 or 23.

The focus on adolescents is more pronounced once we account for release. LRA raiding parties commonly abducted all able-bodied members of a household to carry looted goods, but were often under explicit instructions from Kony to release children under 11 and adults older than their mid-20s, once loot was delivered safely. 15% of abductees were released in the first

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two weeks of abduction. Figure 7 displays a running mean, by age of abduction, of the deviation from the average probability of release (adjusted for location and abduction year). Release is highest for children under 10, dips sharply for adolescents, and is rising in age thereafter.

The impoverished LRA seldom provided material incentives. Just 5% report material rewards, mainly food. Money or loot was rarely given, even to officers. Such rewards were promised upon victory, however. "They used to tell us," said one abductee, "that if we fight and overthrow the government then we would get wealth, and even the young soldiers would get high ranks".

Violence and the threat of punishment was the main instrument of control in the LRA. 54% of abductees were severely beaten (versus 12% of non-abductees) and 24% report being attacked with a weapon (versus 3% of non-abductees). Beatings or death were the punishment for attempted escape, a sentence other abductees were often forced to carry out with weapons.

Initiation sometimes involved the forced commission of violence; 26% of abductees were forced to harm or kill a civilian, and 23% to desecrate dead bodies—a deeply held taboo. 12% of abductees report being forced to kill a family member or close friend. Such violence served to break down a youth's psychological defenses and desensitize her to violence. More importantly, it bound her to the group, by raising the specter of community rejection if she were to flee.

Other forms of misinformation were used to promote fear and loyalty. Abductees were told that rebels would kill escapees and their families. Abductees who caught word of the government amnesty were told it was a ruse, and any who escaped would be killed by the government. The LRA banned radios after the government began to announce messages of peace on air.

The LRA also limited escape opportunities by moving the abductee as far as possible from home. Half of abductees were tied, and the first day's march would deliberately backtrack and disorient. Abductees were taken to the bases in Sudan as quickly as possible.

Spiritual practices were also central to motivating recruits—an explicit attempt to create new social bonds and loyalty based on a shared cosmology (as well as fear). Kony created a cult of mystery and spiritual power which few Acholi question even now. Those with whom we spoke disagreed not on whether Kony possesses spiritual power, but rather whether these spirits are good or bad. These purported powers were used to instill fear, awe, and loyalty. A spiritual initiation ceremony was reported by the majority of those taken two weeks or longer. The LRA

is highly structured, with detailed spiritual restrictions on personal conduct (e.g. eating, drinking, and bathing) and on military practices. Kony is also feared and respected as a prophet.

While spiritual messages and initiation were common, so were political propaganda and the promise of material rewards. The importance of overthrowing the government is most commonly reported in our data, followed by incitement over crimes committed by Museveni and promises of government positions, both of which could heighten recruits' efforts without an increase in tangible incentives.

Together, this spiritual, political and material propaganda were often effective. 31% say they once felt allegiance to Kony, 5% admitted there was a time they felt like staying with the LRA, and 6% admitted that they aspired to become a commander. Of those abducted more than 2 months, those figures rise to 63, 26, and 16%. According to a two-year abductee, "for a time I forgot survival and became a part of them; I was abducting and stealing just like them." Such "forgetting" and shift in identity was commonly reported. In some cases this was associated with Kony's spiritual powers. According to one informant, "In the bush, there is something that confused people. There is a certain type of holy oil which they put on you. It confused you and you could never think of home."

Accounts of allegiance and forgetting suggest that LRA discipline, religion and propaganda did not simply change individual incentives, but fundamentally altered the beliefs and values of recruits. Such indoctrination, misinformation, and identity manipulation has been widely remarked upon in social psychology and military sociology. More recently, economists Akerlof and Kranton (2005) have articulated how such preference shifts can be formally modeled in the framework of incentive theory, arguing such preference shifts are the most plausible explanation for observed behavior.

For those who remain with the LRA for long periods of time, the decision to escape is usually associated by a moment of "awakening". "When I grew up," explained one young man, "I saw that everything Kony said was false. If it were really true then the government could have been overthrown. And here the people he abducted before me had all escaped." Some of these stories reflect a realization that the promised benefits would not be received: "We would ambush and carry things," said another young man, "but then I wouldn't benefit. It was the leaders who

benefited. Then I thought I should escape because I had not gone on my own but had been abducted."

Estimation

LRA recruitment closely resembles our theoretical framework. Violence is employed as an incentive for performance, with threats of severe punishment for dereliction or desertion. Rebel commanders also use violence to lower reservation utility, but not necessarily through the threat of force. Rather, they force abductees to criminal acts and convince them (incorrectly) that they face nothing but punishment, death or exile on the outside. Commanders try to shape expectations rather than reality. This coercive strategy came cheaply; with no civilian support to lose, and material backing coming from one of the least human-rights-sensitive regimes on the planet (Sudan), the LRA faced little penalty for its abductions and abuses. Finally, indoctrination and misinformation were central to LRA retention, and seem to have been successful in a substantial number of cases—enough to give the LRA a force of some thousands of relatively dedicated fighters by 2001.

What these averages do not explain is the overwhelming abduction of young adolescents so evident in Figures 6 and 7. Our model suggests several reasons that children may be more attractive, especially higher susceptibility to indoctrination and misinformation, and more difficulty in escape. It also predicts the greater use of threats and lower rewards. We conduct "cross-age comparisons" of the self-reported actions, attitudes, and experiences of abductees.

Graphically, we examine non-parametric regressions of a self-reported attitude or experience over age of abduction. We calculate a running-mean via nearest-neighbor smoothing with unit bandwidth.[29] We also look for linear relationships with weighted least squares regressions. To account for changes in rebel practice over time, space and gender, we include abduction year indicators and gender-specific indicators for location of birth.

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[29] Some experiences (including rewards, roles, and attitudes) were only measured among those abducted more than two weeks. Unless otherwise noted, all figures and Table 1 assume a value of zero rather than a missing value for these short abductions. The results are robust to the exclusion of these short abductions.

In most rebel groups, such cross-age comparisons would be biased by differential selection into the rebel group: the more willing or susceptible would self-select into the group, or be selected or screened by commanders. The characteristics that drive selection may be correlated with age (indeed, that is the entire basis for our model of child recruitment), biasing the coefficient on abduction age. LRA recruitment, however, was largely indiscriminate, and nearly indistinguishable from random. Abduction party leaders reported that the only criterion for abduction was the demand to release young children and adults. Indeed, abduction by the LRA is indistinguishable from random abduction after accounting for year and location of birth. No other pre-abduction household trait is associated with a higher risk of abduction, whether household wealth, education levels, or orphaning. In logit regressions of abduction on pre-war household traits the coefficients on wealth, education, occupation and orphaning are small and not statistically significant.[30] In contrast, these same characteristics predict survey respondents' participation in a government militia. Only household size predicts abduction by the LRA: large households were slightly less likely to be raided, perhaps because they were harder to control by a small band of fighters. Nevertheless, to account for any unobserved selection into abduction, we include pre-abduction covariates such as household assets and parents' occupation, education, and death.

Two other potential sources of bias are systematic measurement error and selective mortality. We are especially concerned about under-reporting of measures such as loyalty or violence committed. So long as any systematic error is uncorrelated with abduction age, however, that measurement error will be cancelled out in cross-age comparisons. Only measurement error that varies with age of abduction will cause bias. Bias from mortality is unknown, but the most plausible forms of selection (e.g. children are less skilled fighters, and the less skilled are more likely to die) understate cross-age differences.

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[30] See Blattman and Annan (2010)

Results

Results are summarized in Figures 8 through 10 and Table 1. Panel A of Table 1 estimates the linear relationship between abduction age and experiences, and Panel B estimates the quadratic relationship.

Coercive incentives

Not only were the LRA more like to forcibly recruit adolescents than adults, but once recruited, younger recruits received more punishments and fewer positive inducements. Virtually no recruits received actual rewards other than extra rations, and we see no correlation (linear or quadratic) between the receipt of such rewards and age of recruitment (see Table 1, Column 1). But older abductees were more likely to report positive inducements in the form of promises and propaganda: either promises of riches or positions upon victory, or appeals to ethnic dominance.[31] The probability of propaganda rises 1.4 percentage points with each year of age (Column 2), from an average of 42% among 11–13 year olds to 79% among those aged 24–26.

Threats were universal, but younger abductees were more likely to report threats but no positive propaganda (Column 3). Children were also more likely to be forced to commit acts that would reduce their real and perceived outside options. Being forced to kill a family member fell by 0.9 percentage points per year of age while being forced to abuse dead bodies fell by 0.7 percentage points per year (Table 1, Columns 4 and 5). These are large declines relative to the average incidences, 12% and 23%. These patterns echo the relationship between child recruitment and coercion predicted by the model.

