Waging Civil Conflict: Essays on Counterinsurgency and Repression

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Political Science)
in the University of Michigan
2020

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ACKNOWLEDGMENTS

For the last year and a half, I have told friends and colleagues that I think of myself as the most fortunate graduate student in Political Science. I have had the opportunity to call two departments—at the University of Michigan and University of Rochester—my home and have learned from and been supported by peers and mentors at numerous other institutions. Therefore, the number of people deserving of acknowledgment and thanks is far greater than can be represented here, though all of those individuals have my enduring gratitude.

Foremost thanks to Scott Tyson, whose faith in me was (almost) never shaken and whose advice and insight not only shaped this dissertation but also my approach to research and the profession. Scott showed me a path I didn't know existed, not realizing I would be stubborn enough to pursue it with reckless abandon. Lucky graduate students have advisors who help them find and take advantage of opportunities for funding and collaboration. I'm luckier because Scott created opportunities for me that are in many ways irreplicable.

Jim Morrow has showed me, both as a teacher and scholar, how to take big ideas and complicated models and distill them in a way that they can't be misunderstood. His ability to make what I thought were big problems seem small and manageable (and his patience with my multi-layered contingency plans for all logistical hurdles) is also the reason I have been able divide my time between two universities and complete my dissertation away from Ann Arbor. I'm still working on these skills myself, but Jim's example will continue to serve as a reminder that my ideas can be simpler and more powerful than I think they are.

In many ways, Iain Osgood's help and advice have bookended my graduate career. His class was the first to show me that I love math now that I know I can use it to answer the questions I care about. His careful reading of each of the papers of this dissertation has caught many mistakes that he certainty taught me not to make. I aspire to be as kind and constructive in correcting future students as Iain has been to me. Each of these papers is better for his thoughtfulness. John Ciorciari has helped me take the formal models in this dissertation and explain them in ways that help anyone see their value. John has helped make my thinking and writing clearer, both by recommending excellent books on topics from the UN to Cambodia to security sector reform that have helped me develop the ideas that follow and by posing insightful questions that pushed me to clarify each paper's contribution.

Outside of my committee, Christian Davenport has created a conflict community at Michigan that I am sad to leave, taught me I must ask *big* questions, and has challenged me to

write models that transcend their inherent simplifications of the world. I'm happy to continue to agree to disagree with someone I deeply respect. I have benefited greatly from many informal advisors at Rochester, notably Scott Abramson, Mark Fey, and Jack Paine who all know this dissertation nearly as well as my committee. Maggie Penn has given me invaluable advice about my work and my career, and I'm honored to soon be her colleague.

I'm fortunate to have mentors who have become friends, including Chris Fariss, whose support has been critical in helping me navigate some of the more difficult moments of writing this dissertation. Clare Tyson has always had my back and I still keep a postcard she gave me above my desk to remind me to 'write more papers.' I'm also glad to have a former student now friend in Lotem Halevy, whose academic trajectory looks too much like mine to really be advisable. Fortunately for me, this will bring her to Emory and for that I am grateful.

Many colleagues at Michigan have become my most helpful sounding boards and valued friends. I'm lucky to follow in the footsteps of Meredith Blank, Jason Davis, and Alton Worthington, who helped me find my place in the department. Now, I can't get any work done when I go back to Ann Arbor because I have so many important people to catch up with, including Deanna Kolberg, Todd Lehmann, Kevin McAlister, Tom O'Mealia, Rebecca Savelsberg, Corina Simonelli, Roya Talibova, and Sasha de Vogel. Someday Tom and I will finish the scorched earth paper we started in our first year and all these wonderful people will be so happy to never have to hear about it again.

Joining a new department after three years at Michigan was not an easy transition, but many friends at Rochester have made me a part of the department. This year I may have spent more time in other people's offices than my own, either with Karen Albert, Olga Gasparyan, and Christy Qiu or on Maria Silfa and Varun Karekurve-Ramachandra's couch. When I am in my office, I've had the privilege of sharing it with Zuheir Desai who always selflessly offers his help when I'm stuck on a proof or struggling with Mathematica.

The greatest of thanks to Kiela Crabtree and Amna Salam, without whom I either wouldn't have made it to this point or would have lost any sense of sanity along the way. Finishing a dissertation in the middle of a pandemic has been an odd experience and I'm fortunate to have been able to spend the last months in particular talking with Amna about the final stages of this project, politics in models and the real world, and anything and everything else. Kiela's friendship over the last five years has been sustaining. I'm a better person for knowing her and I look forward to many future travels together and having the number of years we've been friends eventually exceed the number of years we're in grad school.

Finally, my parents Ellen and Paul, my sister Rachel, and Max have seen the best and worst of this Ph.D. They always knew I'd make it here but sometimes had to convince me it was possible. I couldn't have done this without them and there is no way I can thank them enough.

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ABSTRACT

My dissertation explains governments' strategies for using force in civil conflict. Combined, these papers make two primary contributions. First, each highlights why, counterintuitively, governments rely on tactics that have negative consequences—mass repression, forced resettlement, and destruction of property. Second, I show how opportunity cost shapes citizens' decision-making, leading them to take actions that reinforce governments' reliance on particularly destructive tactics.

The Wages of Repression:

Incidents of government repression vary in which individuals are targeted. Building on a conceptual distinction between targeted repression (against opposition group members) and mass repression (against citizens broadly), I explain why regimes use both types of repression in combination. Targeted and mass repression have distinct effects on civilians' incentives to support an opposition. Targeted repression decreases the benefit of challenging the regime, activating security concerns. Mass repression affects individuals' material wellbeing, improving opportunities for participants in the economy. These participation and material wellbeing mechanisms make targeted and mass repression jointly optimal for the regime. By identifying distinct logics for targeted and mass repression, I show in some cases, both types of repression are complements, meaning it is optimal for governments to employ more targeted and mass repression simultaneously.

Forced Economic Migration:

Why do governments manipulate the movement of citizens in conflict? I develop a model of forced resettlement by a counterinsurgent regime that show how economic incentives influence, and in some cases determine, the form and intensity of displacement. Specifically, governments may use forced resettlement to affect labor markets. As the government uses force to retake con-

tested territory, it decreases the opportunity cost of migration for citizens in conflict-affected areas. This can lead to an influx of migrants to government-controlled regions, increasing the supply of labor and exerting downward pressure on wages. Governments may forcibly resettle citizens to avoid an oversupply of labor in secure areas, or an undersupply in areas in which they regain control. I compare the economic incentives that lead to two common forms of resettlement, government-controlled model villages and internal displacement camps, and show that increasing economic development in government-controlled regions may increase levels of forced resettlement.

Targeting Lives and Livelihoods:

I develop a model of civil conflict that explains why combatants choose to destroy capital under control of their opponents, as a substitute for or in combination with violence against non-combatants. A government and an insurgent group can direct force against two types of targets: citizens that may support their opponent and the natural and produced capital that enables each side to fight. The choice of tactics by each party affects citizens' decision of which side to support, which may lead to either moderation or escalation of the use of destructive war-fighting tactics. I show violence against citizens and destruction of capital are often substitute tactics, and that governments and insurgent groups adopt opposite strategies. One side chooses high levels of violence against citizens and the other side chooses high levels of capital destruction. Moreover, I show that despite backlash against the use of force, violence against citizens may benefit the government.

CHAPTER 1

Introduction

Incidents of repression and violence are the observable results of strategic deliberations within government forces. For example, the Guatemalan military's razing of villages in the Ixil Triangle in 1982 was driven by the identification of those villages as "red zones" of insurgent activity, and the result of a decision that those villages were to be obliterated with no attempt to distinguish civilians from guerrillas (Schirmer 1998). In this instance, a former colonel described in an interview how the Guatemalan Army identified its target (all citizens suspected of supporting an insurgent group) and why it chose to raze the villages—because there was no other way to separate the population from the guerrillas without completely destroying the towns. However, this transparent accounting of the deliberations that culminate in government violence are rare. In most cases, no decision maker is willing to offer any account, much less an honest account, of the motivations for a regime's use of force. Therefore, the rationale behind a government's strategy, how and why regimes select certain tactics and targets when waging civil conflict, often remains opaque. In the absence of first-hand accounting, theoretical explanations shed light on the motivations behind government violence.

