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Decapitation by Arrest: International Justice and Demobilization in Congo[1]

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Abstract

This study examines how arrests of militia leaders pursuant to international criminal warrants have affected demobilization of Rwandan militias in the eastern Democratic Republic of the Congo (DRC). Hypotheses as to causes of demobilization were derived from the literature and interviews in Eastern Congo. Models based on those hypotheses were tested against a data set of all Rwandan combatants, commanders, dependents processed through UN-operated demobilization camps in the DRC from 2003-12. The models confirm that arrests are significantly and substantially related to increased demobilization. The models also confirm other factors significantly related to the rate of demobilization, including: policies and events that increased or decreased military pressure on Rwandan militias; the UN's mobile radio and leafleting "sensitization" campaign; and the rainy season. The findings show that decapitation by arrest may be a viable strategy for advancing peace by degrading a militia or other armed force, particularly in patronage-based militias.

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The re-emergence of international justice mechanisms since the 1990s through the establishment of *ad hoc* international criminal tribunals and the International Criminal Court, and the assertion of universal jurisdiction by some national courts, has been driven partly by the hope that they would deter the most atrocious aspects of conflict, and perhaps facilitate peace and world order through a variety of mechanisms (Henham 2003; Harmon & Gaynor 2007; Sikkink 2011). Yet many commentators have argued such effects would be unlikely (Mullins and Roth 2010; Yukhananov 2008; Smidt 2001), and some have argued that international justice mechanisms might deter culpable leaders from negotiating peace (Goldsmith & Krasner 2003; Southwick 2005; Ainley 2011; Fearon 1998).

Recent statistical work has suggested that the contemporary era of more accountability through international justice mechanisms is characterized by longer civil conflict duration when leaders culpable of mass atrocities are in power, but also by leaders who are less likely to commit mass atrocities than in the pre-ICC era (Krcmaric 2016). Other recent work has developed cross-national evidence that the ICC might deter atrocities under some conditions (Jo & Simmons 2014) and that ICC investigations significantly increase domestic human rights prosecutions in the intermediate term (Darcy & Montal 2015) .

Much of that debate has focused on how *leaders* will behave in the shadow of international justice mechanisms, and to infer from that behavior effects on the course of conflict. In addition to trying to understand the effects of international justice on such things as entire militias, militaries, or conflict length (the macro level), the relationship between international justice and conflict may be tested by examining particular dimensions or elements of conflict that are susceptible to statistical analysis, such as effects of international justice actions on individual combatants, particular types of crimes, or rank and file support for criminally accused leaders (the micro level).

To date, no study has empirically tested what effects, if any, international justice actions might have on individual rank and file combatants serving under political or military leaders criminally accused of perpetrating mass atrocities.

Targeting leaders for international criminal arrest as a method of degrading or ultimately destroying an armed group bears much in common with "decapitation" strategies whereby leaders are targeted for assassination. In both cases, leaders are transparently removed from the conflict. Some argue that decapitation by assassination is a viable and effective strategy against a terrorist organization, militia, or other armed force (Tierney 2015; Johnston 2012; Price 2012; Byman 2006), but other studies contend that the negative effects of the practice outweigh the positive and that decapitation leads to increased violence by the targeted group (Jordan 2014; Cronin 2009; Jordan 2009; Hafez & Hatfield 2006). In some contexts, decapitation by assassination may be seen as ethically reprehensible and illegitimate, or may reify the target as a heroic martyr, intensifying recruitment and violence perpetrated by the targeted group. Decapitation by arrest-- arresting the leader of a targeted group pursuant to an international criminal warrant—may, in some contexts, enjoy greater legitimacy or normative appeal than assassination. Is decapitation by arrest an effective strategy for degrading an armed group?

This article examines why individuals in militias have demobilized in Eastern Congo, where several international justice mechanisms have targeted mass atrocities, and tests *inter alia* whether combatant demobilization[3] is significantly related to militia leader arrests pursuant to international criminal warrants. Ongoing active hostilities have been taking place in Eastern Congo continuously since 1994, including mass killing, torture, and rape of civilians; forced

[3] "Demobilization" is the discharge of active combatants from armed forces and groups. In some conflict zones, combatants are accompanied by dependents (their wives and children) and in those cases demobilization entails extraction of combatants' dependents as well. Demobilization through UN DDRRR camps involves formal and controlled discharge of combatants.

displacement; pillaging; conscription of child soldiers; and other mass atrocities that amount to crimes against humanity or war crimes. Sparked by the Rwandan genocide, the conflict continues to feature a few militias populated largely by Rwandans, along with dozens of other militias, and the Congolese military, all competing for territory and natural resources. In order for the Congolese government to reestablish control of the Eastern Congo and the violence to end, the militias will need to be either destroyed, integrated into the DRC military, or demobilized.

Hypotheses as to the causes of demobilization are generated from the literature on the topic and the author's interviews with demobilizing combatants, commanders, and their dependents in remote areas of North and South Kivu in the Democratic Republic of the Congo (DRC), and in the United Nations (UN) Disarmament, Demobilization, Repatriation, Reintegration, and Resettlement (DDRRR) camp in Goma, North Kivu. Unlike other studies that have focused on the micro level of demobilization through surveys or interviews of only combatants or other local civilians (Berdal 1996; Humphreys & Weinstein 2007; Humphreys & Weinstein 2008), this study also employs interviews of DDRRR camp senior staff and its Director, and UN peacekeeping officials in the DRC. And unlike other studies, hypotheses about factors affecting demobilization in this study were tested through regression analysis of a comprehensive database of weekly demobilization from 2003-12.

The analysis shows that demobilization in Eastern Congo is significantly related to international criminal arrests of political and military leaders. Other significant factors affecting demobilization include military pressure on militias (which may increase by means of offensives or reinforced deployments against them, or may diminish as national army or international forces withdraw from the theatre to attend to other security threats); DDRRR radio and leaflet "sensitization" campaigns aimed at combatants; and poor weather. These factors may affect the

morale of combatants, break the militia's chain of command, or threaten the provision of patronage to militia members or factions, each of which facilitates demobilization.

Part I of this article presents this study's research design. Part II presents factors hypothesized as related to demobilization in Eastern Congo. Part III presents information on data, methods, and models. Part IV presents results and findings. Part V concludes.

I. Research Design in Light of Prior Demobilization Research

Some past research addresses demobilization directly, while other work addresses related phenomena such as enlistment or sustained mobilization, but all of this work goes to a similar question: what are the motivations to participate in armed conflict?

Many analysts start to answer that question by acknowledging a collective action problem stemming from the public goods yielded by successful combat, at a private cost borne largely by combatants. Two theories are often used to explain the solution: "greed" theories emphasize private incentives to combatants; "grievance" theories focus on anger, frustration, and motivation derived from socioeconomic conditions or ideology (Humphreys & Weinstein 2008; Haer et al. 2011).

Insecurity offers a common explanation for the persistence of mobilization of an armed force. Repressive violence by the state may mobilize rebel opposition (Mason 1989). And where neither side has achieved a decisive victory, demobilization cannot be forced on a losing side, so demobilization through a peace agreement is unlikely absent a credible commitment to not cheat (Walter 1999; Spear 2002; Knight and Ozerdem 2004). Group demobilization, or the absence of it, may also be affected by economic incentives facing the entire group. For example, where economic prospects in civilian life are poor, and a militia is able to control natural resources or a local economy, a militia is less likely to demobilize than otherwise (Reno 2001; Spear 2002;

Thakur 2008; Gurr 1970). [4] Ideology may also favor continued mobilization, though economic considerations often crowd out ideology (Reno 2005).

Other scholarly work on demobilization focuses on why *individual* combatants may demobilize or remain mobilized. Four factors dominate the literature. First, the lower the morale, the more likely a combatant will choose to demobilize (BICC 1996; Richards 2012), and morale can be affected by things like the way commanders treat them, the harsh demands of military life, sustained hardships and trauma of combat, safety concerns, isolation from civilian life or family, and a diminishing chance of victory (Rammsberger and Bell 2002; Theiden 2007; Uvin 2007). Second, the relative economic value of remaining mobilized versus demobilizing affects the decision. Hence, opportunities for a militia to loot or control conflict minerals trade, or for combatants to receive patronage from superiors, may make continued mobilization attractive (Reno 2001), whereas external incentives, such as more lucrative options outside the militia or a cash payment to demobilize, may lead a combatant to demobilize (Berdal 1996; Gates 2002; Thakur 2008). Similarly, receiving a promotion may incentivize continued mobilization (Haer et al. 2011). Third, combatants might remain mobilized due to a strong sense of social cohesion as a result of shared experiences or processes of socialization (Florez-Morris 2010; Haer et al. 2011). Fourth, the fear of punishment for desertion, which may include beatings, imprisonment, death, or public execution, is a compelling reason to not demobilize (Rammsberger and Bell 2002; Richards 2012). Of course, the inability to participate due to physical injury or decisive victory by the combatant's militia may make continued participation impossible or moot.

[4] Berman et al 2011 suggest that economic well-being (or lack thereof) does not explain insurgency in at least some conflicts.

The Predominance of Combatant Surveys—and Limitations of that Approach

Much of the macro work on demobilization employs rationalist analysis or case studies to explain cases of demobilization or sustained mobilization (Walter 1999), whereas most micro-level analyses are based on surveys or interviews of combatants or ex-combatants (Berdal 1996; Humphreys and Weinstein 2007; Humphreys and Weinstein 2008; Theidon 2007; Richards 2012). Some reports commissioned for international organizations take into account interviews of DDRRR professionals (McCandless 2010), but little or no scholarly work systematically distills that perspective.