Effectiveness as fighters

While fighting effectiveness is difficult to measure, the interview and survey evidence suggests that children were less able on the battlefield than older adolescents and adults. In interviews, junior commanders and long-term abductees emphasized that children under 12 were extremely loyal, and could be useful servants, but were not effective fighters.

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[31] Incidence of threats and propaganda was only measured on abductions longer than two weeks.

The data support these claims. First, older adolescents and adults received a gun sooner than younger adolescents and children. Leaders waited longest to give abductees younger than 12 a gun: male youth aged 8–9 took roughly 10 months to receive a gun, compared to 4 months for youth aged 11–13 and 1.8 months for those 24–26 (Figure 8a). Moreover, a large number of young abductees never received a gun. Young children were nearly half as likely to have received one as adolescents aged 15 to 17 (Figure 8b). Regressions using an age quadratic suggest that these non-linear relationships are statistically significant (Table 1, Columns 6/7).

Finally, adolescents were more likely than children and adults to report that commanders considered them dependable fighters (Column 8). Self-reported dependability peaks at ages 15 to19 and is lowest among younger children and older adults. This pattern is consistent with younger children being trusted but less effective fighters, and older adolescents and adults being able but untrustworthy and difficult to manipulate—a finding reinforced by evidence on the relative ease of manipulation.

Ease of escape, misinformation and indoctrination

Figure 8 illustrates why rebel leaders can coerce children to a greater extent than adults: younger abductees stay longer before attempting escape. Abduction length falls steeply in abduction age, from a year at age 11–13 to 4.5 months by age 24–26. Abduction length falls by 0.72 months for every year of age (Table 1, Column 9). Judging by the quadratic terms, the relationship is steepest in pre-adolescence and tapers off afterwards.

Why do children stay longer with the LRA? According to one long term abductee, "it is easy to convince a child of 12 years of anything. He will believe any promises made and does not know the difference between good and bad. But if you are mature, you know they will not overthrow the government." Indeed, the data suggest that older abductees were less likely to report that they ever felt safer in the LRA, falling 0.3 percentage points with each year of age, from 6% at age 11–13 to 2% at age 24–26 (Table 1, Column 10). Older abductees (especially males) were also least likely to report feeling allegiance to Kony (Column 11). Allegiance fell by 0.9 percentage points with each year of age, from 34% at age 11–13 to 22% at 24–26. We illustrate these relationships in Figure 10.

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Older males were also less likely to say they believed in Kony's spiritual powers, such as the claim that his magic provided protection from bullets (Column 12). This belief fell 0.5 percentage points with each year of age (significant at the 10% level), from 13% among those abducted at age 11–13 to 8% of those 24–26. Roughly 13% of adolescent abductees report there was a time they felt like staying with the LRA, with these rates falling steeply towards zero on both sides, among young children and adults. Thus we see little linear relationship but a robust quadratic relationship (Table 1, Colum 5). Aspiration to become a commander is also U-shaped in nature, 7% in the teenage years, falling below 5% among both children and adults, though the relationship does not appear to be statistically significant (Column 6).

Turning to escape, exit from the LRA took three forms (excluding release): rescue by the Ugandan army (7%); escape in the heat of battle (32%); and running away at night or when scavenging (61%). Involuntary escape, such as rescue, is highest among the young and falls by 0.6 percentage points for every year of age (Table 1, Column 15). Voluntary and premeditated escape, on the other hand, is least common among the young, rising by 1 percentage point with each year of age (column 16)—from 49% at age 11–13 to 61% at 24–26.

LRA officers and abductees explained that young abductees were most fearful of escape because their surroundings were less familiar and they were insufficiently cunning. According to a 7-year servant to Kony, "Old people are able to escape, but for the children it is difficult because they do not know how." The survey asked abductees if they knew their whereabouts when they escaped. Familiarity with one's location at the time of escape is increasing in age— 1.3 percentage points for each additional year (Column 16), rising from 38% at age 11–13 to 49% at age 24–26.

5. Cross-national evidence

Collectively, the micro-evidence above suggest that our core theoretical assumptions, on ease of child manipulation, is an important one. But children's relative ability and ease of indoctrination are unlikely to vary substantially across time and space. Our model also suggests two main sources of cross-country variation in child recruitment that interact with ease of manipulation to produce child recruitment: the cost of punishment, and relative outside options. In the remainder of the paper, we use new cross-rebel data to investigate variation in the costliness

of punishment. We leave the study of relative outside options to future research (as it requires age-disaggregated microeconomic data on wages and schooling in conflict zones).

The model suggests that we should not observe child recruitment where punishment is expensive, as when groups start with and depend on high initial levels of civilian or diaspora support, or face international penalties or prosecution. Similarly, rebel groups with low levels of initial civilian support and resource bases that are unresponsive to crimes (such as those with natural resource bases or indifferent foreign donors) should be more likely to employ coercion and children.

Forcible recruitment is the most easily measured form of coercion. We develop new data on forced and child recruitment, by rebel group, and compare the prevalence of forced child recruitment by sources of material support: civilian support, foreign governments, and natural resources.

Such cross-rebel statistical analysis is plagued by a number of challenges. First, information on rebel recruitment and resources is scarce, scattered and inconsistent, and so our data (like all cross-national data on Africa) should be treated with circumspection. Second, we only observe groups that have been minimally successful in organizing and sustaining a movement, so observability is likely correlated with both recruitment strategy and resource base. Thus cross-rebel regressions must be used with caution. Nevertheless, this group-level analysis is more novel and more insightful than the usual cross-country analysis, and presents a rare large-sample means of testing theories about rebel organization and behavior.

Data and measurement

To maximize data quality and depth, we gathered data on a random sample of African rebel groups. We sampled at the conflict level (allowing multiple conflicts per country) using all conflicts in sub-Saharan Africa, 1980-2004, reported by UCDP/PRIO.[32] We sampled 14 of 42 conflicts, stratifying the sample by the number of conflicts reported in a country. Within each, we collected information on all non-state actors listed by UCDP/PRIO, excluding coups: 40

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[32] Harbom et al. (2008)

groups from a total of 124. The sample includes groups from Burkina Faso, Cote d'Ivoire, DRC, Ethiopia, Gambia, Guinea-Bissau, Mali, Nigeria, Senegal, Somalia, South Africa, and Uganda.

A team of student researchers used reports, academic literature, and news archives to develop group-specific narratives on key variables: method and age of recruitment, remuneration type, and resource base (material and social, internal and external). Academic experts on each group were then contacted to complete and validate information.

Data on child and forced recruitment is scattered and inexact. We coded the *percentage of recruits under 18* by classifying groups into one of five bins: 0-5%, 5-19%, 20-39%, 40-59%, or 60-80%. We use the midpoint of each bin. The mean of this variable is 0.13 and the standard deviation is 0.13. We also developed an indicator for evidence that at least 20% of recruits experienced *forced recruitment* (data availability made a more precise coding impossible). We observe forced recruitment in one third of groups. We combine these two measures into an indicator for *forced child recruitment*, which equals one if more than 20% of recruits are believed to be coerced and more than 5% of recruits are under 18.

Finally, we develop three indicators for initial resources: an indicator for local population support, an indicator for financial support from a foreign government, and an indicator for access to natural resource wealth (such as oil, diamonds, or other commodities).

Note that, with the exception of the LRA, there are no representative survey data on our sample, and so all coding is subjective. Data are weakest for a third of the groups who were small, short-lived and obscure. We create a dummy for groups active less than two years. Column 1 of Table 2 lists summary statistics.

Results

We began this paper with two puzzling facts: child soldiering was not only commonplace, but also closely associated with forced recruitment. Our rebel data confirm both. Figure 11 plots the distribution of percentage recruits under 18 over our forced recruitment indicator. The box represents the 25th to 75th percentile, and the red dot the median; they are non-overlapping. A regression of the percentage recruited under age 18 on forced recruitment (not shown) yields a

mean difference of 14 percentage points.[33] Here we face a problem of aggregation: it is possible that the 10 to 20 percent of children are the same 10 to 20 percent that are thought to be forcibly recruited. Given the scarcity of data it is difficult to say, and an investigation of our hypothesis and predictions will likely require further comparative case work or new, finer databases.

We examine the role of resources in Table 2. We use a linear probability model with binary independent and dependent variables, giving the coefficients a simple interpretation: the increase in the probability of forced child recruitment associated with a particular endowment. We consider each endowment individually (Columns 2 to 4); then together (Columns 5 and 6); with the LRA, a potential outlier, omitted (Column 7); and, finally, allowing foreign influence to vary after the Cold War (Column 8). The results provide suggestive, but not conclusive, support of our model.