This dissertation comprises three papers that explain governments' strategies for using force in civil conflict. I develop theories of why regimes employ mass repression, interfere with citizens' migration, and target the natural and produced capital that sustains the livelihoods of some portion of its population. I show that each of these tactics is adopted for its specific downstream effect on citizens participation in conflict. Governments' choices of tactics and targets in part determine conflict outcomes, and the long-run consequences of violence. In Guatemala, the army's brutality contributed significantly to the government's victory and the scorched earth campaign has been linked to a reduction in maize species diversity in the Guatemalan highlands, its effects extending far beyond its socio-political consequences (Steinberg & Taylor 2002). These papers represent one step towards an explanation of government strategy in civil conflict, taking seriously governments' and citizens' economic incentives to clarify regimes' motivations for using force.

Arguably the most prominent explanations for how and why combatants, and governments in particular, choose their repressive strategies to wage civil conflict center information and capacity

disparities between the regime and opposition forces. This is most evident in explanations for indiscriminate violence against non-combatants. Both governments and insurgent groups are perceived to use force indiscriminately when they lack sufficient information to target opponents selectively and when their adversary is too weak to protect its supporters from this violence (Valentino, Huth & Balch-Lindsay 2004, Kalyvas 2006, Weinstein 2007, Downes 2008, Wood 2010). In the related debate about whether such violence 'works,' often the objectives of whichever combatant employs violence indiscriminately are characterized as punishment, submission, or decisive victory (Mason & Krane 1989, Arreguín-Toft 2001, Merom 2003, Lyall 2009, Toft & Zhukov 2012). According to this set of theories, combatants whose strategies stop short of indiscriminate force do so then because indiscriminate violence is counterproductive. Information and capacity arguments have been used to explain the use of tactics including repression (Herreros 2006), aerial bombardment (Kocher, Pepinsky & Kalyvas 2011), scorched earth campaigns (Downes 2007), mass killings (Gregory, Schröder & Sonin 2011), and forced migration (Zhukov 2015), both in individual conflicts (Hultman 2009) and cross-national analyses (Eck & Hultman 2007).

Rationales for governments' and insurgents' strategies differ substantially from the mechanisms that explain citizens support for opposition groups. Citizens' willingness to support challengers increases when the opportunity cost of doing so is low (Collier & Hoeffler 2004, Collier, Hoeffler & Rohner 2009). The opportunity cost mechanism has previously been used to explain conflict incidence (Becker 1968, Grossman 1991), support for armed groups (Collier & Hoeffler 1998, Bueno De Mesquita 2005, Chassang & Padro-i Miquel 2009), and government violence (Esteban, Morelli & Rohner 2015). This economic motivation is validated in a number of studies that show negative economic shocks to labor-intensive industries and positive shocks to capital-intensive sectors increase repression (Dal Bó & Dal Bó 2011, Dube & Vargas 2013). Opportunity cost for citizens also has clear effects on conflict tactics, particularly for non-state actors. When economic prospects are favorable, fewer citizens are willing to join insurgent groups, forcing insurgents to rely on irregular tactics (Bueno de Mesquita 2013) and leading to increases in violence against civilians (Humphreys & Weinstein 2006).

My dissertation provides an alternative explanation of how and why governments choose their tactics in civil conflict than, as Kalyvas calls it, the control-collaboration model (Kalyvas 2012). I focus on governments that aim to generate affirmative support from their citizens, achieved by manipulating the opportunity cost of participation in an opposition movement or insurgent group. The three papers that comprise the dissertation make two primary contributions. First, each highlights why, counter-intuitively, governments rely on tactics that have negative consequences—mass repression, forced resettlement, and the deliberate destruction of physical assets, respectively. Second, I focus on how opportunity cost shapes citizens' decision-making, altering their support decision in ways that reinforce the regime's need to rely on particularly destructive tactics. I show that,

even if government violence may to some extent deter support from citizens, regimes' use of force can so greatly reduce the capacity of opposition groups to provide material benefits to supporters that many citizens are willing to support the regime.

In each of the three papers, I consider individuals combined security and economic interests to explain their decision-making in conflict. For citizens, their own material wellbeing concerns affect their underlying willingness to participate in conflict while security concerns affect their instantaneous decisions of whether to join an opposition group, flee their homes, or switch their support to the opposing side of a conflict. Thus, my models offer one type of explanation—one based on economic incentives—for how citizens respond to government (or insurgent) violence. Given the focus on opportunity cost, I present not explanations for why citizens participate in conflict as combatants or informants, but rather why they do not. From the individual's perspective, if she knows joining the opposition is going to incur a risk of targeted repression, why not continue to participate in the labor force? If she expects her long-term economic prospects are better in an area not affected by conflict, why not flee when her security is threatened? And why not stay once violence abates? Finally, if caught between government and insurgent forces, if her economic prospects are better if she supports the government, why not support the regime? By clearly separating security and material wellbeing concerns I show that, when the immediate threat of violence forces citizens to make a decision, underlying economic incentives play a significant role in citizens' response to conflict.

Governments' choices of tactics, in each paper, similarly depend on regimes' own security and economic concerns, and additionally depend on the distinct security and economic concerns that drive the decision-making of citizens. I model governments' strategies at the macro level—rather than explaining specific realizations of violence perpetrated by individual soldiers, I incorporate economic concerns, as well as political and security concerns, to show how regimes' choices of tactics may change depending on underlying economic conditions. Specifically, though governments' security concerns remain constant, variation in economic conditions, in my frameworks, leads to different levels of violence, directed against different groups of citizens. Therefore, I show how economic incentives affect overall patterns of government violence and subsequently citizens' movement and participation in conflict.

In Chapter 2, I explain why governments use mass repression (against citizens broadly), particularly when alternative tactics are available, namely targeted repression (against opposition group members). Targeted and mass repression have distinct effects on civilians' incentives to support an opposition group. Specifically, I argue that while targeted and mass repression both alter the opportunity cost of participating in an opposition group, they operate through separate channels. Targeted repression reduces participation in opposition groups by decreasing the benefit of challenging the regime and activates citizens' security concerns by making opposition group member-

ship riskier. Mass repression affects individuals' material wellbeing, improving opportunities for citizens that forgo opposition group membership to participate in the economy. These participation and material wellbeing mechanisms, I show, make targeted and mass repression jointly optimal for the regime.

Targeted and mass repression, used together, solve two problems for the government. Citizens choose between joining an opposition group and participating in the labor force. Targeted repression directly reduces the size of the opposition. In addition, targeted repression activates citizens security concerns by making joining the opposition riskier. This creates a participation incentive that drives individuals out of the opposition group and into the labor force. This participation incentive generates a countervailing effect that reduces the benefit of targeted repression for the regime. As more citizens opt into the labor force, they flood the labor market and reduce the per capita material benefits for all individuals in the economy. Mass repression compensates for the economic distortions created by targeted repression. Mass repression's downside, from the governments perspective, is that, in addition to targeting opposition members, it removes individuals from the labor force. But this adjustment in the potential labor pool increases the availability of material benefits for citizens who participate in the labor force. The material wellbeing incentive generated by mass repression sufficiently encourages economic participation. This increase in labor force participation outweighs the government's costs for mass repression.

Moreover, I identify circumstances under which both types of repression are complements, meaning it is optimal for governments to employ more of both types of repression simultaneously. Because of the distinct ways targeted and mass repression affect citizens, they are not merely options governments trade off. Regimes can have strong incentives to choose to employ higher levels of both targeted and mass repression simultaneously. Complementarity holds when the cost of targeted repression is low and when, at high levels of mass repression, targeted repression discourages more citizens from joining the opposition. That is, the marginal effect of increasing targeted repression on citizens' participation decision is larger when levels of mass repression are high. This represent a significant departure from existing literature that largely views mass repression as a result of some lack of state capacity, particularly due to high costs of targeted repression. Even when targeted repression is costly, the participation and material wellbeing mechanisms make both types of repression optimal for the government.