While studies of demobilization based on combatant interviews or surveys offer sensible reasons for demobilization from the perspective of combatants, they face limitations. First, each interview or survey study has been undertaken in a particular context: by interviewing or surveying at a particular moment in the history of a conflict, or during a particular season of the year, some factors affecting demobilization might be absent. Without considering demobilization over a longer period, it is hard to assess how the changing nature of the pool of combatants may affect demobilization; for example, in the early years of a conflict, the initial pool of combatants may be less able to handle the stress of combat than those seasoned in combat over time, so the pool of combatants may become more resilient and less likely to demobilize in the later years of a conflict. Similarly, each survey and interview study has taken place in a particular theatre, where some factors affecting demobilization might not be present.[5] Few survey-based studies of demobilization have taken place in countries that have been subject to intensive international justice actions.

[5] A notable exception is Weinstein 2007.

Second, interview and survey subjects often offer unreliable answers. Subjects may offer strategic answers instead of sincere ones, telling surveyors what the subject thinks she wants to hear (particularly when subjects are paid), or offering instrumental responses intended to catalyze an allocation of resources to the subject or his social group. Moreover, combatants tend to wield a machismo, so an interviewee may downplay certain factors that could make them appear weak.

Third, interviews and surveys of demobilization subjects alone— just combatants—biases the identification and weighting of factors thought to affect demobilization. In a survey, each combatant is likely to express his demobilization decision in terms of factors that affected him personally (e.g., his morale, his personal economic opportunities, etc.), rather than in terms of factors that affected the militia group as a whole. As a result, micro-level level consequences tend to be explained by micro-level causes, without linking those causes to macro-level stimuli that affect all combatants. Scholars have not often interviewed or surveyed foreign or international actors engaged in a particular conflict, such as agents of international organizations. These international actors may have a different understanding of demobilization, one that is more macro-focused and policy-relevant than that of combatants, and informed by having observed demobilization in various theatres and over a longer period.

Research Design for Hypothesis Generation

This study was designed to complement those based largely on combatant surveys and interviews, to identify new factors that might have been missed by prior methods, and to consider policies—international justice mechanisms in particular-- that may affect demobilization.

In order to assess the international justice factor, this study centered on Eastern Congo, which has been the focus of more international justice actions than any other ongoing conflict in the world. Conflict in Eastern Congo has been ongoing continuously since 1994, involving 30 to

120 militias, and between one and eight national armies, depending on the moment. The situation has been close to anarchic, with no state having clear and consistent control of the territory, and has been characterized by mass atrocities covered by international criminal law. To date, six of the thirteen people arrested pursuant to a warrant issued by the International Criminal Court (ICC) were militia commanders or political figures operating in Eastern Congo. In addition, some Eastern Congolese commanders or political leaders have been arrested pursuant to warrants issued by governments acting under a universal jurisdiction theory or based upon the nationality of the alleged perpetrator. If international justice actions have affected demobilization anywhere in the world, it would be happening in Congo.

Field interviews of combatants were undertaken to identify factors entering into demobilization decisions in Congo. In spring 2012, in the DDRRR camp in Goma, the author spoke informally at length with small groups of demobilizing combatants and individual commanders from Mai Mai Sheka and Democratic Forces for the Liberation of Rwanda (FDLR), a group originally composed largely of Hutu who fled to the DRC following the Rwandan genocide. In fall 2012, the author returned to the Goma DDRRR camp with a small team that spoke individually with 35 demobilizing FDLR combatants and commanders, and five dependents,[6] in formal, structured interviews. All of the subjects were from Rwanda. In spring 2015, informal conversations with an additional 20 individual, demobilized FDLR combatants and commanders, and 30 individual mobilized combatants and commanders from the FDLR, FARDC (*Forces Armées de la République Démocratique du Congo*, the Armed Forces of the DRC), and Mai Mai Banyamulenge (Congoloese Rwandaphone Tutsi) took place in the village of Kiringye and town of Uvira in South Kivu.

[6] Dependents (wives and children) of the combatants and commanders often live and travel with a militia, particularly the FDLR.

To broaden understanding of demobilization, the author also engaged five DDRRR senior camp staff and the camp Director in individual three-hour interviews in spring and fall 2012 in Goma. Two senior MONUSCO officials were also interviewed in fall 2012. Each staff member and the camp Director had worked in DDRRR camps in several African countries for five to twelve years. Their perspective on demobilization was shaped partly by having collectively interviewed hundreds of demobilizing combatants and scores of commanders, as each person who passes through the camp is typically interviewed by camp staff. The perspective of camp staff differed markedly from those of the combatants and commanders in that they conceptualize factors affecting demobilization largely in terms of policy decisions exercised by DDRRR operations, United Nations forces, other international organizations, and national and foreign militaries and governments, and they had seen changes in demobilization rates over a longer time horizon than the combatants who were interviewed.

II. Hypothesized Reasons for Demobilization in Eastern Congo

Hypothesized reasons for demobilization were derived from the literature, interviews of demobilized and mobilized combatants, and interviews with DDRRR camp leaders. The hypotheses here are tailored to context. A more detailed discussion of the data set follows in Part III, below, but for now it is important to know that the dependent variable is the three week moving average number of demobilizing combatants, commanders, and dependents who had been operating in the DRC and were disarmed and demobilized through the DDRRR camps in Goma and Bukavu for repatriation, reintegration, and resettlement in Rwanda in the 2003-2012 period.

A common thread that emerged from interviews with camp officials is that demobilization depends largely on factors that affect the morale of the combatants or that may break the militia's chain of command. Most of the hypothesized factors fall within one or both of these categories.

The camp staff's emphasis on low morale as a reason for demobilization is consistent with the literature as well as this author's interviews of demobilizing combatants and commanders. Interviews of fifteen of demobilizing combatants (M= 24.8 yrs., range 18-43) at the DDRRR camp in Goma by a team that included this author in fall 2012 included administration of the *Beck Depression Inventory-SF* and the *Beck Hopelessness Scale*. Most (80%) men reported clinically significant levels of depressive symptoms, at or above levels where established norms indicate the need for further screening, and most reported high levels of hopelessness.[7]

A break in the chain of command is also crucial, according to camp officials. Contrary to popular belief, these militias usually have tight and disciplined command structures, and combatants who decide to demobilize are often unable to do so for fear of punishment if they are caught trying to leave. A break in the chain of command offers the opportunity for individual combatants to break away. Moreover, a militia is often a coalition of factions, so a break in the chain of command may fracture the militia such that small units or larger factions demobilize *en masse*. For militias built on patronage, a break in the chain of command, or an associated fracture in the coalition, may be particularly consequential.

International Justice Actions

Interviewed DDRRR camp staff and the camp Director each stated that they noticed increased demobilization in the weeks following the arrest or attempted arrest of a militia commander or political leader pursuant to an international warrant. One camp official equated the arrest of a militia commander to that commander's assassination, in terms of its effect on morale and chain of command.

[7] Janice Zeman, Jennifer Poon, Diana Morelen, and Richard Steinberg, "Disarmament in the Democratic Republic of the Congo: Predictors of Psychological Adjustment in Ex-Combatants," unpublished paper (2013), on file with author.

There are at least five reasons why arrests might catalyze demobilization. First, to the extent that a militia is held together through patronage provided by a militia leader, the arrest of a militia leader, or a break in the chain of command associated with the leader's arrest, may catalyze demobilization, or even a breakup of the militia. African militias are often held together at least in part by patronage (Reno 2002; Reno 2007; Weinstein 2006; Bratton & Van de Walle 1994), in which leaders offer both pecuniary awards (such as wages, drugs, alcohol, weapons, looted goods, or sex slaves) and non-pecuniary awards (such as camaraderie and social ties) (Gates 2002). When arrest of a militia leader interrupts the flow of those awards, demobilization follows.

Second, the arrest of a commander may upset the political equilibrium of a militia built on a coalition of factions. Militias factions may splinter from one another as the political and economic landscape shifts (Bueno de Mesquita 2008, 399; Seymour 2014; Gates 2002). Factions that united based on a particular understanding about leadership structure and lines of authority can break apart when a militia leader is arrested, catalyzing increased demobilization, as well as violence among factions or with third parties (Potter & Abrams 2013).

Third, militia members may be inspired to join or remain in a militia by the charisma of a particular leader (Downton 1973; Weber 1947). In those cases, where allegiance to the militia is based on devotion to the leader, the death or departure of the leader may lead some to demobilize (Freeman 2014).

Fourth, following the arrest of their leader, some militia members harbor fear that they will be arrested, so they demobilize to diminish that risk. Two DDRRR staff stated that in their interviews with combatants and commanders who demobilized following an arrest, some commanders (and even some combatants) told them that they feared that they could be arrested. The ICC, and national governments exercising universal jurisdiction, usually indict only "those most responsible" for "the most serious crimes," so it is unlikely that low- or mid-level

commanders would face arrest. Nonetheless, for many militia members, this appears to be a real fear: in conversations with this author at the Goma DDRRR camp in spring 2012, a demobilizing mid-level FDLR commander, several demobilizing Rwandan combatants, and a low-level commander from Mai Mai Sheka (which had recently engaged in a mass rape attack of more than 300 women), expressed concern that they might be arrested for international crimes. Moreover, many of those combatants and commanders, as well as Congolese perpetrators of mass rape interviewed by this author in spring 2015, expressed feelings of guilt—often expressed as feeling that they had been overtaken by an evil spirit-- which may have contributed to their fear of arrest.

Fifth, arrest of a militia leader may internationalize a previously local conflict, effectively engaging new, powerful foreign actors in opposition to the militia. Parties to a conflict and other actors, including influential states, international organizations, and international courts, cognitively construct a reality upon which those engaged in a conflict may act (della Porta 2013). International criminal arrests are usually motivated at least partly by pressure from the ICC, ICC states parties, and non-state parties supporting an arrest in the \case at hand. International criminal arrests may be uneventful and routine, but are usually set up through trickery, or are military or paramilitary operations carried out by a national government's police or armed forces. Arrest of a militia leader may expose the militia's vulnerability. But more potently, an arrest pursuant to an international criminal warrant may expand a previously local conflict to the international level, transforming it from hostilities among local ethnic groups and forces to the international engagement of European countries and other powerful, distant states that were previously perceived as disinterested or disengaged. This can instill a sense of hopelessness among commanders and combatants about realizing the militia's goals and long-term well-being.