Initial civilian support is associated with a 22 to 29 point reduction in the probability of forced child recruitment, as predicted by the model. The result is not statistically significant, however except when controlling for all resource bases and short-lived rebellions, and even then the relationship is significant at only the 10 percent level (Column 6).

Natural resource access is associated with a 6 to 13 point increase in the probability of forced child soldiering, also as predicted, but the effect is smaller and weaker than expected—quite substantial inverse effects are also within the (wide) confidence interval. This could be due to the diversity of natural resource wealth (some resources are not easily looted without the cooperation of local civilians).

Support from a foreign state is strongly associated with forced child recruitment, however—a 38 to 41 point increase, significant at the 5% level. These foreign sponsors are typically other African countries (only in one case, SWAPO in South Africa, do we have clear evidence of support from developed nations). Foreign support is diverse in nature, and can come with many

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[33] We might be concerned that the LRA is an outlier and drives the result. Excluding the LRA reduces the coefficient to 9 percentage points (standard error of 0.026) and so the difference remains significant. Also, the LRA is not an outlier; numerous African groups outside our random sample, including several in Liberia and Sierra Leone for which survey data are available, have similar levels of child recruitment.

conditions, but we observe few instances where a rebel group's human rights record is taken into account, especially before the Cold War. It is difficult to imagine a reason that these state sponsors would explicitly encourage forced recruitment, least of all children. We interpret the coefficient as reducing the costliness of punishment, by providing rebel groups an alternative source of funding than local civilians.

These represent some of the first "cross-rebel regressions" performed, and we hope they spur further data collection and tests. In the meantime, the results suggest that unconditional foreign sponsorship was a significant force in reducing the accountability of rebel groups and the consequent costs of engaging in coercion and civilian violence.

6. Conclusions

International and domestic actors predicate their actions, implicitly or explicitly, on a theory of conflict. But theories of conflict typically take the existence and organization of armed groups as given, and many international relations theorists assume that armed groups are unitary actors and leave aside the question of who fights and why.[34] Those who study the origins of rebel organization, moreover, have tended to focus on the collective action problem in rebellion—i.e. the participation constraint. They have paid less attention to problems in agency theory, especially incomplete information and incentive compatibility—the incentives for recruits to perform and obey. Notable exceptions include Weinstein (2007) and Gates (2002), who both look at how geography and ideology shape rebel recruitment strategies under incomplete information. Our analysis joins these papers in arguing that theories of industrial organization can add to our understanding of rebellious groups, especially systems of recruitment, command and control, and thus shape counter-insurgency as well as policy to prevent war crimes.

Clearly, raising the cost of child recruitment is crucial, and the recent policy focus here is well deserved. Aid can be conditioned on human rights behavior. Financing from diasporas and other funders can be frozen. And the threat of prosecution is powerful. But is it sufficient? Child recruitment can still be optimal when the costliness increases, especially when children's opportu-

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[34] Blattman and Miguel (2010), Powell (2006)

nities are poor or leaders exert control over the information that reaches them. Also, prosecution is not without difficulty. The first prosecution for child soldiering, against Lubanga, has gone poorly and narrowly missed an acquittal (New York Times 2011). And prosecutors have no means of bringing leaders like Kony to justice. This tool is powerful, but not all powerful.

One insight highlighted in this paper is that war crimes like forced recruitment, or inflicting punishments, is a rational and optimal strategy for motivating people who are poor in the sense of having bad alternatives. Hence children's reservation utilities are crucial—it is only because they are low in expectation that abduction and punishment are optimal. Raising real opportunities—educational and economic—should make rebel recruitment more difficult (or at least more expensive) for children and adults alike as the participation constraint becomes more difficult to satisfy. But there are dangers. First, intermediate levels of development could push the optimal age of recruitment downwards if adults share in growth more than children. Second, demobilization and reintegration programs must pay attention to relative impacts on children and adults. Counter-insurgency and post-conflict programs commonly do the opposite, concentrating programs on adults and leaders, and being slow to generate educational opportunities for adolescents, especially the remedial services they need to restart education.

In any case, reducing poverty and increasing access to education are long term solutions to an urgent and immediate problem. The LRA case shows the incredible power of rebel groups to distort perceptions, especially those of children. Real opportunities may matter less than perceptions. Where child abductions continue to occur, our results suggest an unconventional intervention by domestic actors and the international community: counter-propaganda and counter-abduction training.

A child's reservation utility is lower partly because the rebel leader exploits a child's lower expectations of successful escape and community acceptance. Children in the LRA were also taught to value the same objectives as the rebel leader, particularly spiritual rewards. Programs of education and counter-propaganda can counter these manipulations.

Just as Western schoolchildren perform fire drills, or learn not to speak to strangers, so should children in war zones be drilled in escape and resistance to misinformation. Just such a grassroots effort was launched by Ugandan civil society, albeit too little and too late. In 2000,

organizations began to broadcast radio messages of welcome and amnesty. One rebel commander reported that, by 2004, such broadcasts led to orders to halt new abductions: widespread knowledge of amnesty and reconciliation meant that new abductees would reveal the truth and prompt mass desertion. Informal education programs also emerged. Returned youth taught younger relatives and neighbors how to escape. Experienced hunters also began to pass on traditional methods of navigation by the shape of various rock formations scattered across the region's landscape.

In retrospect, more and better education and communication earlier in the conflict could have reduced the effectiveness of LRA abduction. It is difficult to imagine UNICEF or education ministries distributing abduction-training curricula to schools. The policy would be a frank admission of their failure to protect, and politically difficult. Nevertheless, in future conflicts, some institutionalized mechanisms for counter-propaganda, escape training, and other counter-measures ought to be a central part of the governmental and non-governmental response to war.

7. Theoretical Appendix

The rebel leader's problem is to optimally choose recruit type θ, incentives u_G and u_B, and agent effort a, subject to constraints (IC) and (PC). We form the Lagrangian and derive FOCs

$$\theta(1 - u_G^2 + \hat{k}u_B^2) - \lambda_1 2\theta^n - \lambda_2\left(\theta(u_B - u_G) + 2a\theta^n\right) = 0, \tag{3}$$

$$\theta(\lambda_1 + a(\lambda_2 - 2u_G)) = 0, \text{ and} \tag{4}$$

$$-2\hat{k}u_B(1 - a\theta) - \lambda_1\theta + \lambda_2(1 - a\theta) = 0. \tag{5}$$

Denote as σ_1^* the candidate solution in which the leader abstains from recruitment entirely and receives a null utility. The leader is indifferent over actions off the equilibrium path, but we let $u_B^* = u_G^* = 0$, $a^* = 0$, and $\theta^* = 1$ for σ_1^* due to weak dominance. We can then establish the following Lemmas.

Lemma 1. In any equilibrium, $0 \leq u_G^* < 1$.

Proof: First, consider the claim that $u_G^* < 1$. Suppose $u_G^* > 1$. Then (2) yields utility below the leader's utility from σ_1^*, a contradiction. Any strategy profile with $u_G^* = 1$ yields utility no higher than 0, but we assumed that the leader will select σ_1^* over any other strategy profile that yields the same utility. Second, consider the claim that $u_G^* \geq 0$. We examine whether the leader has an incentive to deviate and choose $u_G^* + \varepsilon$ for some $\varepsilon > 0$. First, the recruit's utility is increasing in u_G and hence (PC) is satisfied by $u_G^* + \varepsilon$ if it is satisfied by u_G^*, given the leader's optimal choice for θ. Second, a is increasing in u_G by (IC). But the leader's utility is increasing in a and decreasing in the cost associated with u_G, so $u_G^* + \varepsilon$ yields a higher payoff than $u_G^* < 0$, a contradiction.□

Lemma 2. In any equilibrium with recruitment, $a > 0$.

Proof: At $a = 0$, outcome B obtains for sure and the leader can achieve no higher than a payoff of 0. But then the leader prefers σ_1^* to any strategy profile with $a = 0$, and hence no such strategy profile can be in equilibrium. Since a is non-negative by assumption, this implies the Lemma. □

Now consider the case where (PC) binds. We solve (IC) and (PC) for

$$u_B = \underline{u} - \theta^n a^2 \text{ and} \tag{6}$$

$$u_G = \underline{u} - \theta^n a^2 + 2\theta^{n-1}a, \tag{7}$$

and substitute for u_B and u_G to solve (4) and (5) for

$$\lambda_1 = 2a(1 - a\theta)\left((\underline{u} - \theta^n a^2)(1 - \hat{k}) + 2\theta^{n-1}a\right) \text{ and} \tag{8}$$

$$\lambda_2 = 2(\underline{u} - \theta^n a^2)\left((1 - a\theta)\hat{k} + a\theta)\right) + 4\theta^n a^2. \tag{9}$$

We substitute (6) through (9) in (3) to yield omitted equation (10), which we solve (numerically) for a in terms of θ and exogenous parameters: For a given set of values for θ, n, and $\underline{u}$, we solve (10) for $\hat{k} = k$ and for $\hat{k} = 1$ and check that candidate solutions are consistent with (2). Finally we solve for θ^* by evaluating whether (2) yields the highest utility at $\theta = 1$ or $\theta = y$, where we substitute for u_B from (6), u_G from (7), and a from (10). Denote as σ_2^* the candidate solution formed by θ^*, (6), (7), and (10). We verify that $\lambda_1, \lambda_2 \geq 0$ using (8) and (9) and reject σ_2^* if these conditions are not met.