Chapter 3 ask why governments use forced migration tactics, including forcibly resettling citizens into model villages or internment camps. I develop a theory of forced resettlement that demonstrates how economic incentives that drive citizens' migration affect governments and show that the economic consequences of conflict-induced migration spur resettlement. In my framework, the flow of refugees and internally displaced persons fleeing conflict increases as the government uses violence to take control of a contested economic sector. Forced resettlement is a strategic

response by government forces to economic distortions caused by this migration.

The government uses violence and forced resettlement to maximize revenue collected from two sectors of the economy, an uncontested sector that is firmly under regime control and a contested sector where the government's authority is challenged by an insurgent group. In the model, the government's use of force increases its control over the contested sector, increasing its share of tax revenues. However, citizens in the contested sector may flee in anticipation of, or in response to, both violence and its downstream economic consequences. As the government increases its use of force, and control over resources shifts, citizens' economic opportunities in both sectors change, affecting their willingness to migrate.

An increased migration rate has two consequences for the government. First, an increase in the flow of refugees, who leave the country, reduces the population of citizens who participate in the labor markets of the contested and uncontested sectors, reducing the government's tax revenue. Second, the government risks internally displaced citizens flooding the labor market of the uncontested sector, exerting downward pressure on wages and reducing marginal productivity in the contested sector. These economic effects of emigration and internal displacement can lead the government to forcibly resettle citizens. I compare two forms of forced resettlement, resettlement that compels some citizens to remain in the contested sector and internment in camps that exist outside of the two economic sectors. In both cases, I show the government has strong economic incentives to employ high levels of forced resettlement.

In Chapter 4, I consider what motivates combatants to destroy the natural and produced capital that is used to support non-military economic activity, either instead of or in addition to employing violence against an opponent and its supporters. I contrast the strategies of governments and insurgent groups, exploring why combatants choose to destroy the natural and produced capital under control of their opponents, and how this tactic is combined with or substituted for violence against non-combatants. I model a government and an insurgent group that can direct force against two types of targets: citizens that may support their opponent and the natural and produced capital that enables each side to fight. The choice of tactics by each party affects citizens' decision of which side to support, which may lead to either moderation or escalation of the use of destructive war-fighting tactics.

I show that violence against citizens is driven by the zero-sum nature of their support decision. Because citizens take sides, either the government or the insurgent group will choose to target citizens and deny that support to their opponent. Further, I demonstrate that under many circumstances, targeting physical capital is a substitute for targeting citizens. Destruction of an opponent's capital increases support from citizens without risking backlash against the use of force but bears different costs than perpetrating violence against citizens. When these costs are high, violence against citizens increases.

These incentives that lead combatants to destroy capital and direct violence against citizens generate three implications for governments' and insurgent groups' tactical choices, and the consequences of these decisions on citizens support for each side. First, both sides derive greater benefits, typically with fewer costs, from targeting capital than targeting citizens. Second, weaker insurgents often substitute violence against citizens for destruction of capital because they lack the capacity to efficiently target the government's capital stock. In turn, the government increases its efforts to destroy the insurgents' capital and reduces its violence against citizens, which increases support for the government. Third, even when capital targeting is costly for both sides, prompting each to increase its violence against citizens, the government may increase the size of its support base at the expense of the insurgent group, in spite of backlash to this violence.

These three papers are unified not only by a shared focus on the tactics adopted by combatants in civil conflict, but also by a common economic model that captures citizens' opportunity cost of opposition group participation. In each of the three papers, I incorporate violence into a partial equilibrium framework, endogenizing the material benefits that drive citizens' decisions. This economy is the simplest in Chapter 2, isolating the effects of violence on supply and demand for labor. Chapters 3 and 4 feature two-factor economies in which the relative size of capital endowments effect the scope and scale of violence. Taken together, these models contribute to a growing formal theoretic literature that jointly models civil conflict and its economic consequences (Bueno De Mesquita 2005, Dal Bó & Dal Bó 2011, Chassang & Padro-i Miquel 2009, Bueno de Mesquita 2020).

CHAPTER 2

The Wages of Repression

2.1 Introduction

Autocratic regimes often rely on an array of repressive tactics when confronting internal challenges. Depending on the nature and severity of the threat, governments' repressive response may vary considerably in scope and scale (Pierskalla 2010, Ritter 2014, Schnakenberg & Fariss 2014). Regimes are strategic in selecting their repressive strategies (Svolik 2013, Tyson & Smith 2018, di Lonardo, Sun & Tyson 2020) but this does not resolve the puzzle of why governments often repress broadly in a manner arguably counterproductive to their ends (Davenport & Inman 2012). Why do governments sometimes employ mass repression, particularly when alternative targeted tactics are available to them? For example, why do some regimes repress by detaining or 'disappearing' vocal dissidents while others forcibly displace all residents in a particular town or village in an attempt to identify, and deny support to, internal challengers?

I develop a model of government repression that offers a strategic rationale for mass repression and provides a novel explanation for why governments employ mass repression and targeted repression simultaneously, counterintuitively adopting repressive tactics that affect broad swathes of the population along with more discriminating forms of repression. The primary dimension on which repression varies in my framework is the politico-social characteristics of the government's targets. What matters is whether repression is employed only against identifiable members of an opposition group or the citizenry more broadly. Repression is *targeted* when it is directed only at members of an opposition group. If the regime represses broadly, using force against both opposition members and non-members, the regime has employed *mass* repression. These types of repression largely map onto the descriptions of discriminate and indiscriminate violence in the context of armed civil conflict (Kalyvas 2006, Zhukov 2015). However, targeted and mass repression admit more forms of repression than lethal physical violence. Moreover, I diverge from current explanations for repression that emphasize a tradeoff between tactics—instead of demonstrating why regimes may adopt either targeted repression or mass repression, I illustrate conditions under

which they sometimes employ both. The key intuition that drives government repression is that citizens' security and material or economic concerns are linked. Repression activates both concerns, but targeted and mass repression do so in distinct ways. These unique effects of targeted and mass repression give rise to their complementarity.

Conventional wisdom suggests that targeted repression is more effective than mass repression at achieving the government's ends, and a choice to use mass repression indicates some deficiency of the regime. Yet mass repression, employed alone or in combination with targeted repression, is applied by a diverse set of regimes, under varied circumstances (Lyall & Wilson 2009, Esteban, Morelli & Rohner 2015, Zhukov 2015). I argue targeted and mass repression have distinct effects on the incentives of the citizens repressive regimes seek to control. Specifically, targeted and mass repression both alter the opportunity cost of participating in an opposition group, but operate through separate channels. Each form of repression has a distinct effect on citizens' relative benefits from opposition group membership. Regimes, therefore, have different incentives for employing each tactic.

Moreover, I identify a set of conditions under which governments gain by using targeted and mass repression together. If mass repression were a mistake or sub-par alternative, it would be natural for regimes to substitute targeted repression for mass repression whenever feasible. Instead, I show targeted and mass repression can be complements. This complementarity holds when the cost of targeted repression is low and when, at high levels of mass repression, targeted repression discourages more citizens from joining the opposition. That is, the marginal effect of increasing targeted repression on citizens' participation decision is larger when levels of mass repression are high. Because targeted and mass repression affect citizens in distinct ways, they are not merely options governments trade off. I find regimes can have strong incentives to choose to employ higher levels of both targeted and mass repression simultaneously.

I model citizens with both security and material wellbeing concerns and a government that benefits from citizens' participation in the labor force. Citizens are naturally concerned for their own security. This concern interacts with two other incentives citizens must consider in choosing whether to support an opposition group—their own affinity for the government and concerns for material wellbeing (Becker 1968, Grossman 1991). These three motivations, security, ideology, and material wellbeing, present citizens with a tradeoff. Joining the opposition provides some ideological benefit. Alternatively, individuals that opt not to join the opposition receive some material benefit from participation in the economy. Opposition group membership, in part, determines an individual's potential exposure to repression because targeted repression is only directed at those who challenge the government.[1] Thus, opposition participation increases the risk

[1]I abstract here from a specific form of repression. While states can employ a wide variety of repressive tactics, I am interested in differences in scope and scale of repression tactics, not across other dimensions like visibility or

of suffering repression, while citizens who participate in the economy avoid exposure to targeted repression. Mass repression affects individuals' material wellbeing, improving opportunities for citizens that forgo opposition group membership to participate in the economy. Each individual's relative weighting of these benefits and costs determines whether she joins the opposition or the labor force.