H1: The arrest or attempted arrest of a militia leader pursuant to an international criminal warrant is associated with increased demobilization.

The DDRRR camp Director speculated that there might be different effects between the arrest of militia field commanders versus militia political leaders. Field commanders control the disbursement of patronage and have a direct, on-going, operational relationship with their mid-level commanders and sometimes with rank and file. In contrast, political leaders often work outside the theatre of operations, fundraising or working on public relations, having less contact with combatants. Moreover, the arrest of a field commander shatters the chain of command and may lead to factional fighting within a militia's command structure, shifting power within the militia to the detriment of many who had benefited from allegiance to the arrested commander. For those reasons, the arrest of a field commander may have a longer-lasting and bigger demobilization effect than arrest of a political leader. The camp Director also conjectured that combatants learn quickly when their field commander has been arrested, but it takes time to learn information about the arrest of a militia's political figure, who generally operates outside the military theatre.

H1a: The arrest or attempted arrest of a militia field commander is associated with increased demobilization that begins sooner and lasts longer after the arrest than the arrest of a militia political leader.

<u>Military Pressure on Rwandan Militias in North Kivu</u>

Military pressure is characterized by the scale, frequency, and effectiveness of an adversary's military actions. The literature is replete with findings that the trauma and stress of combat hurts morale (BICC 1996; Richards 2012). Many combatants interviewed for this study identified combat stress as one reason for leaving and as a source of sadness, which is a common consequence (Bandeira 2008). Moreover, the death of a commander and the chaos of combat often

create a break in the chain of command, sometimes interfering with patronage, fracturing the coalition of militia factions, or providing an opportunity for an individual or a unit in the militia to escape from it. Where local resources, such as conflict minerals or farmed goods, are a primary source of a militia's income, military pressure may interfere with the extraction, transportation, and distribution of those resources, harming patron-client relationships. All camp staff interviewed for this study identified military pressure on the militias as an important factor explaining demobilization.

H2: Military pressure on a militia is directly associated with the rate of demobilization.

Formal peace agreements may or may not change military pressure;[8] what matters is the scale, movement, and persistence of troops whose mission is to attack or destroy a militia, and whether those movements constitute an offensive or a withdrawal. According to MONUSCO officials interviewed for this study and consistent with available sources on military movements in the DRC during the period for which data is available, there were five identifiable periods in which military pressure on militias in the Kivus was increased and one period in which pressure was diminished.

There were three separate offensives by the DRC army, backed by MONUSCO, against the FDLR, other Rwandan militias, or elements of those militias: the offensive known as "Umojawetu" began in January 2009; it continued until the strongest offensive of the period, known as "Kimia II," began in April 2009, which ended in December of that year; on February 26, 2010, "Amanileo" began, continuing at full strength until April 10 of that year, and then ramping down to about 40% of full strength (due to disengagement of DRC forces constituting 60% of troops that initially engaged) until April 5, 2012, when it ended. However, Amanileo is largely considered a

[8] The formal end of the Second Congo War on July 2, 2003, did not change military pressure on Rwandan militias in Eastern Congo. Rwandan army troops, which had been in the DRC partly to fight the FDLR, had already left the DRC in spring 2002, pursuant to the Pretoria Accord.

military failure due to the collapse of DRC forces early in the operation, in which MONUSCO served exclusively in a logistical support role.

H2a-c: Umojawetu, Kimia II, and Amanileo are each associated with increased demobilization, with the relationship decaying only for Amanileo.

Two other events resulted in increased military pressure on Rwandan militias during the period. From November 15, 2005 until January 2006, soldiers of the former Zairian army that had been exiled in the Republic of Congo crossed back into the DRC and reintegrated into the FARDC, enabling reinforcement of the 8th Brigade in North Kivu, which stepped up its pursuit of Rwandan militias operating there. Similarly, from February 19 to April 9, 2009, Ugandan forces that had been operating in northeast Congo withdrew to Uganda, freeing up Congolese troops to refocus their attention on militias to the south.

H2d-e: Zaire Army reintegration and Ugandan withdrawal from the DRC are each associated with increased demobilization of Rwandan militias.

From March 27 through June 7, 2003, there were two separate coup attempts in Kinshasa against DRC President Joseph Kabila. During that period, a substantial portion of the DRC army was redeployed to Kinshasa from the East, diminishing pressure on the Rwandan militia operating there.

H2f: The period of coup attempts against Kabila was associated with decreased demobilization.

<u>DDRRR Propaganda Campaigns</u>

Throughout the period, MONUSCO maintained Project Gatahuka, a "sensitization" campaign aimed at persuading Rwandans to demobilize and return to Rwanda. UN Radio, which reached only provincial capitals, broadcasted messages in Kinyarwanda intended to reach

Rwandan combatants and convince them to return home. DDRRR camp officials did not believe these broadcasts were effective because combatants spent little time in or near the provincial capitals.

In August 2005, MONUSCO began operating five mobile radio stations (MRS), each with a broadcast radius of 50-60 kilometers, deploying them to areas where Rwandan combatants (usually FDLR) were located. The broadcasts contained descriptions of the DDRRR camps and the process of demobilization, including information on DDRRR payments that would be made to those who demobilize, as well as messages from Rwandan family members of suspected militias, encouraging combatants to come home and arguing that Rwanda was safe and generally welcoming. The broadcasts also contained stories and pleas from previously demobilized combatants, encouraging combatants to demobilize. Camp officials stated that they believed the mobile radio broadcasts were effective, so they purchased and began operating seven more MRS in August 2009, with two more added in February 2010.

H3: Mobile radio station broadcasted "sensitization" campaigns are associated with an increased rate of demobilization.

Beginning in November 2009, DDRRR began producing leaflets for distribution in combatant areas—specifically targeted at reaching the FDLR. From 2009 through 2012, nearly half a million leaflets were distributed. The leaflets contain photographs of former combatants enjoying their civilian life. Some of the leaflets also feature a gallery of photos of recently demobilized combatants, targeted at militia units that may have known the demobilized. Still others publicize the arrest of various militia leaders pursuant to an international warrant and argue that continued fighting is meaningless. Some combatants interviewed for this study said they had seen the flyers, but nearly half of the combatants we interviewed were illiterate. Others said that they had heard about the flyers and their messages from friends or family. Believing that the

flyers were effective at catalyzing demobilization, DDRRR increased the rate of production and dissemination of flyers.[9]

H4: The more "sensitization" leaflets disseminated, the more combatants demobilize.

Peak Rainy Season

Several camp staff noted a surge in demobilization each January, which they attributed to the onset of the heaviest part of the rainy season. Heavy rains start in January and run into March in North Kivu[10] and militia morale suffers as combatant hardship increases, according to camp staff.

H4: The demobilization rate rises each year in January and February.

Relative GDP Growth of Rwanda and the DRC

From 2003-12, the Rwandan economy improved relative to the Congolese economy, which might have made demobilization increasingly attractive. Rwanda has enjoyed substantial economic growth since 1995; infrastructure improved markedly and Rwandan GDP grew substantially. Interviews suggested that some combatants were demobilizing partly because they hoped or heard that life in Rwanda was easier than life in the FDLR. Hence, it is possible that economic pull to leave the DRC for Rwanda persisted throughout the period and may have increased.

[9] In November 2009, leaflet distribution began at a rate of 2,500 per month, which was increased to 5,000 per month from May-December 2010, again increased to 12,500 per month in 2011, and then to 25,000 per month in 2012 and 2013.

[10] Data on monthly rainfall in the DRC may be found on The World Bank Group, Climate Change Knowledge Portal at http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisCCode=COD .

Nonetheless, there are reasons to believe that the Rwanda's relatively rapid economic growth might not have affected demobilization—and that mining opportunities in Eastern Congo might have slowed demobilization. First, Rwandan development has not been even and in the rural Hutu villages in Rwanda where repatriated combatants have usually resettled, life has changed far less markedly than in other parts of the country (Ansoms 2007). Second, the economic prospects of some Rwandan militia operating in the DRC may have improved considerably during the period. In the DRC, some Rwandan militia have endured constant economic challenges, engaging in the same type of farming that occupied their repatriated counterparts, but leading a nomadic life, settling briefly in remote areas away from communications routes that could be reached easily by the FARDC, fighting sporadically with the local population, and then moving on to another location. At the same time, however, other Rwandan militia have taken control of lucrative mining areas and it is likely that at least some of those Rwandans who have stayed in the DRC are attracted by expanding mining opportunities in eastern Congo. This would dampen, eliminate, or even reverse the pull of Rwanda's relative overall economic growth.

> *H5: The demobilization rate correlates with the difference between Rwandan per capita GDP and the DRC's per capita GDP.*

Time

The camp Director and staff asserted that over the course of the conflict the rate of demobilization had slowed, which they attributed to two factors. First, the pool of combatants had shrunk: in 2002, the camp Director estimated that there were 40,000 FDLR operating in the DRC, but by 2013 there were approximately 4,000. Second, the remaining FDLR combatants were "the hard core," many of whom would never demobilize.[11]

[11] Some speculate that the Rwandan government has had an interest in persistent FDLR presence in the DRC, which Rwanda supported in part by a continuous threat of criminal prosecution against

H6: As time passed in the 2003-12 period, the rate of demobilization decreased.