Second, consider the case where (PC) does not bind, which implies $\lambda_2 = 0$. From (5), we have $u_B \leq 0$ and hence $\hat{k} = k$. We substitute $\lambda_1 = 2au_G$ from (4) and u_G from (IC) into (5), which yields

$$u_B = \frac{-4\theta^n a^2}{\theta + 2k(1 - a\theta)}. \tag{11}$$

Substituting back into (IC) gives us

$$u_G = 2\theta^{n-1}a + \frac{-4\theta^n a^2}{\theta + 2k(1 - a\theta)}, \tag{12}$$

Now substitute $\lambda_1 = 2au_G$, (11), (12), and $\hat{k} = k$ into (3) for omitted equation (13), which we solve (numerically) for a. We solve for θ^{**} by evaluating (2) at $\theta = 1$ and $\theta = y$, with u_B from (11), u_G from (12), and a from (13). Denote as σ_3^* the candidate solution formed by θ^{**}, (11), (12), and (13). We verify that $\lambda_1 \geq 0$, which requires that (12) is non-negative, and that (PC) is met, and reject σ_3^* if these conditions are not satisfied.

Third, consider possible corner solutions. At $a = 0$, outcome B obtains for sure and the leader can achieve no higher than a payoff of 0. But then the leader prefers σ_1^* to any strategy profile with $a = 0$, and hence no such strategy profile can be in equilibrium.

Consider now a possible corner solution at $a = 1$. We first establish the following result.

Lemma 3. At any equilibrium solution in which $a = 1$, (IC) binds with equality.

Proof: Suppose to the contrary, so that (IC) does not bind and $\lambda_1 = 0$. Then optimality requires

$$u_G - u_B \geq 2\theta^{n-1}a , \tag{14}$$

but since the provision of $u_G - u_B$ is costly to the leader, he has an incentive to choose a minimally necessary amount of rewards and punishments. If (PC) does not bind, no countervailing incentive exists and $u_G - u_B = 2\theta^{n-1}a$, a contradiction. If (PC) does bind, consider $\theta = 1$ and $\theta = y$ separately. If $\theta = 1$, outcome G obtains for sure, and so $u_B = 0$ because it is weakly dominant. But then (14) implies $u_G > 2$ in contradiction to Lemma 1. If $\theta = y$, then (4) and (5) yield $u_G = \hat{k}u_B$. If $u_B < 0$ and hence $\hat{k} = k$, this implies $u_G < 0$ in contradiction to Lemma 1. If $u_B \geq 0$ and $\hat{k} = 1$, it implies $u_G - u_B = 0 < 2\theta^{n-1}a$, in contradiction to (14). □

Since (IC) binds in any equilibrium, we can rely on equations derived in the first two cases to describe candidate solutions when $a = 1$. First, in the case where (PC) binds, we solve for $\hat{\theta}^*$ by evaluating (2) at $\theta = 1$ and $\theta = y$, with u_B from (6), u_G from (7), and $a = 1$. We denote the candidate solution formed by these values and $\hat{\theta}^*$ as σ_4^*. Second, in the case where (PC) does not bind, we solve for $\hat{\theta}^{**}$ by evaluating (2) with u_B from (11), u_G from (12), and $a = 1$, and call the corresponding solution σ_5^*.

Finally, we evaluate the leader's utility (2) at candidate solutions σ_1^* through σ_5^* to determine the leader's optimal choice σ^*, which yields the highest payoff for the rebel leader.

Proposition 1: Strategy profile σ^* constitutes a Nash equilibrium to the leader's programming problem described in section 2.

The proof proceeds as sketched in the preceding text. From the candidate solutions, we note:

Corollary 1: In any equilibrium with recruitment, $u_G^* > u_B^*$.

We include formal proofs for some comparative statics. First, we show that no child recruitment occurs unless a child recruit can either be indoctrinated to provide effort at a lower cost or his or her reservation value is lower than the reservation value of an adult recruit.

Proposition 2: If $n = 0$ and $\underline{u}_L = \underline{u}_H$, then $\theta^* = 1$.

Proof: From (2) we have that the leader's utility is non-decreasing in θ if both a and the likelihood that (PC) is met are non-decreasing in θ. First, (IC) implies that a^* is non-decreasing in θ

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because $n = 0$. Second, the RHS of (PC) does not change in θ because $\underline{u}_L = \underline{u}_H$, and the LHS of (PC) is non-decreasing in θ because $n = 0$, so the likelihood that (PC) is met is non-decreasing in θ as required. Finally, if the leader is indifferent over $\theta \in \{y, 1\}$, he optimally chooses weakly dominant $\theta = 1$. $\square$

Second, we prove that indoctrination alone can produce child soldiering in our model.

Proposition 3: In any equilibrium with recruitment, there exists some $\bar{n}$ such that $\theta^* = y$ for $n > \bar{n}$.

Proof: From Lemma 3 and the fact that (IC) binds at any interior solution for a, we have that (IC) binds in any equilibrium with recruitment. We can therefore solve (IC) for a and substitute in the leader's utility (2). For some fixed u_G and u_B, the leader prefers $\theta = y$ only if (2) evaluated at $\theta = y$ is greater than (2) evaluated at $\theta = 1$. We simplify this expression and have

$$(y^{2-n} - 1)\left(\frac{u_G - u_B}{2}\right)(1 - u_G^2 + \hat{k}u_B^2) > 0. \tag{15}$$

Lemma 1 and Corollary 1 imply that the last two terms of the LHS are positive, and the first term is positive if $n > 2$, as required. We still need to consider that selecting $\theta = y$ instead of $\theta = 1$ could lower the recruit's utility on the LHS of (PC) and require changes in u_G or u_B that are costly to the leader but necessary to meet the recruit's reservation value. We evaluate at which point the LHS of (PC) at $\theta = y$ is greater than the same expression at $\theta = 1$, which yields $2y^{2-n} > y + 1$ and hence $n > 2$ after simplification, as required to complete the proof. $\square$

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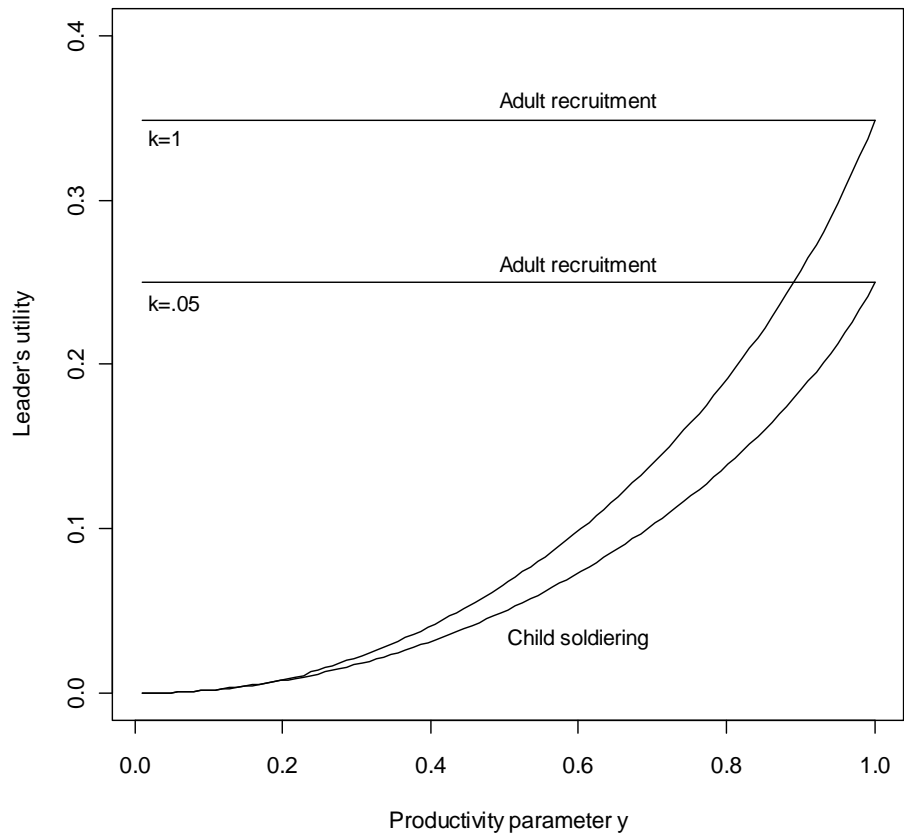Blattman, C. and E. Miguel (2010). "Civil War." Journal of Economic Literature **48**(1): 3-57.