An individual citizen's relative weighting of ideological and material benefits is not fixed. Thus, if repression affects this weighting it can be a powerful, if blunt, tool for the government. Targeted repression activates citizens' security concerns, which makes joining the opposition riskier. This creates a *participation incentive* that drives individuals who value their ideological benefits at near equal the material benefits from the economy to join the labor force. However, as more citizens prefer participating in the economy, the participation incentive generates a countervailing effect. The increase in citizens opting into the labor force floods the labor market, reducing the per capita material benefits for all individuals in the economy. This can reduce the participation effect of targeted repression if the citizens more ideologically inclined toward the opposition then cannot earn a wage high enough to deter them from joining the group anyway, despite the risks. In this way, targeted repression is an imperfect instrument for a repressive government.

Mass repression, because it is directed at opposition members and civilians alike, does not activate security concerns in the same way as targeted repression. Thus, it has no direct effect on participation in the economy. However, mass repression does affect the economy in a manner distinct from targeted repression. Mass repression's downside, from the government's perspective, is that it removes individuals from the labor force, as well as targeting opposition members.[2] But this adjustment in the labor supply increases the availability of material benefits to non-opposition members in response to the new level of employment. This improves the material wellbeing of citizens who participate in the labor force. The *material wellbeing incentive* generated by mass repression sufficiently encourages economic participation which, for the government, outweighs its costs. Moreover, mass repression seems to compensate for the increase in labor market participation generated by targeted repression. As mass repression block some citizens from participating in the economy, it reduces the potential labor supply but also creates opportunities in the labor market for some individuals to sort out of the opposition in response to targeted repression. This negates, to some extent, the countervailing effect of targeted repression.

Targeted and mass repression, used together, solve two problems for the regime. First, targeted repression directly reduces the size of the opposition. Second, mass repression compensates for the economic distortions created by targeted repression. Thus, repression's effects are subtler

lethality. For a discussion of repression generally see (Davenport 2007).

[2]There may be rational reasons, that are beyond the scope of this paper, for an autocrat to employ mass repression outside of its labor market effects. For an example see (Gregory, Schröder & Sonin 2011).

than simply modifying citizens' risk of victimization. The participation and material wellbeing incentives capture how repression alters the opportunity cost of conflict by directly manipulating citizens' material incentives. Even when targeted repression is costly, the participation and material wellbeing mechanisms make both types of repression optimal for the government.

In line with observed incidents of repression, targeted and mass repression are not always complementary. Under some conditions, governments will substitute targeted repression for mass repression, or vice versa. Repression is costly so the government confronts its own tradeoff. Targeted repression carries a direct cost of identifying opposition members while mass repression requires the regime to accept, as a consequence of targeting some proportion of its own potential labor supply, a reduction in future income. When targeted repression is sufficiently costly, the regime will substitute, employing more mass repression than targeted repression. When the cost of targeted repression is low, if mass repression has a decelerating effect on the participation incentive, the regime will substitute targeted repression for mass repression. Consequently, my framework explains considerable variation in a government's potential repression choice, indicating circumstances under which we should see higher levels of targeted and mass repression, or both.

Other scholars have focused on how states can manipulate individuals' ideological incentives by winning hearts and minds (e.g. Berman, Shapiro & Felter 2011) or through propaganda campaigns (e.g. Little 2017). In addition, there are other patterns of complementarity between repressive tactics than the one I explore in this article (Fariss & Schnakenberg 2014). I isolate the effects of coercive force on individuals' security-economy tradeoff, and related decision to join the opposition. For a government facing an opposition movement and citizens living under the threat of repression, it is reasonable to view economic concerns as second order relative to security concerns. However, even in times of conflict security concerns cannot be completely divorced from economic concerns (Moore & Shellman 2006, Engel & Ibáñez 2007, Ibáñez & Vélez 2008, Czaika & Kis-Katos 2009, Adhikari 2013, Balcells 2018). In linking security and material concerns, I show governments' objectives are furthered when the regime's forces employ repression with economic consequences in mind. Moreover, I replicate several common results from studies that center governments' security concerns. What distinguishes my framework is that first, I replicate the finding that governments prefer to avoid mass repression only by shutting down my economic mechanisms, masking repression's effects on the economy. Second, by considering the joint security and material consequences of repression, I demonstrate possible complementarities between targeted and mass repression.

The remainder of the article proceeds as follows. The next section considers the literature on repression and economic motives for challenging regimes. I then introduce the model and the participation and material wellbeing mechanisms through which repression affects citizens'

preferences. This is followed by results on complementarity and substitutability between targeted and mass repression. The final section concludes.

2.2 Related Literature

In the face of internal challenges, regimes often turn to repression to maintain their hold on power (Davenport 2007, Hill & Jones 2014). Under such circumstances, regimes may employ mass or indiscriminate repression, though why they adopt these tactics, and their effectiveness, remain open questions (Condra & Shapiro 2012, Finkel 2015, Dragu 2017, Rueda 2017, Zhukov & Talibova 2018). Explanations for mass repression include an inability to change strategies once a regime has adopted indiscriminate tactics, poor control over individual soldiers, or desperation during a losing campaign (Kalyvas 2004, Valentino, Huth & Balch-Lindsay 2004).

All repression is costly for governments to carry out. The use of repression requires regimes to overcome agency problems (Tyson 2018) or institutional constraints within government (Ritter & Conrad 2016). Notably, much of the literature contends indiscriminate repression is less costly than discriminating repressive tactics (Kalyvas 2006). The high cost of selective repression stems from the difficulty of collecting intelligence to distinguish between civilians and insurgents (Downes 2007, Downes 2008). Repressing indiscriminately may reduce the cost of fighting or minimize casualties for state armed forces (Valentino 2004, Eck & Hultman 2007). Explanations of regimes' repressive strategies, then, implicitly rely on a notion of a budget for repression that requires substituting less costly mass repression for targeted repression. The literature sees indiscriminate repression as a result of some deficiency of the state—a lack of capacity, intelligence, or ability to withstand casualties. I provide a framework that challenges this assumption, showing mass repression can be optimal, and complement more targeted repression, depending on repression's effects on citizen's incentives.

Opportunity cost provides a well-established explanation for opposition group participation (Blattman & Miguel 2010). Citizens with limited economic opportunities face lower cost for leaving the economy to join the opposition. The opportunity cost mechanism has been tested using a number of (often exogenous) proxies for opportunity cost. These include low GDP per capita (Collier & Hoeffler 1998, Collier & Hoeffler 2004, Collier, Hoeffler & Rohner 2009), negative income shocks (Chassang & Padro-i Miquel 2009), and wage suppression resulting from changes in import prices (Besley & Persson 2008). Examining labor demand more directly, (Dal Bó & Dal Bó 2011) find positive shocks to labor-intensive industries reduce the risk of repression, while shocks that reduce commodity prices for labor-intensive industries are linked with an increase in repression (Dube & Vargas 2013).

(Bueno De Mesquita 2005) endogenizes the opportunity cost of opposition participation in the

context of terrorism, showing a link between economic downturn and an increase in terror attacks. I similarly endogenize the opportunity cost of opposition participation and, by doing so, demonstrate that repression is not merely a response to opposition groups but also alters the opportunity cost of conflict, affecting the composition of the opposition itself.

2.3 The Model

I develop a framework in which a government chooses whether and how to repress citizens who may participate in an opposition group and citizens choose to join the group or supply labor to the economy. The citizens' decision is determined by a tradeoff between ideological and economic motives. The government cannot take any action to prevent the establishment of the opposition group but can respond to its presence. In reaction to the opposition, the regime chooses a repression strategy designed to manipulate citizens' incentives. In particular, the government's policy of repression affects citizens' security and material wellbeing. The government's chosen repression policy shifts the opportunity cost for individual citizens of joining the opposition through its effect on the economy. The regime chooses levels of targeted and mass repression that maximize participation in the economy. In this framework, I constrain the state such that its only available means of influencing citizens is repression.[3]

The game proceeds as follows: (1) The government chooses levels of targeted repression and mass repression to employ against the population; (2) Citizens decide to participate in the labor market or join the opposition and markets clear; (3) Payoffs are received.