Time-Invariant Factors

It is important to note that some factors were not directly included in the quantitative study because those factors were invariant across the 2003-12 period. First, most demobilizing combatants interviewed for this study mentioned family pleas to demobilize and return home, usually communicated to them via cell phone.[12] It is assumed that family pressure to demobilize (and combatants' desire to return home) was constant across the period.[13]

Second, interviewed demobilizing combatants frequently mentioned that they were concerned about potential prosecution and imprisonment by the Rwandan government for alleged atrocities perpetrated in 1994, but that threat of prosecution and imprisonment was constant throughout the 2003-12 period. Approximately 200,000 Hutu remain imprisoned in Rwanda for their actions and many repatriating combatants were subject to risk of prosecution. Throughout the period, DDRRR offered all demobilizing combatants the services of a lawyer to provide advice concerning Rwandan government prosecution. It was not until 2013, after the data set examined here ended, that repatriated combatants were granted amnesty from Gacaca prosecution for acts they may have committed in 1994, though they have remained subject to a risk of prosecution by Rwanda's formal justice sector.

Hutu in Rwanda. In this view, FDLR presence has provided an ongoing pretense for Rwandan government intervention in the mineral rich Eastern Congo.

[12] Several interviewed combatants reported that they communicated with their family by cell phone, and it is common knowledge that the number of cell phones and cell towers increased markedly during the period. It is assumed that combatants found other ways to communicate with their family prior to the expanded use of cell phones, including borrowing cell phones of others. In any event, for two years the author tried unsuccessfully to obtain data on the quantity of cell phone usage or cell towers built in Eastern Congo and the Rwandan border area.

[13] In so far as that assumption is incorrect, such that family pressure increased or decreased over the period, this factor is controlled for by the **Year** variable. See Part III, below.

Third, the DDRRR resettlement package (which interviewed combatants frequently mentioned as influencing their demobilization decision) remained constant during the period. The DDRRR provides combatants and their dependents with cash, free legal advice concerning potential criminal liability for their past behavior, new clothes and shoes, three free meals, medical examination and treatment, free transportation to Rwanda, and resettlement in a location that takes into account their clan, familial ties, and activities during the Rwandan genocide; dependent wives also get a new set of cooking pots and basic cutlery. That package costs $300 per combatant or dependent. From 2003 through March 23, 2009, funds for the resettlement package were provided by the plurilateral Multi-country Demobilization and Reintegration Program; thereafter, the World Bank has provided support. All combatants interviewed for this study mentioned some or all of these incentives as a reason they demobilized. Camp staff reported that these incentives had been in place throughout the 2003-12 period, without varying.

III. Quantitative Analysis: Demobilization Data, Methods, and Model Specification

After presenting the data, the rationale for methods employed are explained and models are specified.

Demobilization Data

From January 1, 2003 through December 31, 2012, a total of 12,146 Rwandan combatants and commanders, dependents, and child soldiers (combatants under 18 years of age) demobilized and resettled in Rwanda through the DRC DDRRR camps.[14] Table 1 summarizes the data.

[14] It is unlikely that there is a problematic selection effect from analyzing demobilization through DDRRR camps. Combatants and their dependents receive a compensation package from UN DDRRR, as well as protection during the extraction and resettlement process, so most of those who want to demobilize could be expected to do so via DDRRR. In some cases, however, some militias have faced complete military defeat at or near the Rwandan border with their members fleeing into Rwanda directly to resettle; these demobilizing combatants would be excluded from the data set

Table 1: Weekly Demobilization Rates by Group

Weekly Demobilizations				
	Combatants	Dependents	Child Soldiers	All Demobilized
Mean	12.43	11.80	1.07	25.30
Variance	74.00	163.48	5.32	417.46
Total (2003 – 2012)	5,965	5,666	515	12,146

Approximately 80% of those demobilizing were FDLR; the rest were Rwandan (mostly Tutsi) members of CNDP (*Congrès national pour la défense du peuple),* Rwandan Hutu and Hutu-allied factions in PARECO (*Coalition des patriotes congolais résistants*), various Mai Mai that included Rwandans, and Rwandans serving in the FARDC. Data were obtained, with authorization, from desktop computers at the Goma DDRRR camp. The author was not permitted to download data later than 2012 because of a diplomatic dispute over whether Rwanda was supporting the M23 militia, many of whom were rumored to have been processed for repatriation to Rwanda through the Goma DDRRR camp.

The data were aggregated into the sum of the number of combatants, dependents, and child soldiers who demobilized weekly during the 2003-2012 period, and converted into a three-week moving average for the period. This three-week moving average is the dependent variable, making each y_t the mean of that and the previous two weeks' demobilizations. The main rationale for this conversion is variance in the lag by which combatants demobilize after a common stimulus: some combatants may demobilize a week after a shock, while others may demobilize three weeks later; according to camp staff, surges in demobilization characteristically lagged about three weeks after most stimuli. Hence, a three-week floating average was used to best capture the effects of a stimulus.

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employed here and their exclusion may result in an underestimate of the effect of military pressure on demobilization.

Analysis of the data indicates autocorrelation. The partial autocorrelation function of demobilization with a one-week lag is 0.575, highly significant; with a two-week lag the autocorrelation is close to 0.3; and with three- and four-week lags, the coefficient remains just outside typical 95% confidence bands, tapering toward 0.1. Not until after the fourth lag does autocorrelation become insignificant. The upper panel of Figure A1 (in Appendix 1) shows the autocorrelation and partial autocorrelation functions of demobilizations distilled from the data.

It would appear that militia members in the eastern DRC, as with most insurgencies, do not typically decide to demobilize independently of one another in the face of influential, shared conditions. There is correlation or dependency both within each period of measurement, and autocorrelation across time periods as the conditions leading militia members to their various tipping points of demobilization will often persist for weeks or months. These interdependencies between combatants and across time are consistent with interview statements to the author by DDRRR camp leaders that sometimes a commander may demobilize along with most or all of those combatants under his command. Moreover, combatants and their dependents (i.e., their wives and children) demobilize together.

Methods

Among a number of statistical models tested (all of which reflected nearly identical trends), two principal models were implemented to test hypotheses regarding the influence of international justice and other factors on demobilization. A negative binomial generalized linear autoregressive moving average (GLARMA) model was employed to understand whether international justice mechanisms influence decisions to demobilize. A negative binomial regression was also run as a sensitivity check against the results of the GLARMA model.

Although many time-series models have been developed, it is not clear which, if any, of the current models will become the dominant model for time series count data (Cameron & Trivedi 2013, 263; Ver Hoef & Boveng 2007). This paper utilizes a negative binomial (and negative binomial GLARMA model) for two principal reasons. First, the weekly number of demobilizations is highly overdispersed, with an average rate of 25 demobilizations per week, but a variance of 296, making standard Poisson models generally inappropriate (Fox 391-2; King 1989, 763; King 1998, Ch. 3). The negative binomial model for the demobilization count data is selected because, unlike most Poisson density models of count data, the negative binomial model incorporates dependence among observations within a given time period via a dispersion parameter. Hence, the negative binomial model enables regression analysis that is consistent with the anecdotal evidence (e.g., DDRRR camp leaders' statements) and even the most minimal of rational intuitions that within each time period (week), combatants and dependents do not choose to disarm independently of one another or apart from common stimuli.

While the negative binomial model is capable of accounting for some of the common causes or contagion that lead combatants to demobilize within a given week, the autoregressive moving average (ARMA) portion of the model aims to account for trends in demobilization that occur across time. As suggested by the (partial) autocorrelation function and related diagnostics, the number of militants that demobilize from week to week tends to be somewhat similar under relatively "normal" conditions over the span of the 10-year data set, varying far less between any pair of weeks, or even over the course of a month, than the change in the number of demobilizations over years. Hence, the autoregression (AR) parameter helps to remove bias from the coefficient estimates.

An equally important reason and component of the ARMA portion of the negative binomial GLARMA model is that, although serial correlation in the number of demobilizations between

weeks is "typical," one of the principal purposes of the regression analysis lies in the identification of the effects of "atypical," sometimes short-lived interventions or shocks, such as the arrest of a militia field commander or political leader. However, any accurate estimate of the influence of factors like arrests or military offensives on demobilization must consider that counts taken at weekly intervals are somewhat artificial units of measurement. Hence, the moving average (MA) portion of the GLARMA model also helps to captures these sometimes lagged, externally induced, and often interdependent demobilizations.

Finally, the time-series plots shown in Figure 1 and in the bottom-left of Figure A1 (Appendix 1) indicate that even following various events and shocks, it often takes several weeks or longer for the number of demobilizations to return to its typical or mean value—further evidence in favor of a negative binomially distributed, generalized ARMA model that controls for contagion and overdispersion (negative binomial), autocorrelation (AR), and a sometimes unstable or artificial weekly unit of measurement (MA). As an extension of the ARMA time-series structure to generalized linear models, the generalized linear autoregressive-moving-average (GLARMA) model offers one of few available methods for the estimation of non-linear time-series data that exhibit dependencies both across time and within each count or contagion of demobilizations.[15]

The Models Specified

As the GLARMA model is an application of the ARMA model to generalized linear models (specifically here as a negative binomial model), I first present the negative binomial model.

[15] See Brandt et al. 2000 for a partial exception, and Fordham 2002 for an implementation. Because of the two types of dependencies identified in the text, and the limited importance of seasonal patterns in explaining demobilization in the Eastern DRC, seasonal P(AR) models (as well as seasonal ARMA or ARIMA models) are suboptimal (Mitchell & Moore 443).

Negative Binomial Model

The negative binomial model is specified as follows:

$$\widehat{\textbf{Demob}}. = \beta_0 + \beta_1\textbf{Arrests} + \beta_2\textbf{Military}_{t-4} + \beta_3\textbf{DDR}_{t-6} + \beta_4\textbf{Peak Rainy Season} + \beta_5\textbf{GDPpull} + \beta_6\textbf{Z} + \varepsilon$$

Arrests Vector

The Arrests vector is comprised of four independent variables, each associated with one or more arrests or an attempted arrest of an Eastern Congo militia leader pursuant to an international warrant.