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**Figure 1: Leader's utility, by recruit type and punishment cost**

Adult recruitment
k=1

Adult recruitment
k=.05

Child soldiering

Leader's utility

Productivity parameter y

Notes: Assumes no indoctrination (n = 0) and no difference in reservation values ($\underline{u}_H = \underline{u}_L = -0.2$).

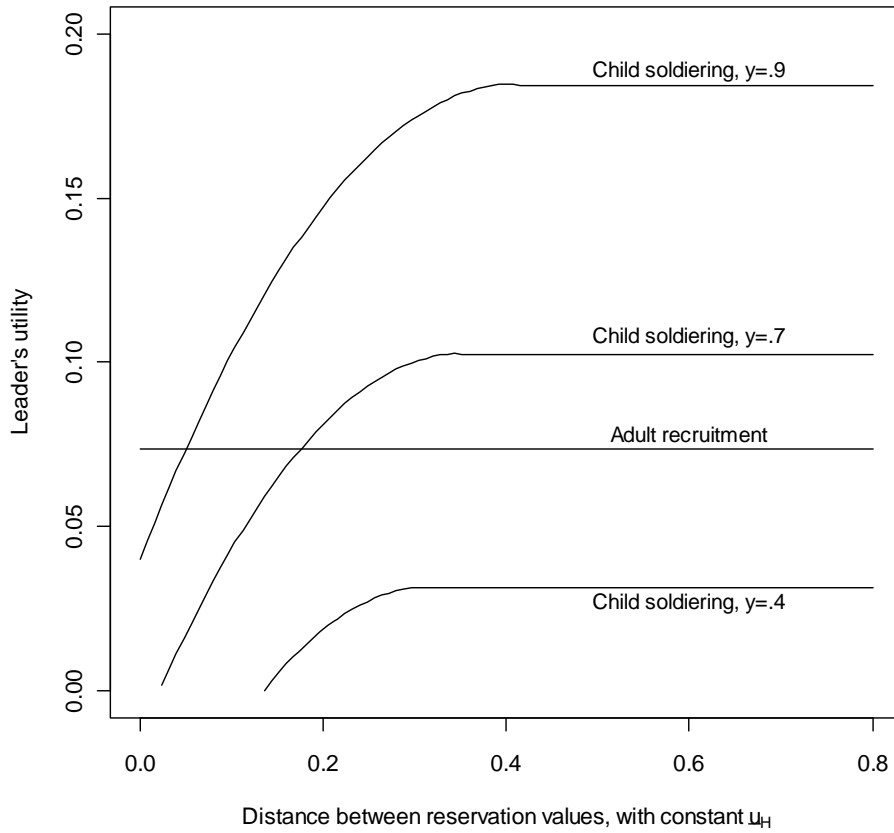**Figure 2: Leader's utility when indoctrination is effective**
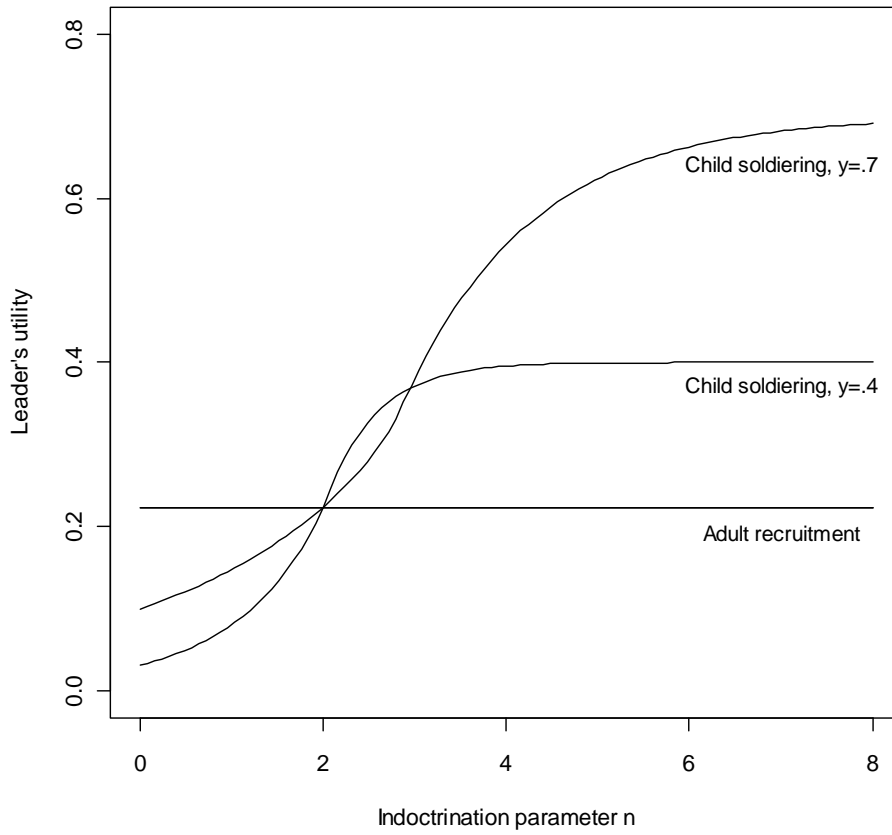
Notes: Graph here is for k = 1 and $\underline{u}_L = \underline{u}_H = 0$.

**Figure 3: The effectiveness of indoctrination as punishment becomes cheap**
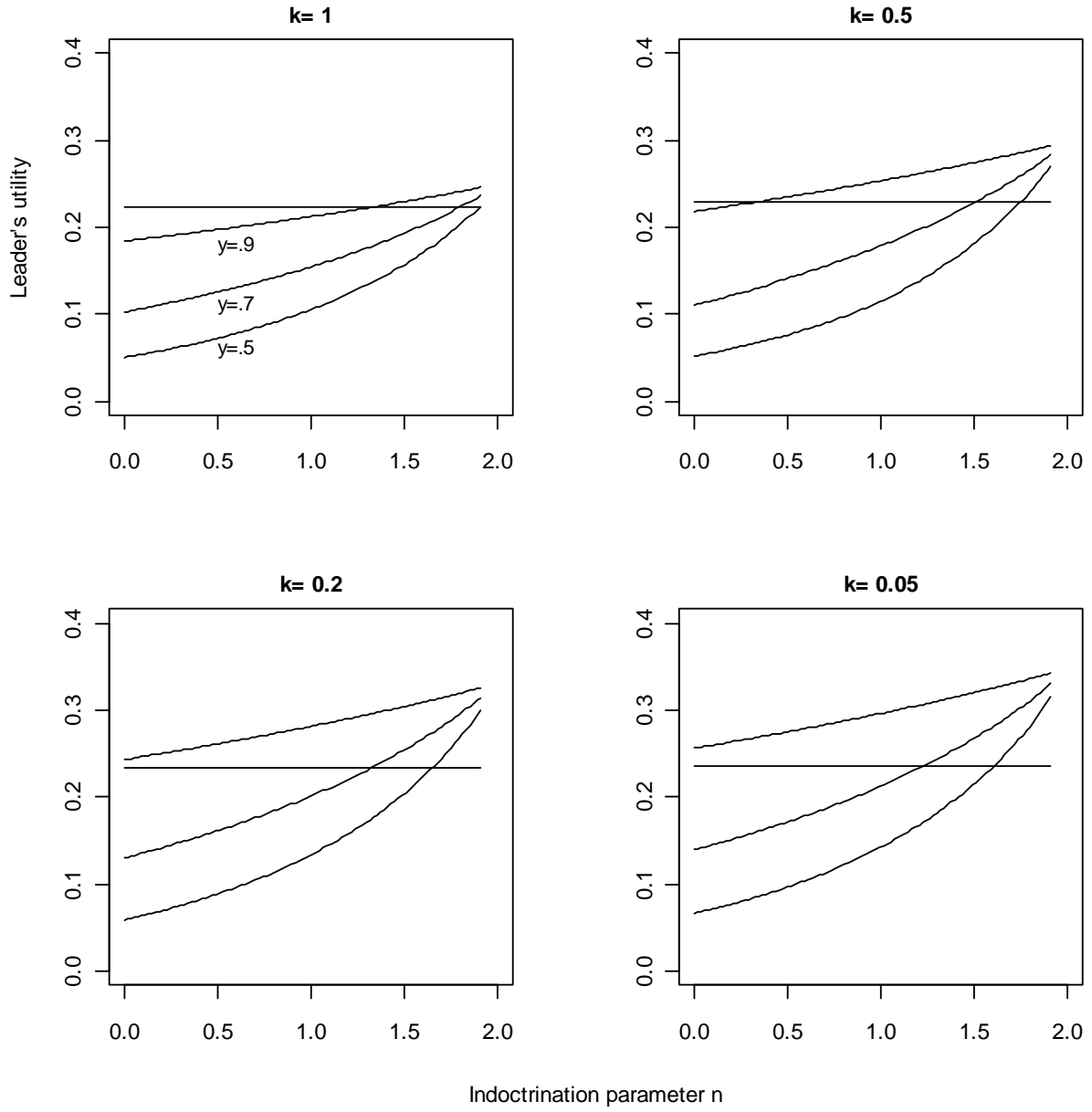
Notes: Graph assumes $\underline{u}_H = 0$, $\underline{u}_L = -0.2$.