2.3.1 Citizens

There is a unit mass of citizens normalized to 1 prior to any government repression. Every individual is endowed with an ideology θ_i distributed uniformly from $[\underline{\theta}, \bar{\theta}]$. Ideology captures an individual's view of the opposition group's mission and may be driven by social and cultural factors like ethnicity, peer network effects, and anti-state attitudes. Higher values of θ indicate a greater degree of sympathy for the opposition group.[4] Individuals who opt to participate in the opposition receive an ideological benefit of participation equivalent to their ideology, θ_i. Citizens who do not join the opposition group participate in an economy, where individuals supply labor, earn a wage, and consume goods. A citizen's individual utility from economic participation is represented by

[3] Allowing the government to make investments that improve citizens' material wellbeing, instead of just using repression, resembles a 'hearts and minds' style of counterinsurgency, which focuses on provision of public goods or services (Berman, Shapiro & Felter 2011).

[4] Ideology can be considered a commonly known type for each individual. Conceiving of θ_i as a privately known type requires Bayesian perfection as a solution concept but does not alter the results.

$u(c)$, where utility is a strictly increasing, strictly concave function of consumption. Citizens trade off economic and ideological incentives when choosing whether to support the regime or the opposition. I denote the choice to join the opposition as $e = 0$, while $e = 1$ represents a decision to work. This decision generates a cutoff in θ that represents mobilization for the opposition. The proportion of citizens who participate in the labor force is represented by λ, where $\lambda = \int_0^1 e_i di$.

2.3.2 Markets

The economy consists of a labor market, production technology, and a goods market. Wages, the supply of goods, and prices for those goods are determined endogenous for a given production technology, a potential labor pool, citizens' labor force participation decisions, and the government's repression choices. The economy's labor supply, $L = (1 - m)\lambda$, depends on the size of the potential labor pool and the labor force participation rate. A profit-maximizing firm hires citizens to produce a single good, y, using a labor input $L^\dagger$, where $L^\dagger$ is the number of citizens employed by the firm. The firm is independent of the citizenry and the government and absorbs all profits from production.[5] The production technology is represented by $Y(L)$, where $Y(\cdot)$ is any strictly increasing, strictly concave production function.[6]

Citizens who opt to work earn a wage, $w(L)$, where $w(\cdot)$ is strictly decreasing in L. Individuals who participate in the economy have a consumption budget $w(L) \geq p \cdot c$ such that the amount consumed for a given price p cannot exceed the real wage. Citizens consume goods such that supply and demand for goods are equal.

Lemma 2.1 *Market clearing is characterized by:*

1. *Optimal labor force participation:* λ^*
2. *Profit maximization:* $w^* = p \cdot Y'(L)$
3. *Labor supply equals labor demand:* $(1 - m)\lambda^* = L^\dagger$
4. *Goods supplied equal goods demanded:* $p^* Y(L^\dagger) = c^*$

The price, p, of good y is treated as the numeraire for the remainder of the analysis, thus p is normalized to 1. Proof of this lemma, and proofs for all other results, are in the appendix.

[5] The firm is a strategic actor in that it maximizes profits given all other players' strategic decisions, but otherwise has no effect on the government's repression decision and the citizens' participation choice.

[6] I include an analysis with specific functional forms in the supplementary appendix.

2.3.3 Government

The government values economic output because a strong economy implies the government is more likely to remain in power and reap the benefits of office (Londregan & Poole 1990, O'Kane 1993, Marinov 2005, Miller 2012). To capture this preference, I represent the government's utility as benefits from economic production, captured by Y. This can be thought of as benefits it can spend or distribute to remain in power, or as spoils of office.[7] For example, when productive output is high, the government may be able to extract excise taxes on this output to increase its own revenue.

In response to the opposition group, the regime chooses both forms and levels of repression to employ against the population. Repression removes affected individuals from the political and economic spheres with certainty, meaning these individuals cannot join the opposition group or the labor force. The outcome of repression could take the form of imprisonment, exile, revocation of citizenship or work status, or physical repression. For the purpose of this analysis, the breadth of the application of repression is of primary interest, rather than the severity or lethality of individual repressive acts. Each of these forms of repression could be employed by the government in carrying out targeted repression or mass repression. The key distinction between targeted and mass repression is in which individuals are affected, not the type of violence used to carry out repression.

2.3.3.1 Targeted Repression

If the state employs targeted repression, it targets some portion $t \in [0, 1]$ of the opposition group. Targeted repression is perfectly discriminating, effecting only members of the opposition group with no effect on civilians participating in the economy. Repression that 'targets' an ethnic group does not satisfy this definition of targeted repression because citizens do not make an affirmative choice to join an ethnic group, even though the regime can identify citizens by their ethnicity. For citizens, targeted repression triggers a *security concern* because targeted repression directly increases the risk associated with participation in the opposition group. Because only opposition group members face the risk of targeted repression, the security concern makes citizens less willing to join the group. For the government, targeted repression carries a linear cost, $k \cdot t$. This cost can be thought of as the price of gathering intelligence or identifying opposition members.[8] The

[7] Bueno De Mesquita, Smith, Morrow & Siverson (2005) offer a theoretical explanation of how regimes can be expected to distribute these benefits.

[8] Extending the model by assuming the cost is a convex function of the level of repression is fairly straightforward and changes the analysis in two ways but does not fundamentally alter the results. First, the diminishing returns from targeted repression are compounded by the increasing costs for the regime. Second, evaluating the complementarity/substitutability of targeted and mass repression would require considering the regime's choice for a point-wise shift in the distribution of cost.

opposition group's strength after the regime has carried out targeted repression is $1 - t$.

2.3.3.2 Mass Repression

Mass repression effects both opposition members and non-members equally. Returning to the example of repression of an ethnic group, repression that 'targets' members of that group is mass repression. Because opposition group members are no more likely to be affected by mass repression than non-members, mass repression does not trigger citizens' security concern. Instead, mass repression activates a *material wellbeing* concern. Mass repression alters the possible composition of the labor force and therefore chances the economic opportunities available to citizens. The level of mass repression is represented by $m \in [0, 1]$. The non-opposition population after government repression is $1 - m$. If the regime elects to use targeted and mass repression concurrently, the size of the opposition following the use of force is $(1 - t)(1 - m)$.

2.3.4 Utilities

The solution concept is subgame perfect Nash equilibrium. An equilibrium to the model is defined by the quintuple $(w^*(t, m), c^*(t, m), \theta^*(t, m), t^*, m^*)$, which gives an optimal wage and individual consumption given the regime's repression strategy, the citizens' threshold strategy conditional on the repression choice, and optimal levels of targeted and mass repression. This equilibrium has three components. First, market clearing conditions defined in Lemma 2.1 must hold. Second, a cutoff strategy in θ determines the portion of citizens participating in the economy. Given the government's chosen levels of repression, a citizen's expected utility is

$$U(e_i, \theta_i) = e_i\Big((1 - m)u\big(c(t, m)\big)\Big) + (1 - e_i)\Big((1 - m)(1 - t)\theta_i\Big).$$

The marginal citizen who is indifferent between supporting the state and the opposition group has a type that solves

$$\underbrace{(1 - m)u\big(c(t, m)\big)}_{\text{material incentives}} = \underbrace{(1 - m)(1 - t)\theta^*}_{\text{ideological incentives}}. \tag{2.1}$$

Third, the government chooses levels of targeted and mass repression that solve

$$\max_{t,m} \;\; Y\big((1 - m)\lambda(t, m)\big) - k \cdot t, \tag{2.2}$$

where $Y(\cdot)$ is the production function.