(i) On January 22, 2009 Rwanda arrested Congolese rebel leader General Laurent Nkunda, pursuant to an international warrant issued by the DRC on the basis of nationality, and a warrant by Rwanda under a universal jurisdiction theory based on alleged crimes against humanity. Nkunda founded and led the National Congress for Defence of the People (CNDP), which in 2007 began massacres and mass rapes in North Kivu villages. The ICC had begun investigating Nkunda with a view to indicting him.[16]

(ii) On April 10, 2012, the DRC government began an attempt to arrest then Congolese General Bosco Ntaganda, pursuant to an ICC warrant for crimes against humanity and war crimes. Ntaganda, nicknamed "the Terminator," was by 2012 widely considered the most violent figure in Eastern Congo. Upon learning that an arrest

[16] When Nkunda was arrested, Bosco Ntaganda, who had been the CNDP's Military Chief of Staff, assumed clear leadership of the CNDP and then made a deal with President Kabila to integrate it into the Congolese army.

attempt would be made, Ntaganda fled, with FARDC forces in pursuit until July 10, when it was announced that the arrest effort had ended in failure. Ntaganda then created a new militia, M23, backed by Rwanda.

(iii) On October 11, 2010, Callixte Mbarushimana, a Rwandan Hutu and Executive Secretary of the FDLR, was arrested in France pursuant to an ICC warrant for crimes against humanity and war crimes committed against civilians in the Kivus.

(iv) On November 19, 2009, FDLR Leader Ignace Murwanashyaka (who had been living in Germany for at least nine years) and his Deputy, Straton Musoni, were arrested in Germany pursuant to a German warrant based on universal jurisdiction for crimes against humanity and war crimes committed in the DRC.

Arrests = $Nkunda_{t-1}$ + *Attempted* $Ntaganda_{t-1}$

+ *Murwanashyaka* & $Musoni_{t-4}$ +$Mbarushimana_{t-4}$

The effects of the variables are binary. Lag estimates for this vector (and for each of the vectors) are based on suggestions in interviews with DDRRR officials.[17] Based on the DDRRR camp Director's speculation about a distinction between the arrest effects of field generals versus political leaders, the lags differ: effects are lagged one week for the two field generals, Nkunda and Ntaganda, but four weeks for the three political leaders. Also based on the camp leader's distinction, the effects of the field generals' arrests are estimated to be longer than for the political leaders: effects of the political leaders' arrests are estimated at three weeks; the effects of General Nkunda's arrest are estimated at four weeks, with subsequent decay at a rate of 0.5 for two weeks

[17] For each vector, alternative lags of different lengths were tested. The lags described in this section, which accorded with those suggested in interviews, proved to generate the most significant results.

thereafter and to zero two weeks after that; the effort to arrest General Ntaganda lasted three months.[18]

Military Vector

The Military vector consists of six separate variables associated with military deployments and objectives. The three separate joint MONUSCO-FARDC offensives against the FDLR and associated militias were Umojawetu, Kimia II, and Amanileo. Also included are the integration of former Zairean troops into the FARDC, withdrawal of the Ugandan army, and the period of two coup attempts on Kabila. DDRRR camp staff believed that demobilization lags about a month behind the start of an offensive because it takes time for morale to decline, for a combatant to then decide to demobilize, and for an offensive to start interfering with the chain of command.

$$\textbf{Militaryt}-\textbf{4} = Umojawetu_{t-4} + Kimia\ II_{t-4} + Amanileo_{t-4}$$
$$+ Zaire\ Army\ Reintegration_{t-4} + Coup\ Attempts_{t-4}$$
$$+ Ugandan\ Army\ Withdrawal_{t-4}$$

Umojawetu began in January 2009, and continued until the beginning of Kimia II in April 2009. Kimia II finished at the end of December 2009. Two months later, on February 26, Amanileo commenced; according to UN and DDRRR officials, the offensive continued at full strength until April 10, 2010, after which it ramped down to 40% strength until April 5, 2012. The dates for the three remaining events are coded as follows: (i) reintegration of former Zaire army troops into FARDC began in the week of November 15, 2005 and ended in the first week of January 2006; (ii) Ugandan withdrawal started in the week beginning February 19, 2009, and ended in the week

[18]The precise start and end dates of effects are estimated as follows: **Nkunda:** Begins on January 22, 2009, starts decaying at a rate of 0.5 after February 26, and decays to zero on March 12. **Attempted Arrest of Ntaganda:** Begins on April 10, 2012, ending on July 10, 2012. **Mbarushimana:** Begins on October 11, 2010, ending on October 29. **Murwanashyaka and Musoni:** Begins on November 19, 2009, ending on December 10. As the dependent variable is calculated weekly, and the arrest dates usually fall in the middle of a week, the beginning and end dates are not always a multiple of seven days.

beginning April 9, 2009; and (iii) the Two Coup Attempts on Kabila took place from the week of March 27, 2003 and ended in the first week of June 2003. None of the military offensives but Amanileo feature a decay function.

DDR Vector

The DDR vector is made up of two independent variables: (i) the Number of Mobile Radio Stations in operation and (ii) the Numbers of Leaflets distributed per week (in thousands). Both of these variables are lagged by 6 weeks, based on the recommendations of DDR/RR camp staff.

$\mathbf{DDR_{t-6}}$ = *Mobile Radio Stations*$_{t-6}$ + *Leaflets Distributed* (*in* 1000*s*)$_{t-6}$

The rate of leaflet distribution per month is adjusted from November 2009 (when it started) through 2012, and the number of Mobile Radio Stations in operation was adjusted, each according to information provided by DDRRR staff.[19]

Peak Rainy Season

January is the beginning of the rainiest months of the year in the Kivus, lasting through February and into early March. Based on the hypothesis that the beginning of the peak rainy season is associated with increased demobilization, the equation includes a dummy variable for the rainy season of January and February.

Rainy Season = *January/February Dummy*

GDP Pull

During the 2003-12 period, both the DRC and Rwandan economies grew, but the Rwandan economy grew faster. Based on a hypothesis that the Rwandan economy became increasingly

[19] Leaflets begin being distributed in November of 2009 at a rate of 2,500 per month in the first six months, Nov 2009-April 2010; then 5,000 per month in May- Dec 2010; then 12,500 per month in 2011; and 25,000 per month in 2012 and 2013. Mobile Radio Stations were first implemented in August of 2009 and the number in operation increased thereafter: there were at first five; in August 2009, seven more were added, bringing the total to 12; finally, in February 2010, two more were added for a total of 14.

attractive (relative to the Eastern Congo economy) to combatants over the period, the equation includes an annual per capital GDP differential.

GDPpull = *GDP Rwanda – GDP Congo*

Per capita GDP for each country is based on purchasing power parity, measured in US dollars.[20]

Control for Time

Based on interviews with camp staff, there is reason to believe that the number of demobilizing combatants declined over time due to a declining pool of combatants—and because the pool that remained was increasingly hard-core. The time trend here is incorporated by adding the year relative to 2002 to the negative binomial regression.[21]

Z= *Year Relative to 2002*

GLARMA Model

The GLARMA model used here is an application of the ARMA model to the generalized negative binomial model specified above. Simplified equations of the GLARMA model specified for this study appear in Appendix 2. Based on substantive and diagnostic analysis, the GLARMA parameters were estimated for DRC demobilizations with an AR(p) order of 4 and the MA(q) set to 3, the latter being the same as in the negative binomial regressions presented in Table 4.[22]

[20] Data from World Bank 2016.

[21] While the time variable Z is included (and significant) in the negative binomial regressions (Table 4), the Z variables in the GLARMA model effectively differences out the impact of time, representing the AR(p) and MA(q) coefficients instead. Sensitivity checks of GLARMA with the Year variable suupport the weak stationary assumption of the GLARMA models: where an Augmented Dickey-Fuller (ADF) test rejects the null hypothesis of non-stationarity ($p < 0.001$), the Year coefficient under the GLARMA drops substantially and significantly, while the AR(p) and MA(q) coefficients always retain significance.

[22] However, the coefficients and even standard errors varied strikingly little between orders of 1 and even up to 10 for each combination of AR(p) and MA(q) orders.

IV. Results and Findings

Figure 1 plots the three week moving average of weekly demobilization against the hypothesized independent variables of greatest interest, offering graphical representation of the

FIGURE 1 HERE

relationships.

Table 2 displays the results of the negative binomial GLARMA analysis of demobilized militia members.[23] The first column presents the three Military Offensives grouped and Arrests

TABLE 2 HERE

and Attempted Arrest grouped. The second column presents the results of the same regression, but with the Military Vector and the Arrests Vector parsed. The coefficients have been exponentiated and are displayed as incidence rate ratios (IRR).[24] The parsed regression is a marginally better fit than the grouped regression, as indicated by a lower AIC, and higher Wald and LR test statistics and ratios, respectively.

The results confirm the main hypotheses. In the grouped model, arrests and attempted arrests bear the strongest relationship to demobilization, with a 2.55 IRR significant at the 0.001

[23] The GLARMA method substantially diminished autocorrelation of the data. Figure 2 (in Appendix 1) offers three graphical representations of autocorrelation functions that demonstrate this point. For example, in the lower left pane, "Observed vs Fixed vs GLARMA," the GLARMA model counts are clearly closer than the Fixed (negative binomial) counts to the Observed counts, showing that the GLARMA model is the better fit.