**Figure 4: Leader's utility when adult-child reservation values differ**

Child soldiering, y=.9

Child soldiering, y=.7

Adult recruitment

Child soldiering, y=.4

Leader's utility

Distance between reservation values, with constant $\underline{u}_H$

Notes: Assumes n = 0, k = 1, $\underline{u}_H$ = 0.3, $\underline{u}_L$ = (0.3 – value on x-axis).

**Figure 5: The impact of differing reservation utilities as punishment becomes cheap**
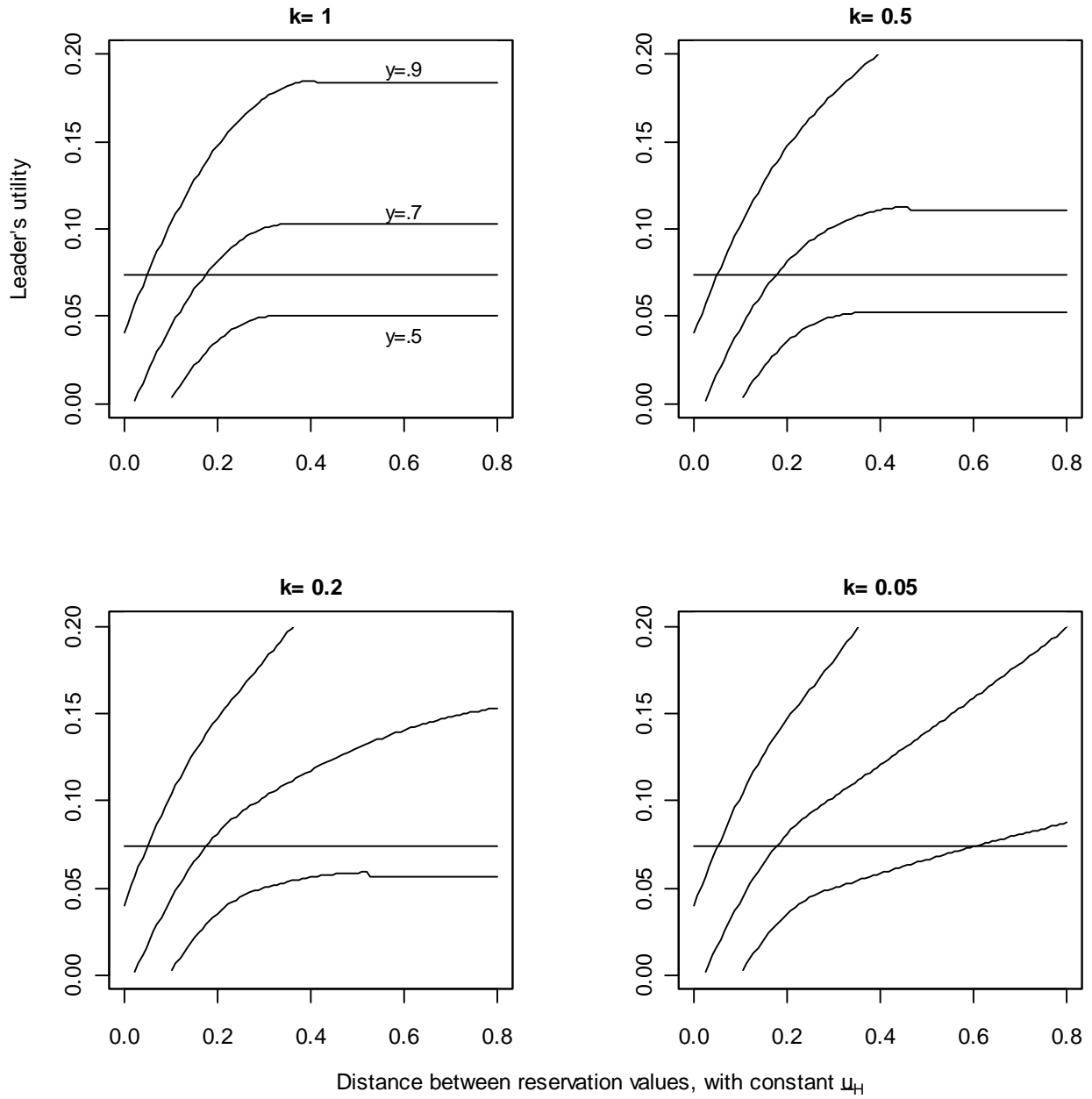
Notes: Assumes n = 0, k = 1, $\underline{u}_H$ = 0.3, $\underline{u}_L$ = (0.3 – value on x-axis).

Figure 6: Distribution of age at the time of abduction in the LRA
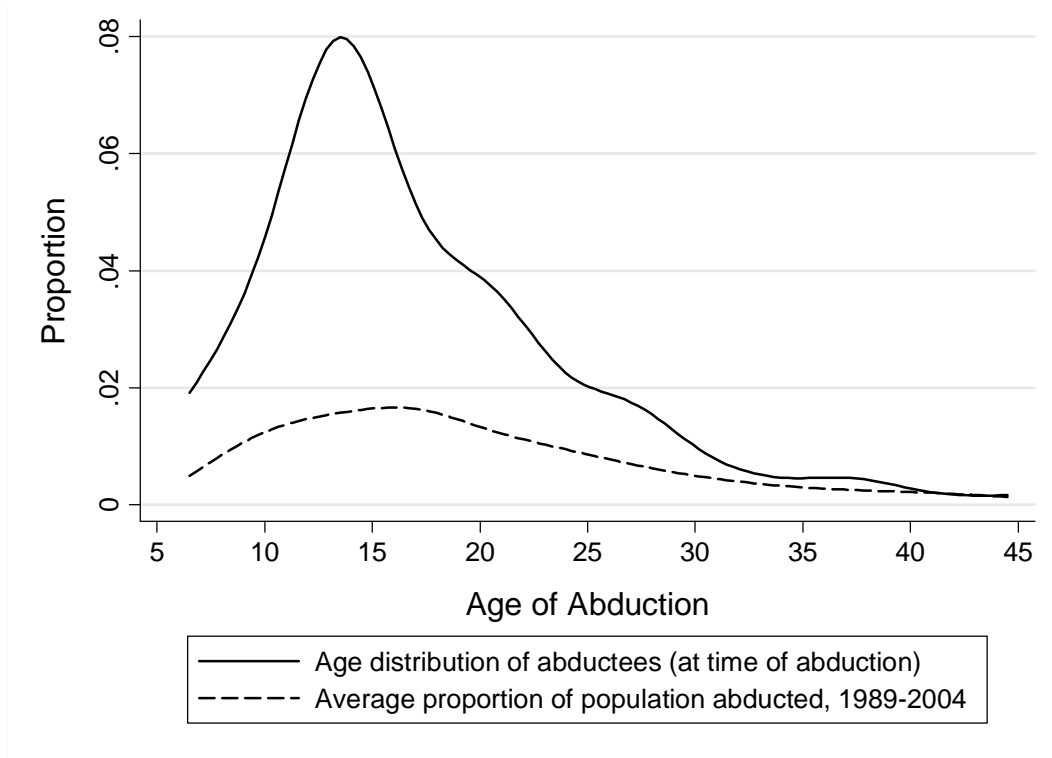
Notes: Data include absentee youth and youth who have since died or did not return from abduction. Multiple abductions are included. The proportion of the population abducted by age is calculated by dividing the number of youth abducted at each age in each year by the total number of youth in the population of that age in that year, and calculating the running-mean over all years via symmetric nearest-neighbor smoothing (bandwidth = 0.5).