2.4 Assumptions of the Model

Before continuing, I offer a few comments on the model's assumptions. This model's aim is to offer an explanation of an observed phenomenon—the incidence of mass repression and its frequent use in conjunction with targeted repression—not offer a prescriptive theory for countering opposition groups. The mechanisms identified, which operate through participation and material wellbeing incentives, may differ from the rationales for such repression offered by regimes themselves for two reasons. Fist, repressive governments are likely to offer explanations for mass repression that are more sympathetic to the regime. Second, a leader's decision to employ mass repression may depend on a number of other concerns that are outside the scope of this model, including characteristics of the security forces, the influence of allies, and the trajectory of the conflict.

Because the channels identified in the model change opposition group participation in a manner that is favorable for the government, regimes may, implicitly or explicitly, take them into account when choosing targets of repression. For example, during the Guatemalan civil war, the regime's military strategy explicitly combined mass repression through a violent rural pacification campaign, and economic inducements through a related program nicknamed *Fusiles y Frijoles*—Bullets and Beans (Schirmer 1998). Alternatively, citizens' material wellbeing concerns were not openly linked to changes in opposition group membership following a government crackdown on protests in Poland in 1968. However, university faculty who supported the protests were dismissed, hundreds of involved students were selected for compulsory military service, and extensive purges of the state bureaucracy removed individuals who were allegedly Zionists, of Jewish origin, or both (Judt 2006, Kemp-Welch 2008). Therefore, repression of the protests created an opportunity for citizens to act both on their security and material wellbeing concerns.

Economy: The government derives its utility from economic output. High levels of production can allow the government to extract revenue from taxes or other sources, both licit and illicit, and increases the regime's hold on power. My framework shows how economic concerns affect government repression and citizens willingness to join an opposition group. Given this focus, the economy is simplified such that just one good is produced by a single firm. The parsimonious partial equilibrium framework has a number of substantively useful features, including that benefits—wages—decrease when more citizens participate in the labor market, while abstracting from additional economic factors that less directly affect the government's tactical decision.

Opposition Group: I aim to isolate the effect of government repression on the decision of citizens to participate in an opposition group. Therefore, I do not explicitly model the opposition group as an independent strategic actor. Formalizing the opposition group could be achieved in two ways: the group could try to recruit supporters by offering some form of inducements or could impose costs on the government. The first case complicates the citizens' decision and reduces

their material wellbeing concern, while the second case would reduce the government's utility. However, in either case, the government's incentives to repress would remain. Thus, I choose the more parsimonious model presented here.

Backlash: Lastly, I do not explicitly model backlash against the government, where some citizens become more likely to support the opposition in response to repression. Formalizing ideology as a uniform distribution that is fixed, instead of viewing ideology as a function of repression, is akin to controlling for ideology in an empirical model. That is, my question regards the effect of state repression on civilian responses, for a fixed ideological distribution. Accounting for backlash would require endogenizing ideology in the model, requiring at minimum changing the interpretation of the effects of both ideology and repression on citizens' choices in a manner akin to interpreting ideology and repression as interacting variables. For related models that explicitly address endogenous backlash against government violence see Gibilisco (2018) and Sun (2020*b*).

2.5 Citizen's Tradeoff

In my framework, economic incentives shape citizens' choices in the context of government repression, and the state manipulates such incentives. I consider in turn the citizen's decision of whether to join the opposition or supply labor to the economy, and the government's policy of repression. The citizens make their choice last, and thus, proceeding backwards, I consider their response to repression first.

The impact of government repression on an individual citizen depends on whether she joins the opposition or participates in the economy. Joining the opposition carries the risk of targeted repression. More importantly, because targeted repression is perfectly discriminating, it asymmetrically increases the risk of victimization—only individuals who choose to support the opposition face the risk of targeted repression. The security concern driven by the risk of falling victim to targeted repression reduces the ideological benefit of joining the opposition group, making economic participation more appealing. Citizens face the risk of mass repression whether or not they choose to participate in the opposition group. Because mass repression targets both opposition members and non-members alike, the additional risk of victimization for an individual citizen is equal regardless of which side she chooses to support. In fact, the citizen's choice can be reduced such that the effect of mass repression drops out of the calculus, leaving only the material wellbeing concern.

The population's response to the regime's repressive efforts is represented by the marginal citizen who is indifferent between supporting the regime and joining the opposition group. The threshold above which citizens join the opposition group and below which they participate in the economy is represented by the marginal ideological type θ^* that solves Equation (2.1). This marginal individual characterizes the equilibrium labor force participation rate, which endogenously gener-

ates the wage offered to individuals participating in the economy.

Rearranging Equation (2.1), the marginal type is $\theta^* = \frac{u(c(t,m))}{(1-t)}$. The unique labor force participation rate, then, is given by the proportion of citizens whose ideological preference for the opposition is equivalent to or less than this threshold. Given that ideological types are distributed uniformly over $[\underline{\theta}, \bar{\theta}]$, the labor force participation rate solves

$$\lambda^* = \frac{\frac{u(Y'(L(t,m)))}{(1-t)} - \underline{\theta}}{\bar{\theta} - \underline{\theta}}. \tag{2.3}$$

The citizens' optimal choice can be characterized by the more interpretable labor force participation rate.

Lemma 2.2 *For fixed levels of repression, t and m, the marginal citizen θ^* is characterized by a unique $\lambda^*(t, m)$, the equilibrium labor force participation rate.*

The regime will implement a policy of repression only if doing so can increase labor force participation. I restrict attention to this case for the remainder of the analysis.

2.6 Economic Motives for Repression

Proceeding to the government's repression strategy, the regime chooses levels of targeted and mass repression to maximize economic output. The regime's repression decision solves an optimization problem that accounts for the expected response of the citizenry. The government's problem depends indirectly on the citizens' choice through the labor force participation rate, λ^*. The regime chooses repression to maximize,

$$\max_{t,m} \; Y((1-m)\lambda^*(t,m)) - k \cdot t. \tag{2.4}$$

Before analyzing the equilibrium levels of targeted and mass repression, it helpful to note that to receive positive utility, the government must ensure some citizens participate in the labor market. Thus, a predatory policy of repression without concern for cost is not optimal within this framework. The regime has no incentive to repress its entire population.

Lemma 2.3 *The government will never choose $m = 1$. For sufficiently high costs, the government will never choose $t = 1$.*

Moreover, the government's problem does not immediately suggest the regime will prefer to use positive levels of either targeted or mass repression. Both types of repression are costly. Targeted repression carries an explicit cost k. Mass repression generates indirect costs by reducing

the size of the potential labor pool, creating a ceiling for the regime's utility. Positive levels of repression are only optimal for the regime if their effect on labor force participation exceeds their costs. The optimal levels of targeted and mass repression solve

$$\begin{aligned} Y'((1-m)\lambda^*)((1-m)\lambda_t^*) - k = 0, \\ Y'((1-m)\lambda^*)((1-m)\lambda_m^* - \lambda^*) = 0. \end{aligned} \tag{2.5}$$

The amounts of targeted and mass repression employed by the state depend on the equilibrium wage, the direct and indirect effects of employing each type of repression on the labor force participation rate, and the cost of targeted repression. The government's repression choice (t^*, m^*), is chosen such that the reduction in wages that arises when the government represses is balanced by the decrease in utility for citizens in the labor force that results from the decrease in the real wage and the cost the government incurs for targeted repression.

The government's utility is increasing in both targeted and mass repression, for sufficiently low k, thus the regime will prefer to choose levels of t and m above zero. The government's best response to the citizens' choice is an optimum with $t^*, m^* \in (0, 1)$, which are implicitly defined by the first order conditions. In equilibrium, the regime will employ positive levels of both targeted and mass repression.

Proposition 2.1 *There exists a subgame perfect Nash equilibrium characterized by* (λ^*, t^*, m^*) *where* λ^* *represents the unique labor force participation rate and the regime employs both targeted and mass repression such that* t^* *and* m^* *solve*

$$\underbrace{\frac{Y'((1-m)\lambda^*)}{Y''((1-m)\lambda^*)}}_{\substack{\textit{responsiveness of} \\ \textit{wages to repression}}} = -\underbrace{\frac{u'(Y'((1-m)\lambda^*))}{u(Y'((1-m)\lambda^*)}}_{\substack{\textit{responsiveness of} \\ \textit{citizen's utility} \\ \textit{to repression}}} \cdot \underbrace{(1-t)}_{\substack{\textit{magnitude} \\ \textit{of security} \\ \textit{concern}}} \cdot \underbrace{k}_{\substack{\textit{cost of targeted} \\ \textit{repression}}}$$

The regime's targeted and mass repression strategy is chosen to balance the elasticity of wages against the elasticity of the citizens' utility, the degree of risk from targeted repression incurred by opposition members, and the cost of carrying out targeted repression.