[24] Using an incidence rate ratio, the expected count associated with each particular independent variable may be multiplied by the IRR for each week that the independent variable is estimated to have an effect. Hence, an IRR greater than one indicates a positive relationship between the dependent and independent variable; an IRR less than one indicates a negative relationship.

level, though the relationship is short-lived. The Arrests effect is modeled as lasting three to twelve weeks, depending on the time period over which the arrest attempt took place. The parsed regression results are also consistent with the DDRRR camp Director's speculation that the criminal arrest of field commanders may have a bigger impact on demobilization than the arrest of militia political leaders. The parsed model shows that the arrests of Murwanshyaka and Musoni, FDLR political leaders who had been resettled in Europe for more than nine years before their arrests, bear no significant relationship to demobilization; similarly, the arrest of FDLR Executive Director Mbarushimana was insignificant. In sharp contrast, the highly significant IRR for General Nkunda's arrest is 4.51, the highest IRR of any variable, with an effect estimated at eight weeks, and the significant IRR for Ntaganda's attempted arrest is 1.71, an effect estimated to have lasted twelve weeks.[25]

Military pressure on militias also bears a strong relationship to demobilization. As a group, joint FARDC-MONUSCO offensives against militias are powerfully associated with the rate of demobilization, with an IRR of 2.11 at the 0.001 level—effectively doubling the number of demobilizations, holding all other variables constant. Other military events that increased pressure on the militias, such as the redeployment of DRC troops to North Kivu following the withdrawal of Ugandan troops from the DRC, or the reintegration of former Zairian troops into FARDC, also have a significant, positive relationship with demobilization in both the grouped and parsed regressions. These effects are modeled as lagging four weeks after the events begin and they last from ten to 32 weeks, depending on the term of the particular offensive. The parsed regression result for Amanileo is consistent with DDRRR camp staff statements that Amanileo was a failure:

[25] The issuance of arrest warrants for militia leaders, and the opening of an ICC investigation were also each tested in both the grouped and parsed GLARMA models and the negative binomial model. Neither arrest warrants nor opening an ICC investigation bear a significant relationship to demobilization.

the IRR is less than 1.0 and the relationship to demobilization is not significant. Meanwhile, parsing suggests that the effect of the strongest offensive, Kimia II, was large, with a highly significant IRR of 2.61. The hypothesized effect of a reduction in military pressure associated with a DRC government troop retreat from the Eastern Congo at the same time that coup attempts took place in Kinshasa is not significant in either the grouped or parsed regression, though the direction is as predicted, with IRRs around .82 in both models.

In the grouped model, the DDRRR sensitization campaigns through leafleting and mobile radio stations do not bear a significant relationship with demobilization. The relationships are significant and positive in the parsed model, however, which (as noted above), fits the data slightly better than the grouped GLARMA (while controlling for overfitting, via the AIC). In the parsed model, the IRR is only 1.071 per MRS, but it is highly significant and with mobile radio stations operating continuously since 2009 and 14 now in operation, the aggregate effect on demobilization is compounded, such that, holding all variables constant, each additional MRS would be expected to increase demobilization by 7.1%. Similarly, leaflet distribution has a significant IRR of 1.097 per thousand leaflets. With continuous leafleting since 2009, rising to 6,250 leaflets per week by the end of 2012, an approximately 6.2% increase in demobilizations would be expected, all else equal.[26]

Seasonality and time were each associated with demobilization. January and February, the beginning of the rainiest months in North Kivu, yielded a significant increase with an IRR of 1.22 compared to the non-rainy season in the parsed model, and an IRR of 1.19 that approached

[26] In a parsed GLARMA model, where the dependent variable included only combatants and child soldiers (i.e., excluding dependents), the MRS and leafleting campaigns are insignificant, which could indicate that combatants' wives are more susceptible than combatants to sensitization campaigns.

significance in the grouped model.[27] Given the significance and stabilization of the time-series by the AR and MA parameters in the GLARMA models, the DDRRR camp staff's hypothesis that demobilization fell over the 10-year study may best borne out—if very cautiously--by the simple negative binomial regression. Although not controlling for autocorrelation as fully as the GLARMA model, the simple negative binomial model does point to a significant drop in demobilizations over time, controlling for the effects of all other covariates. See Table 4. Tests of time under the GLARMA model, likewise to be interpreted with caution, yield insignificance but generally negative results.

The result for GDP Pull might suggest a complex dynamic. Though insignificant in the grouped model, growing income disparity between the DRC and Rwanda (the latter generating more income per capita) is significant in the parsed model, with an IRR of .997. At face value, this IRR of less than 1.0 would suggest that the rate of demobilization in Congo declined as the Rwandan economy improved relative to the Congolese economy. While the IRR of GDP Pull is significant, it is extremely close to 1.0, and retains that significant but substantively indefinite value on every standard-variety measure of GDP (per capita, growth, etc.) and transformations (logged GDP, yearly ratio, growth ratio, and pull/income disparity). Likewise, the opposite of a Rwandan positive GDP pull effect—the apparent small but highly significant negative correlation between the growing disparity in Rwandan versus DRC wealth and demobilization-- remains largely unchanged across most every model specification, apart from some grouped models.

[27] In a parsed GLARMA model, where the dependent variable included only combatants and child soldiers (i.e., excluding dependents), the rainy season is insignificant, which could indicate that combatants' wives are more susceptible than combatants to being demoralized by bad weather.

It is possible that the relationship is spurious.[28] But without question this *state-level* relationship between Rwanda's economic growth relative to the DRC and the associated small reductions in demobilization conceals a complexity of individual, family, and group level preferences, commitments, dynamics, and extreme wartime constraints. Although there are no good available measures of the rate of resource extraction by Rwandan militias in Eastern Congo over time, mines controlled by the FDLR in Eastern Congo may have become substantially more productive over time because of entrenched fixed costs and increased worker productivity as miners gained experience and knowledge. And as fighting persists through decades, only the most entrenched fighters have been likely to remain and they will have enjoyed the benefits of promotions within the ranks, including receiving a bigger slice of the pie. These developments could explain the resource curse's GDP Pull *back.* Sunk cost fallacies could also be part of the story: over years of serving in DRC militias and engaging in resource extraction, at least some Rwandan militia members may have become emotionally invested in their way of life, and possess an associated memory and social identity (Feenstra et al. 2015; Kahneman and Tversky 1984). Phenomena like these can constitute incentives that outweigh the pull of Rwanda's GDP growth. Whether or not the GDP Pull finding is spurious, the GLARMA model that includes GDP Pull fits the data marginally better than an identical GLARMA model that excludes GDP Pull.[29]

Robustness and Sensitivity Checks

While every effort was made to select the most methodologically and substantively accurate models, in addition to the grouped and parsed model described above, most reasonable combinations of predictors and interactions were also considered, but their inclusion or exclusion

[28] An augmented Dickey-Fuller test, significant at $p < 0.001$, strongly rejects the presence of a unit root.

[29] The parsed model with GDP Pull has an AIC of 3579.034, whereas the otherwise identical model without GDP Pull has an AIC of 3765.888.

was largely unimportant. In addition, variations in lags and decay functions were tried, but the lags and decay rates employed in the reported models were optimal given the substantive elements of each intervention. Nevertheless, changes were minimal.

Lagged negative binomial, Poisson, and even (transformed) OLS estimates yield similar findings as to the statistical significance of regressors in the prediction of demobilization, though with increasingly exaggerated parameter estimates. Lagged negative binomial results are reported in Table 3. In the grouped model, all regressors are significant and as predicted. The results in the

TABLE 3 HERE

parsed negative binomial regression model are generally consistent with those of the parsed negative binomial GLARMA model. Taken together, the statistics in regression Tables 2, 3, and A1, as well as the graphics displayed in Figure A1, all come down resoundingly in favor of relying primarily on the negative binomial GLARMA fit and improve confidence in the GLARMA findings.

Estimated Effects

There does not appear to be a standard approach to estimated total substantive effects of a GLARMA model. The effects of the key variables in a GLARMA model are not additive as in a standard OLS regression, and there are challenges in attributing interactive effects, so it is difficult to isolate the substantive effects of variables.

Two different approaches are used here to report estimated marginal effects: a fixed baseline estimate and a variable baseline estimate. Both approaches calculate the effects by

summing the net predicted effect of each explanatory variable for each week over the time period according to the following equation:

$$ME(x) = \sum_{i=t}^{T} [E(y|x_t) - E(y|(x_t = 0))]$$

For the fixed baseline estimates, the estimated effect for the above equation is calculated using the predicted value of $y_{t=0}$ for the models. This fixed baseline is a point in time at which all of the explanatory variables are at zero or their equivalent baseline. The fixed baseline estimated total substantive effect thus calculates the total marginal effect as if the time-varying explanatory variable were having its effect solely on the (fixed) estimated baseline level of demobilization every week. The variable baseline approach calculates an estimate of the above equation using the time-varying predicted value of y_t. This has the advantage of allowing the baseline level of demobilization to vary, but runs the risk of giving the estimated effect "all the credit" for interactive effects with other variables. Nonetheless, the substantive estimates of our key variables are meaningful and large under both calculation approaches.

Table 4 reports estimated total substantive marginal effects of the key explanatory variables, using the approaches described above. While the effect of an arrest is not as long

Table 4: Estimated Effects of International Justice, Military Pressure, and "Sensitization" Campaign

	Total Est Add'l Demobilizations		Weeks Active Over 10 Yrs.
	Fixed Baseline	Variable Baseline	
arrests (grouped)	662	905	22
nkunda_arrest	410	420	6
att_ntaganda_arrest	182	301	13
drc_mil_off	2066	2187	95.8
kimia2	1184	2096	38
uganda_withdraw	213	306	8
zaire_army	109	103	8
rainy_season	197	203	41
Radio	4211	3696	352
Leaflets	718	904	133

Total weeks with complete observations, N=474.
Total number of demobilizing militia members over the period, 12,146.
All coefficient estimates are significant at the 0.05 level.

lived as a military offensive or the DDRRR's sensitization campaign, the effect of an arrest in the weeks following it is greater than the weekly effect of either a military offensive or the sensitization campaign. The best estimate is that an arrest or attempted arrest of a militia leader increased the weekly DDRRR demobilization rate in Eastern Congo by between 30 and 41 combatants, commanders, and dependents per week in the weeks following an arrest or attempted arrest, with the most important arrest yielding between 68 and 70 demobilizations per week. By way of comparison, DRC military offensives increased weekly demobilization by 22 or 23 people per week, with the most potent offensive increasing demobilization by 31 to 55 people weekly. In the 2003-12 period, the best estimate is that arrests pursuant to an international warrant account for

the demobilization of between 662 and 905 Rwandan militia members in Eastern Congo through the DDRRR camps, representing about 5.4% and 7.5% of the total.