Figure 7: Probability of being released in the first month of abduction, by age of abduction
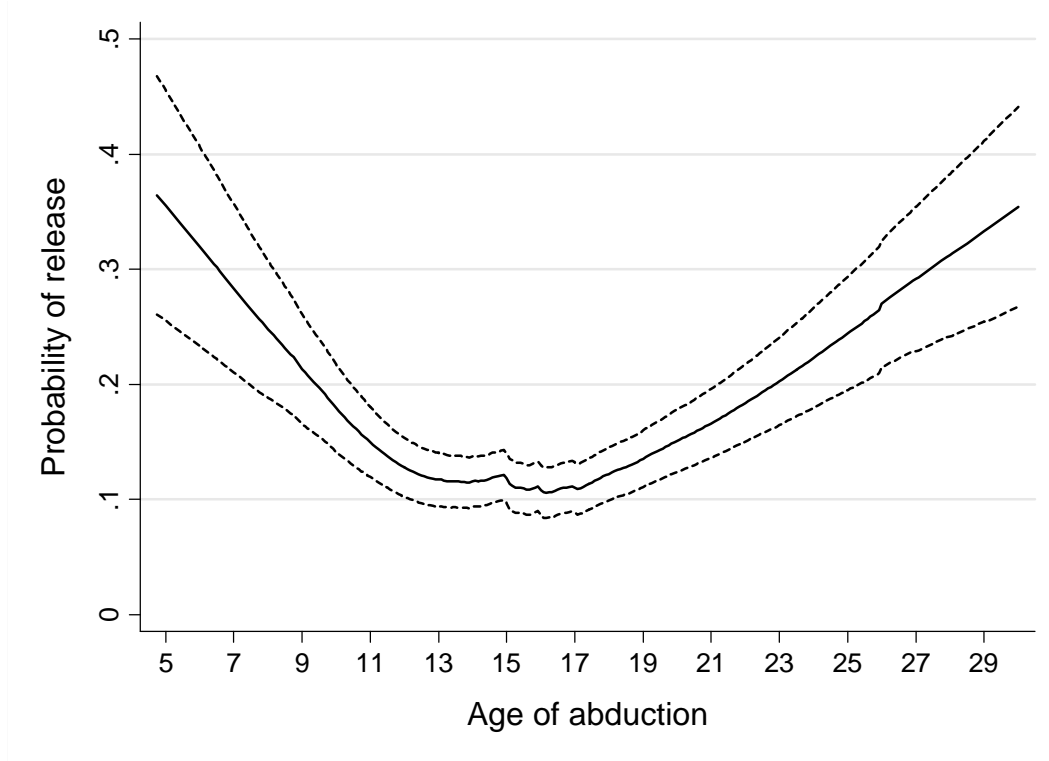
Notes: The solid line is a running-mean calculated via symmetric nearest-neighbor smoothing with a bandwidth of one. The dotted lines represent the 95% confidence interval. Data do not include absentee or non-surviving youth. Multiple abductions enter individually.

Figure 8: How do rebel leaders employ abductees of different ages?

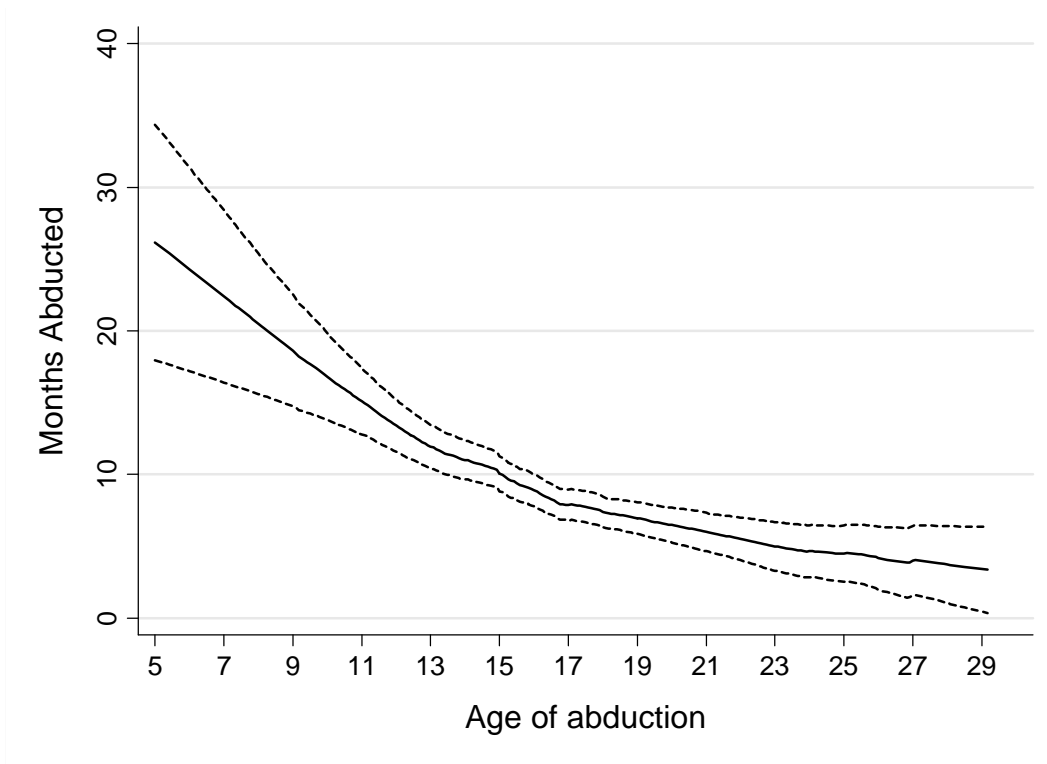*a. Average number of months before receiving a firearm, by age of abduction*
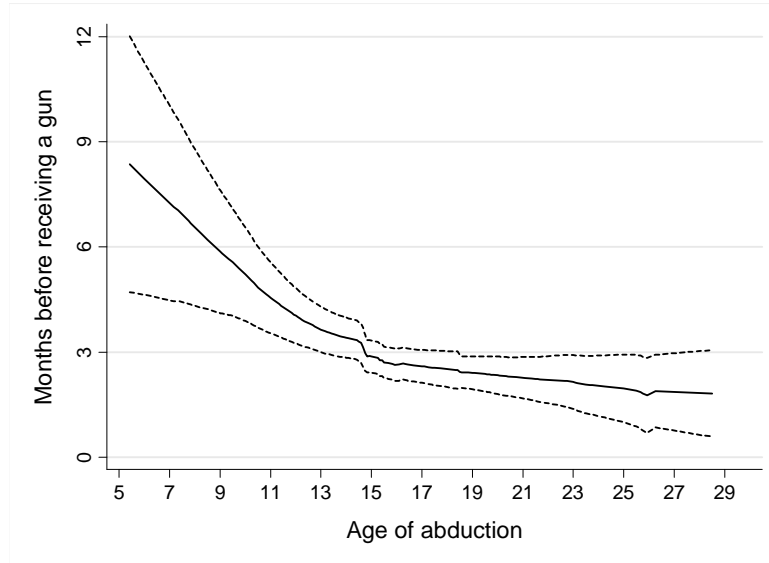
b. Probability of being allowed to keep one's own firearm, by age of abduction
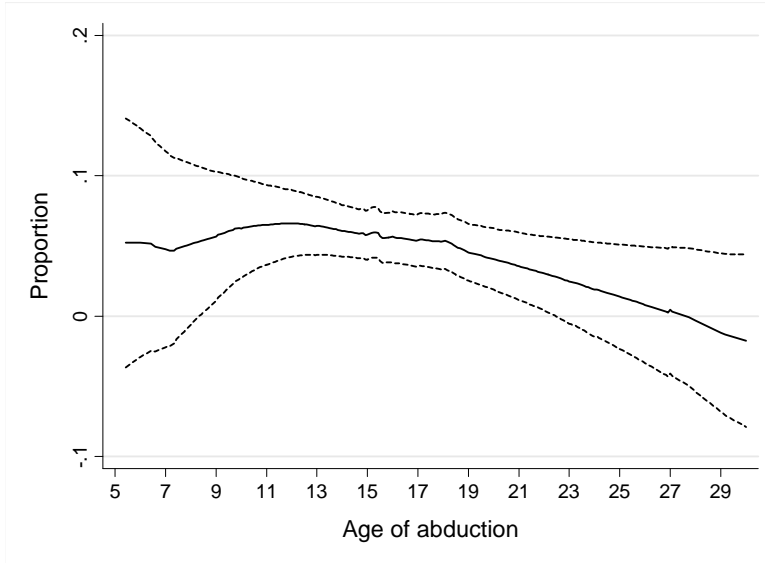

Notes: See Table 7.