A novel implication of this equilibrium is that choosing a positive level of mass repression is optimal for the government. Conventional wisdom suggests that mass repression is either an accident or a mistake, and regimes should not choose to employ mass repression when they are able to repress in a targeted manner. The optimality of mass repression in my framework is due to repression's effect on citizens, whose choice is influenced by the equilibrium wage offered in the economy. By fixing the wage, I both recover the conventional wisdom and demonstrate what is lost in failing to account for citizen's response to government repression.

Remark 2.1 *For a fixed wage, the government may employ targeted repression, $t^* \geq 0$, but will not utilize mass repression, i.e. $m^* = 0$.*

As is true for other theories of repression, targeted repression is an optimal choice (given it is not too costly) regardless of how repression affects citizens' material incentives. Targeted repression has no direct effect on the economy, and therefore is a worthwhile choice for the regime even when wages are fixed. Mass repression, however, is not optimal given fixed wages. In this case, observing mass repression would suggest either the regime had erred or has adopted a strategy of last resort—as predicted by existing accounts. What my framework makes clear is that this explanation of mass repression hides an assumption that repression does not affect material incentives for citizens, even by affecting their opportunity cost for opposition participation—recall wages are fixed and therefore unaffected by both mass and targeted repression. When the labor force participation rate changes with repression, mass repression is a part of the government's optimal strategy. In fact, a strategy that employs both targeted and mass repression is optimal because each tactic has a distinct effect on the citizens' choice of whether to join the opposition.

2.6.1 Participation and Material Wellbeing Incentives

Targeted and mass repression have different effects on the citizen's participation decision, and thus operate through separate channels. To isolate the effect of each type of repression on citizens' incentives, I consider the regime's use of each type of repression independently. Assessing how the citizens' choice responds to changes in the government's repression strategy serves to distinguish the mechanisms by which each type of repression impacts their incentives. Formally, these mechanisms are given by the effect of t and m on the labor force participation rate. These results can be considered intermediate comparative statics of the citizens' sub-game since, in the limited context of the citizens' choice, the levels of targeted and mass repression are exogenous. I refer to the labor force participation rate as $\lambda^\dagger$ to distinguish it from labor force participation in equilibrium.

Targeted repression encourages participation in the economy. Because targeted repression only impacts individuals who join the opposition, increasing t subsequently increases the risk associated with opposition membership. In this way, targeted repression triggers an individual's security concern. Further, targeted repression reduces the benefit of challenging the regime relative to supplying labor. Participation in the economy does not carry the risk of targeted repression. Thus, for some individuals, the increased risk of targeted repression reduces their expected ideological benefits enough that they will instead prefer participating in the economy. This will induce a shift in the labor force participation rate.

Remark 2.2 *Labor force participation is increasing in the level of targeted repression.*

By reducing the payoff of opposition group participation, targeted repression increases $\theta^{\dagger}$ such that fewer citizens support the opposition and more supply labor to the economy. The *participation incentive* generated by targeted repression leads to an increase in the size of the labor force.

However, targeted repression also has a countervailing effect. The resulting increasing in the number of citizens opting to join the labor force exerts downward pressure on wages and reduces marginal productivity. Therefore, the benefits of economic participation will decrease. For some proportion of the citizens, the value of material benefits offered in an economy flooded with labor will not be enough to exceed their ideological benefit from opposition membership, regardless of the increased repression risk. This renders the effect of targeted repression moot for these individuals. Thus, in isolation, the participation incentive reduces opposition group membership, but also generates a negative countervailing effect that fails to maximize the size of the potential labor pool. Targeted repression alone is insufficient to cause all citizens who are near indifferent between working and joining the opposition to sort back into the labor market.

Because mass repression targets both civilians and opposition members, it has no direct effect on labor force participation—the expected payoff for any individual reduces to the same tradeoff she would make in the absence of repression. However, mass repression has an indirect effect on the citizen's tradeoff, through its effect on economic opportunity. Mass repression alters the utility of economic participation.

Remark 2.3 *Labor force participation is increasing in the level of mass repression.*

Mass repression does have a negative direct effect on the labor market—it reduces the overall population of potential laborers. However, because the wage is endogenously determined, when the potential labor pool is reduced by mass repression, wages increase. This triggers the citizens' material wellbeing concern. As mass repression makes labor scarcer, the utility of economic participation increases and citizens whose ideological benefit from opposition participation is relatively low will prefer to supply labor instead. Mass repression induces a shift in the marginal type $\theta^{\dagger}$ such that citizens will sort into the labor market that otherwise would have joined the opposition.

The indirect effect of mass repression dominates the direct effect such that overall, labor force participation increases with mass repression. Key in this case is that mass repression achieves an increase in labor supply without directly incentivizing economic participation. The *material wellbeing incentive* is sufficiently powerful to make additional citizens prefer joining the labor market to joining the opposition group.

The participation and material wellbeing incentives enable the government to use repression to manipulate the labor market. By selecting levels of targeted and mass repression that induce the type of sorting generated by these mechanisms, the government both increases its own economic output and incidentally reduces the size of the opposition group.

2.7 Repression Reinforces Repression

While it is notable that both targeted and mass repression are optimal for the government, what remains unclear is whether one repression tactic is preferred to the other. Much of the literature indicates that mass repression is less desirable than targeted repression (Mason & Krane 1989, Kalyvas 1999, Arreguín-Toft 2001, Kocher, Pepinsky & Kalyvas 2011). Thus, when targeted repression is feasible, which implies its costs are low, governments should substitute targeted for mass repression. Others have argued mass repression can, in some cases, hamper an opposition group to the benefit of the regime, so this predicted substitution should be at most incomplete and the government may employ some positive if small amount of mass repression (Lyall 2009, Zhukov 2015). Might targeted and mass repression be complementary, meaning the regime prefers to use more of both types of repression simultaneously?

The relationship between targeted and mass repression depends on two factors: the cost of targeted repression and the combined effects of targeted repression and mass repression on the labor force participation rate. Within my framework, targeted and mass repression are sometimes complements, and sometimes substitutes for the government. There are ranges of the parameter space where the regime substitutes targeted repression for mass repression, substitutes mass repression for targeted repression, and employs higher levels of both types of repression concurrently.

In contrast with much of the literature on mass repression, as the cost of targeted repression decreases—circumstances under which governments are naturally expected to employ more targeted repression—the most effective strategy may be to increase levels of both targeted and mass repression. Within this region of complementarity, targeted and mass repression's joint effect on the economy leads the government to employ more of both types of repression.

Proposition 2.2 *When targeted and mass repression have reinforcing effects on labor force participation, $\lambda^*_{mt} > 0$, and the cost of targeted repression is low, then a decrease in the cost of targeted repression leads to an increase in mass repression, $\frac{dm^*}{dk} > 0$, and targeted and mass repression are complements.*

Complementarity of targeted and mass repression arises as a result of the complex effect of mass repression on labor force participation. A necessary condition for complementarity is that the marginal effect of targeted repression on labor force participation is increasing in the level of mass repression (or vice versa). In other words, more citizens are willing to participate in the economy due to the risk of targeted repression—the participation incentive is stronger—when the level of mass repression is higher. This can also be thought of as the interaction effect of targeted and mass repression on labor force participation. When this interaction effect is positive, targeted repression's sorting effect is reinforced by mass repression. In this case, the government is willing

to accept the costs of each type of repression in exchange for increased benefits derived from employing higher levels of both.

Understanding when, and why, targeted and mass repression are complements can in part explain the shift in tactics of the Indonesian government from its 1990-1998 campaign against the Free Aceh Movement (GAM) and a subsequent counterinsurgency effort in 2001-2004. In the first campaign, known as the 'Military Operation Area' (DOM) period, the Indonesian military struggled to identify members of GAM, incurring high costs for targeted repression. Instead, the regime acted without restraint, relying on collective punishment and perpetrating a number of abuses. Though the security forces had largely eliminated GAM's military capacity by 1992, the counterinsurgency effort continued until 1998, affecting mainly civilians (Sukma 2004). The DOM period nearly eliminated GAM but not the Acehnese's calls for independence (Aspinall 2009, 112).