V. Conclusions

This study employed two approaches that have not been commonly used to explain demobilization. By systematically interviewing those running a UN DDRRR camp in Eastern Congo, hypotheses were generated that are based partly on policy decisions. And by regressing those hypotheses and others against comprehensive demobilization data, this study has been able to distill an even clearer picture of the effects of those policies and their relative importance.

Demobilization in Eastern Congo is explained by many factors. Increased military pressure on a militia is significantly and substantially associated with demobilization. Radio and leafleting sensitization campaigns aimed at combatants are significantly associated with the rate of demobilization. Factors not within the direct control of policy actors have also affected demobilization in Eastern Congo: the demobilization rate has declined over time, as the pool of combatants shrunk and became more hard-core; and demobilization increases when the rainiest weather begins.

In debates about the effects of international justice, the most important finding of this study is that the arrest or attempted arrest of a militia leader pursuant to an international criminal warrant increases the rate of demobilization of combatants serving under them. DDRRR camp staff claimed that they observed this relationship and quantitative analysis of demobilization data from Eastern Congo confirms that relationship.[30]

[30] It is not claimed that the demobilization effect of arrests leads to a long term reduction in the number of combatants in the theatre. For example, it is possible that demobilized combatants may remobilize in the same or a different militia. However, UN DDRRR acquires each demobilizing combatant's biometrics and DDRRR staff claim in interviews that there is very little evidence of remobilization. Moreover, the total number of Rwandan militia members operating in Eastern

To what extent is the Congo case generalizable? The logic as to why the arrest of a militia leader pursuant to an international warrant would catalyze increased demobilization is not unique to the Congo, though the rationale suggests that decapitation by arrest might be more effective in some types of militias than others. Eastern Congolese militias are mostly patronage-based coalitions of factions led by a charismatic field commander (Stearns & Vogel 2015; Stearns et al. 2013). Moreover, based on interviews, most Congolese combatants are religious Christians who have a sense that perpetrating mass atrocities is "evil" or wrong, lending legitimacy to arrests among rank and file. Decapitation by arrest could have different effects on a militia or terror group based less on patronage and more on religion or ideology, where an arrested leader could be seen as a martyr or political prisoner, arrests are seen as illegitimate, and rank and file are committed to the cause regardless of lost material support. Popular Palestinian support for their nationals arrested by Israel exemplifies the point.

Much of the rationale for decapitation—and its limitations-- applies equally to both arrest and targeted assassination. How then do they differ? Assassination is considerably easier to effectuate than arrest, particularly in the era of drones, and is more permanent than arrest. However, in patronage-based militias and armed groups composed of a coalition of factions, where decapitation by any means might be expected to effectuate demobilization, decapitation by arrest might be the preferred means, depending on how it is perceived in terms of legitimacy. In Europe and the United States, the morality of assassination is questioned more frequently than the morality of arresting someone for perpetrating mass atrocities. In Eastern Congo, interviewed combatants and commanders expressed feelings of guilt and an understanding of the impropriety of the mass

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Congo over the 2003-12 period is estimated to have declined by more than the number of those that demobilized through the Goma and Bukavu DDRRR camps.

atrocities allegedly committed by their militia. In that context, decapitation by arrest may be seen as legitimate, deterring, and preferable to targeted assassination.

Yet international criminal justice, like other areas of international relations, may be explained by a logic of appropriateness or by a logic of consequences (March and Olsen 1998). In one narrative, international criminal arrests for the perpetration of mass atrocities are said to have a symbolic value, expressing humanity's outrage about those atrocities and advancing the ideals of justice (Meron 2006). Only states can effectuate an arrest-- the ICC has no police force-- and in some cases a state could decide to arrest in order to advance the ideals of justice.

At the same time, international criminal justice has important political consequences. An arrest pursuant to an international criminal warrant often removes a powerful political or military figure from the theatre where he has been operating. While some rulers, governments, or policy-makers may decide to effectuate an arrest based on ideals of justice, others surely base the decision on a consequential calculation of interest in removing the arrestee from power. Effectuating an arrest often involves a state pressuring another to act, or a state shifting support away from one military or political leader to another-- before, during, or after an arrest. Within a military or militia command structure, the arrest of a field commander consummates a shift of power on the ground, to the benefit of some in the militia-- and likely to the detriment of others. And as this study has shown, the arrest of a militia leader may catalyze the demobilization of some of its combatants, diminishing the militia's numerical strength. In these ways, international justice, like the wars in which it is often brought to bear, may be seen as a mere continuation of politics by other means.

Hence, the appropriateness of arrests derived from norms of international justice rests in tension with the political consequences of and motivations for arrests: the more that decapitation by arrest is perceived as done for political purposes, the less legitimate arrests will seem—which

may dampen its demobilization effect and diminish its attractiveness in comparison to assassination.

Figure 1: Demobilizations, Arrests, and UN Media Interventions

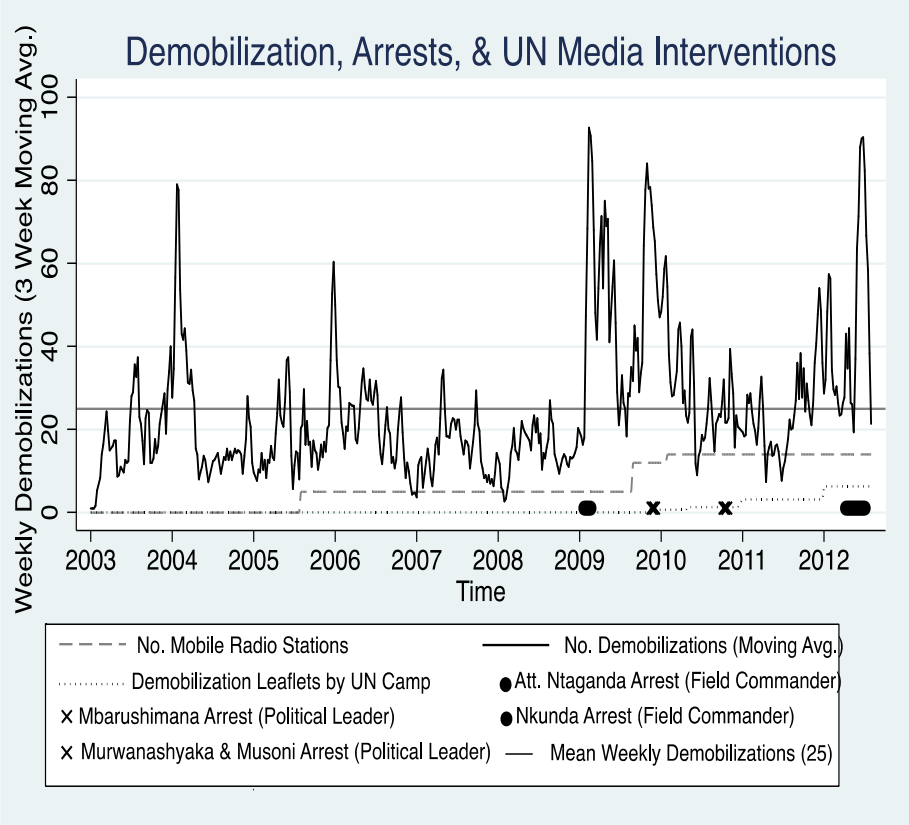


Table 2: Incidence Rate Ratios (IRRs) for Combatant Demobilization in Eastern DRC–Regression Model: Generalized Linear Autoregressive Moving Average (GLARMA)

	Dependent Variable: Demobilization (3-Week Moving Avg.)	
	Grouped GLARMA IRRs	Parsed GLARMA IRRs
	(1)	(2)
Mobile Radio Stations	1.0248042	1.071355***
	(0.01783292)	(0.02113237)
UN Leaflets	1.0334635	1.096766*
	(0.03472892)	(0.04227231)
Arrests	2.5533959***	–
	(0.4260262)	–
DRC Military Offensives	2.1105672***	–
	(0.294693)	–
Coup Attempts	0.8219107	0.8226606
	(0.1957156)	(0.1909748)
Uganda Withdrawal	1.6655974*	2.370389*
	(0.4259114)	(0.858729)
Zaire Army Reintegration	1.8677866**	1.700139*
	(0.4509666)	(0.4024262)
Umojawetu Offensive (DRC)	–	1.60034
	–	(0.5354275)
Kimia II Offensive (DRC)	–	2.605317***
	–	(0.3915195)
Amanileo Offensive (DRC)	–	0.7478437
	–	(0.2078746)
Nkunda Arrest	–	4.514041***
(CNDP Field General)	–	(1.443175)
Murwanashyaka Arrest	–	0.7445773
(FDLR Political Leader)	–	(0.2464922)
Mbarushimana Arrest	–	1.241573
(FDLR Political Leader)	–	(0.4111737)
Att. Ntaganda Arrest	–	1.719627*
(CNDP Field General)	–	(0.4487746)
Rainy Season	1.1945470+	1.222956*
	(0.1179358)	(0.1191304)
GDP Pull	0.9986465	0.9971266**
(Rwanda - DRC)	(0.0009242474)	(0.000955347)
Intercept	29.8130345***	48.42124***
	(10.28516)	(17.01794)
AR(4) Coefficient (Untransformed)	0.10054807***	0.10240***
MA(3) Coefficient (Untransformed)	0.07659526**	0.07051**
AIC (N = 474)	3773.985	3759.034
LR Test	28.79***	29.01***
Wald Test	24.91***	25.03***

+p<0.10; *p<0.05; **p<0.01; ***p<0.001.
Standard errors shown below coefficient estimates are approximated using the delta method.