Figure 9: Average length of abduction by age of abduction

Notes: See Table 7.

Figure 10: Ease of misinformation and indoctrination

a. Proportion that felt safer in the LRA, by age

b. Proportion that felt allegiance to the LRA
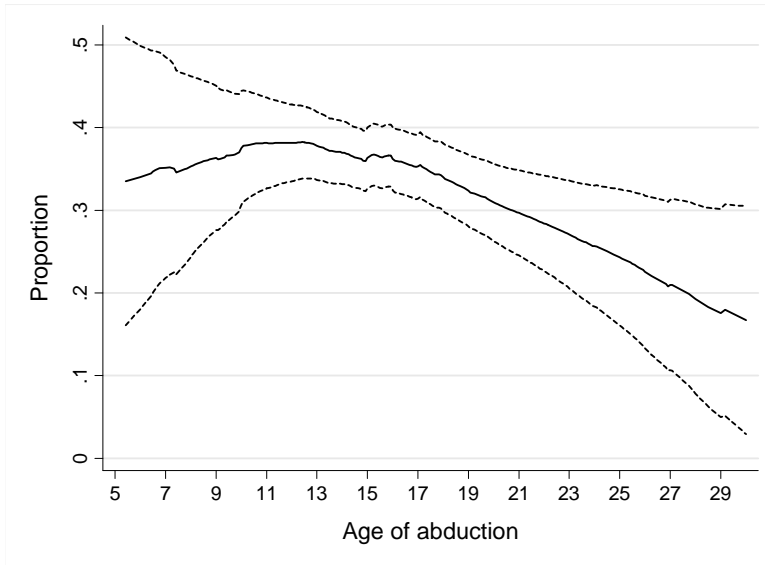
Notes: See Table 7.

Figure 11: The distribution of child soldiering across 40 rebel groups

(by level of coercion employed by the group)

Notes: Each box represents the 25th to the 75th percentile of the distribution. Solid circles represent groups outside this range. The median is indicated by a triangle.

Table 1: Self-reported abduction experiences in the LRA

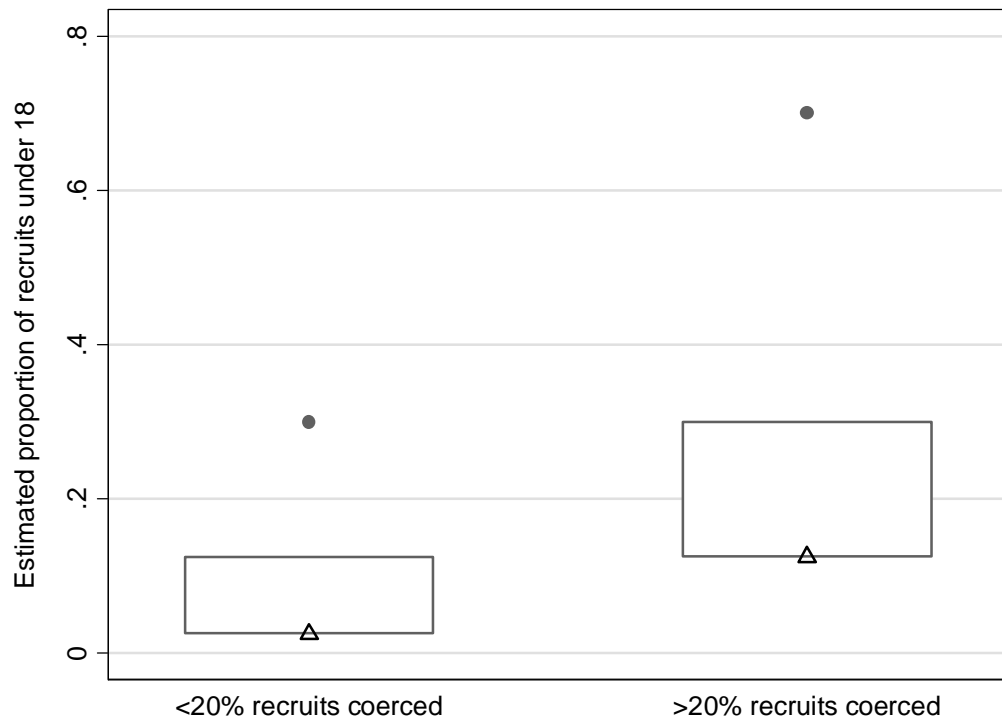|	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
	Incentives					Roles				Attitudes					Manner of departure		
	Ever rewarded	Received propaganda	Receive threats not propaganda	Forced to harm family	Forced to abuse dead	Allowed to keep own gun	Months to receive a gun	Dependable	Months abducted	Felt safer in LRA	Felt allegiance to LRA	Believe magically protected	Wanted to stay in LRA	Wanted to command	Rescued	Premeditated escape	Knew location at time of escape
Mean [s.d.] of dependent variable	0.05 [0.21]	0.49 [0.50]	0.50 [0.50]	0.12 [0.32]	0.23 [0.42]	0.28 [0.45]	3.48 [4.4]	0.19 [0.39]	9.36 [18.6]	0.05 [0.22]	0.31 [0.46]	0.07 [0.25]	0.11 [0.31]	0.06 [0.24]	0.06 [0.24]	0.55 [0.50]	0.47 [0.50]
Regression results:																	
A) Linear age																	
Abduction age	-0.001 [0.003]	0.014 [0.008]*	-0.015 [0.008]*	-0.009 [0.002]***	-0.007 [0.004]*	-0.004 [0.006]	-0.158 [0.049]***	0.002 [0.004]	-0.721 [0.170]***	-0.003 [0.001]**	-0.009 [0.003]**	-0.005 [0.003]*	-0.003 [0.003]	-0.001 [0.002]	-0.006 [0.002]***	0.010 [0.004]**	0.013 [0.005]***
B) Quadratic age																	
Abduction age	-0.015 [0.015]	0.027 [0.046]	-0.019 [0.043]	-0.001 [0.013]	0.009 [0.019]	0.061 [0.032]*	-1.065 [0.446]**	0.068 [0.029]**	-3.146 [1.071]***	0.009 [0.010]	0.022 [0.024]	0.013 [0.009]	0.025 [0.011]**	0.018 [0.012]	-0.004 [0.012]	0.003 [0.023]	0.004 [0.025]
Abduction age ^{2}	0.000 [0.000]	-0.000 [0.001]	0.000 [0.001]	-0.000 [0.000]	-0.000 [0.001]	-0.002 [0.001]**	0.027 [0.013]*	-0.002 [0.001]**	0.072 [0.028]**	-0.000 [0.000]	-0.001 [0.001]	-0.001 [0.000]**	-0.001 [0.000]**	-0.001 [0.000]	-0.000 [0.000]	0.000 [0.001]	0.000 [0.001]
Observations	462	351	351	688	688	462	194	462	780	688	688	462	688	462	774	774	702
Data available for males	×	×	×			×	×	×					×	×			
Omits abductions <2 weeks		×	×				×										
Abduction is unit of analysis									×						×	×	×
Excludes released abductees									×						×	×	×

Robust standard errors in brackets

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

Controls included but not displayed: Gender × location of birth dummies, year of abduction dummies, and pre-abduction household characteristics

Table 2: Correlates of child coercion across rebel groups

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mean (s.d.)	**Dependent variable: Indicator for forced child recruitment**						
Indicator for local population support	0.77	-0.29			-0.22	-0.24*	-0.21	-0.22
	[0.43]	[0.205]			[0.168]	[0.136]	[0.146]	[0.156]
Indicator for natural resource wealth	0.31		0.06		0.06	0.13	0.14	0.11
	[0.47]		[0.169]		[0.192]	[0.168]	[0.174]	[0.161]
Indicator for support from a foreign government	0.49			0.38**	0.41**	0.39***	0.38**	0.42*
	[0.51]			[0.143]	[0.156]	[0.138]	[0.141]	[0.221]
Indicator for group formed post-1989	0.36							-0.06
	[0.49]							[0.317]
Foreign support × Group formed post-1989	0.58							0.10
	[0.50]							[0.218]
Indicator for active at least 2 years	0.70					0.48***	0.47***	0.49***
	[0.46]					[0.121]	[0.121]	[0.145]
Constant		0.59***	0.31***	0.14*	0.32*	-0.05	-0.08	-0.12
		[0.183]	[0.092]	[0.079]	[0.176]	[0.186]	[0.189]	[0.268]
Observations	40	35	39	39	35	35	34	35
R-squared		0.066	0.003	0.163	0.242	0.408	0.378	0.413
LRA omitted		No	No	No	No	No	Yes	No

Robust standard errors in brackets
*** p<0.01 ** p<0.05 * p<0.1*