Table 3: Incidence Rate Ratios (IRRs) for Combatant Demobilization in Eastern DRC Following Int'l. Justice, Arrests, & Military Offensives (Negative Binomial Regression)

	Dependent Variable: Demobilization (3-Week Moving Avg.)	
	Negative Binomial Grouped	Negative Binomial Parsed
	(1)	(2)
Mobile Radio Stations	1.035**	1.070***
	(1.012 | 1.058)	(1.044 | 1.097)
UN Leaflets	1.076***	1.112***
	(1.035 | 1.120)	(1.064 | 1.163)
Coup Attempts	0.586**	0.603**
	(0.422 | 0.821)	(0.439 | 0.836)
Uganda Withdrawal	1.679**	1.931**
	(1.230 | 2.332)	(1.231 | 3.080)
Zaire Army Reintegration	1.851***	1.669***
	(1.369 | 2.548)	(1.246 | 2.271)
DRC Military Offensive	2.364***	–
	(2.013 | 2.779)	–
Arrests	2.351***	–
	(1.911 | 2.910)	–
Umojawetu Offensive (DRC)	–	2.204***
	–	(1.435 | 3.370)
Kimia II Offensive (DRC)	–	2.674***
	–	(2.250 | 3.184)
Amanileo Offensive (DRC)	–	1.067
	–	(0.768 | 1.488)
Nkunda Arrest	–	3.328***
(CNDP Field General)	–	(2.152 | 5.330)
Murwanashyaka Arrest	–	0.756
(FDLR Political Leader)	–	(0.476 | 1.256)
Mbarushimana Arrest	–	1.360
(FDLR Political Leader)	–	(0.864 | 2.240)
Att. Ntaganda Arrest	–	1.808***
(CNDP Field General)	–	(1.335 | 2.459)
Year	0.698***	0.756**
	(0.566 | 0.862)	(0.615 | 0.928)
Rainy Season	1.212*	1.235***
	(1.050 | 1.403)	(1.074 | 1.425)
GDP Pull	1.007**	1.003
(Rwanda - DRC)	(1.002 | 1.012)	(0.998 | 1.008)
Intercept	4.289*	10.069***
	(1.133 | 16.217)	(2.705 | 37.457)
AIC (N = 474)	3541	3517
Theta (Std. Err.):	6.490 (0.536)	7.188 (0.615)
LR Test Statistic:		34.538 $p <$ 1.86e-06***

$^{+}$p<0.10; *p<0.05; **p<0.01; ***p<0.001.
95% confidence intervals shown below coefficient estimates.

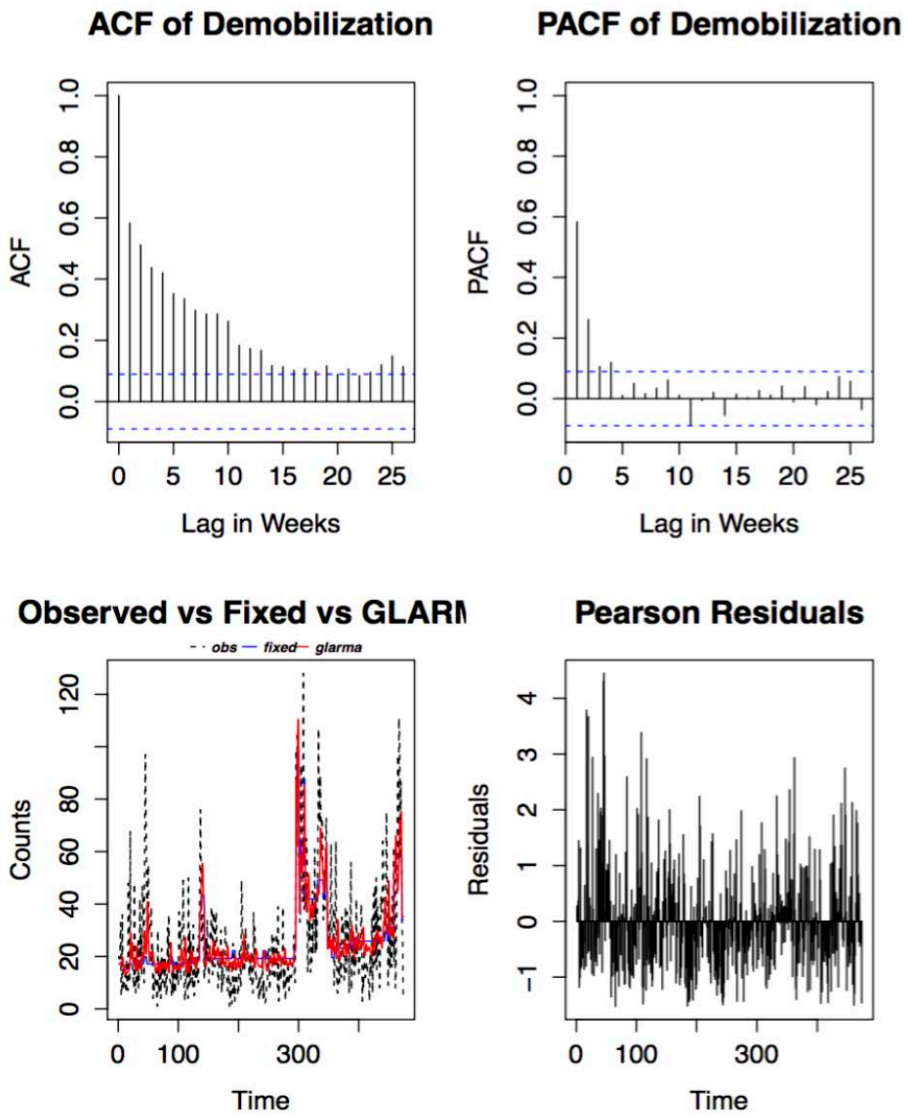
APPENDIX 1

Table A1: Incidence Rate Ratios (IRRs) for Combatant Demobilization in Eastern DRC Following Int'l. Justice, Arrests, & Military Offensives: Poisson Autoregressive PAR(p) Models

	Dependent Variable: Weekly Demobilizations	
	PAR(4) Grouped	PAR(3) Parsed
	(1)	(2)
Mobile Radio Stations	1.019***	1.079***
	(0.005)	(0.021)
UN Leaflets	1.055***	1.099***
	(0.015)	(0.021)
Coup Attempts	0.972**	0.981*
	(0.049)	(0.008)
Uganda Withdrawal	1.736***	2.717***
	(0.149)	(0.245)
Zaire Army Reintegration	1.512***	1.455
	(0.163)	(0.869)
DRC Military Offensive	2.397***	–
	(0.126)	–
Arrests	2.558***	–
	(0.151)	–
Umojawetu Offensive (DRC)	–	1.686***
	–	(0.134)
Kimia II Offensive (DRC)	–	2.714***
	–	(0.155)
Amanileo Offensive (DRC)	–	0.782
	–	(0.162)
Nkunda Arrest	–	5.172***
(CNDP Field General)	–	(0.464)
Murwanashyaka Arrest	–	0.689***
(FDLR Political Leader)	–	(0.076)
Mbarushimana Arrest	–	1.302***
(FDLR Political Leader)	–	(0.152)
Att. Ntaganda Arrest	–	1.970***
(CNDP Field General)	–	(0.129)
AR(1) (Untransformed)	0.219***	0.012**
	(0.014)	(0.004)
AR(2) (Untransformed)	0.118***	0.011**
	(0.004)	
AR(3) (Untransformed)	0.078***	0.008*
	(0.013)	(0.004)
AR(4) (Untransformed)	0.103***	
	(0.013)	
Rainy Season	1.196***	1.096***
	(0.063)	(0.019)
GDP Pull	0.998	0.996***
(Rwanda - DRC)	–	(0.004)
Intercept	36.464***	61.253***
	(0.294)	(8.789)
AIC (N = 474)	5892	5417
Wald Test Statistic (vs. Poisson):	12331.19 p = 0.00	32.833 $p < 3.492e\text{-}07$ ***

$^{+}$p<0.10; *p<0.05; **p<0.01; ***p<0.001.
Standard errors shown below coefficient estimates.

Figure A1: Upper Panel: Autocorrelation (ACF) and Partial Autocorrelation (PACF) of Unmodeled Demobilizations. PACF Reflects Significant Autorocorrelation, Suggesting the Appropriateness of the AR(4) Lag Component. Lower Panel, Left: Superimposed Plots of Observed Demobilizations **vs.** Time (Black Dashed) with Fitted Values for a Roughly Equivalent Non, CLABMA Negative Binomial Model (Blue) GLARMA Negative Binomial Model (Red). Bottom Right: Apart from a Spike Around 2004, Diagnostics Show Normality and Homoskedasticity of the final GLARMA fit.



Appendix 2

R package utilized 'glarma': Dunsmuir, William T.M., and David J. Scott. 2015. "The glarma Package for Observation-Driven Time Series Regression of Counts." *Journal of Statistical Software* 67(7).

The simplified exponentual family form taken by the generalized linear autoregressive moving average (GLARMA) model, where dispersion parameter $\kappa = 1$, is:

$$f(y_t|W_t) = exp\{y_t W_t - a_t b W_t + c\},$$

where a_t and c_t are sequences of constants that can vary depending on observations y_t. While the canonical log link function is used for the negative binomial and Poisson GLARMA models, the principal unique component of GLARMA comes in the state variable or parameter, W_t.

Many generalized or stationary models formulate the expectation of y_t as $\mu_t = W_t\beta$. However, under the GLARMA family of models, it is the expectation of y_t's conditionality on W_t that carries the weight of the autoregression AR(p) and moving average MA(q) parameters. That is, where, as above:

$$f(y_t|W_t) = exp\{y_t W_t - a_t b W_t + c\},$$

W_t itself, in the case of the negative binomial, is equivalent to:

$$W_t = x_t^T * \beta + Z_t,$$

Fundamentally, it is Z_t that captures the autoregression and historical lags:

$$Z_t = \sum_{i=1}^{p} \phi(Z_{t-1} e_{t-1}) + \sum_{i=1}^{q} \theta_i e_{t-1}$$

The residuals, then, which can also be used in linear combination to recover Z_t, are:

$$e_t = \frac{Y_t - \mu_t}{\nu_t}$$

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