After the fall of Suharto, motivated in part by the precise material wellbeing incentives, predicted by the model, GAM reorganized, attaining peak strength around 2000. Liquid natural gas extraction in Aceh expanded rapidly through the 1980s, and exploitation of Aceh's natural resources by government affiliated actors expanded in the DOM period. Migrants seeking employment triggered land seizure and job competition with the local Acehnese, which was linked to increased support for GAM (Hiorth 1986, Kell 2010). The regime responded initially with targeted repression, directed against GAM headquarters and other strongholds, taking the form of an increased military presence in Aceh and killings of GAM members (Ross 2005).

When a ceasefire broke down in 2003, the regime adopted a strategy that involved both targeted and mass repression (Czaika & Kis-Katos 2009). The government continued to make some effort to distinguish between insurgents and non-GAM members by instituting a new ID card system, which required a background check designed to identify GAM members (International Crisis Group 2003). However, government forces also perpetrated extra-judicial killings during operations that cleared villages in the name of punishing GAM members (Human Rights Watch 2003). Further, the displacement, sometimes forced, of tens of thousands of non-combatants represents a clear adoption of mass repression tactics.

What changed in Aceh between the DOM period and the early 2000s campaign? The model suggests that complementarity arises when the cost of targeted repression is sufficiently low and targeted and mass repression have reinforcing effects on labor force participation. These conditions seem to have been present in Aceh when the Indonesian regime carried out targeted and mass repression concurrently. There is evidence that the cost of targeted repression was reduced relative to the DOM period.[9] In addition to ID cards, improvements in the military's intelligence decreased the cost of targeting GAM members (Aspinall 2009, 251).[10]

[9]This assessment is based on the types of features identified in the literature as linked with high costs for targeted repression, namely limited military or intelligence capabilities.

[10]Perhaps more convincing, the Indonesian security forces sometimes collaborated with GAM, for financial and

The effects of targeted and mass repression on the labor force participation rate is more difficult to observe. Complementarity between targeted and mass repression when both forms of repression have reinforcing effects on labor force participation. Patterns of migration suggest that those individuals who left conflict-affected regions moved to wealthier, more urban coastal areas in Aceh, where presumably they pursued some means of attaining material benefits. The effect of conflict on migration compounded traditional migration incentives, like economic opportunity (Czaika & Kis-Katos 2009). Moreover, during the counterinsurgency campaign, GAM leaders, businesspeople, and local government officials who has been involved with GAM defected to the government (Aspinall 2009, 181). This evidence is suggestive of a reinforcing effect between targeted and mass repression on the labor force participation rate.

2.8 Substituting Targeted and Mass Repression

In line with expectations from previous studies, targeted and mass repression may also be substitutes for the regime, depending again on the cost of targeted repression and repression's economic repercussions. Substitutability of targeted and mass repression implies the marginal benefit to the regime of increasing the amount of mass repression is decreasing in the level of targeted repression, or vice versa. Because the optimal level of targeted repression increases as its costs are reduced, substitution establishes the government will trade targeted repression for mass repression. If the cost of targeted repression is sufficiently high, regardless of the labor market effects of repression, the government will substitute mass repression for targeted repression.

Proposition 2.3 *Targeted and mass repression are substitutes for the regime when:*

1. *mass repression decelerates the effect of targeted repression on labor force participation ($\lambda^*_{tm} < 0$), and the cost of targeted repression is low. The government substitutes targeted for mass repression.*

2. *the cost of targeted repression is high. The government substitutes mass for targeted repression.*

The regime will substitute targeted for mass repression when the cost of targeted repression is low and if the marginal increase in labor force participation that arises when the government employs targeted repression is decreasing in the level of mass repression. In this case, mass repression depresses the effect of targeted repression on labor force participation. Under these circumstances, we should observe governments pursuing highly discriminating repression strategies like jailing

security gains, suggesting GAM's membership was clearly identifiable (Aspinall 2009, 188-189).

individual dissidents. Or in the case of Bahrain, revoking the citizenship of journalists, activists, and opposition members.

Bahrain's practice of citizenship-stripping represents a clear example of substituting targeted for mass repression. In 2013, in the aftermath of protests against the Bahraini monarchy, the government amended its anti-terror legislation to permit revocation of citizenship as a punishment for those accused of terrorism, or intent to commit terrorist acts, against the state (Babar 2017). In the five-year period between 2012 and 2017, the regime revoked the citizenship of around 450 individuals, mostly from the disempowered Shia majority, targeting "dissidents the authorities no longer regarded as members of the political community" (Alsabeehg 2018, 135). Individuals who have lost their citizenship include activists, journalists, and religious scholars (Human Rights Watch 2018). Importantly, many of these individuals were identifiable as regime opponents.

Setting aside the Bahraini government's justification for citizenship revocation, this example validates the predictions of the model. The Bahraini security forces are sufficiently competent to capture and detain dissidents, therefore the expected cost of targeted repression is low. This suggests Bahrain may benefit from substituting targeted for mass repression. The model predicts substitution of targeted for mass repression when the marginal increase in labor force participation that arises when the government employs targeted repression is decreasing in the level of mass repression. In other words, if increasing the level of mass repression would dull the effects of the participation incentive, the regime is more likely to employ targeted repression instead of mass repression. While we cannot observe the hypothetical Bahraini opposition response to mass repression in addition to the citizenship revocations, some experts suggest morale waned among opposition supporters in the wake of targeted government repression (Kerr 2016). Moreover, a brutal crackdown against protests in 2011—a clear example of mass repression—failed to eliminate the Bahraini opposition (McEvers 2012). Thus, the Bahraini case exemplifies when substituting targeted for mass repression produces the government's desired effects.

When the cost of targeted repression is prohibitively high for the regime, the model recovers the result from the literature on indiscriminate violence highlighted by Remark 2.3. This literature contends states use mass repression because they are incapable of pursuing more discriminating tactics. However, the model makes clear that substitution of mass repression for targeted repression occurs for a different reason. For the regime, targeted and mass repression are substitutes not simply because targeted repression is more expensive. The tradeoff is subtler. Both types of repression achieve similar objectives for the government—both reduce the opposition threat by encouraging participation in the labor force. While mass repression affects citizens' material well-being concerns rather than their security concerns, it is sufficient to prompt some citizens to sort into the labor force. Thus, when targeted repression is too expensive for the regime, it is willing to shift to using mass repression instead. In this way, the regime achieves the same outcome, through

a distinct channel, with lower costs. It is not necessarily the case that governments substituting mass repression for targeted repression will not use targeted repression. But, when the cost of targeted repression is sufficiently high, regimes capable of implementing targeted repression will trade some targeted repression for mass repression.

2.9 Conclusion

Regimes that respond to threats from opposition groups with repression must make a strategic choice about which individuals or groups to target with repressive force. Governments that choose targeted repression direct their coercive force against only those individuals who have opted to participate in an opposition group. In addition to, or instead of, targeted repression, regimes may employ mass repression that targets members of the opposition and non-members indiscriminately. All repression tactics manipulate civilians' tradeoff between material wellbeing and an ideological inclination toward the opposition. Both targeted and mass repression affect citizens' willingness to participate in an opposition group but operate through distinct channels. Targeted repression, because it only effects members of the opposition, triggers a security concern that prompts citizens to sort out of the opposition and into the labor force. Thus, targeted repression generates a participation incentive. Mass repression creates sufficient economic incentives to accommodate this shift in participation and ensures the benefits of economic participation are sufficiently high to deter citizens from joining the opposition. Consequently, mass repression produces a material wellbeing incentive.

My framework shows that targeted and mass repression employed in concert comprise an optimal strategy for regimes countering opposition groups. Because repression manipulates the opportunity cost of supporting the opposition, through the participation and material wellbeing incentives, governments will employ both targeted and mass repression. In these ways, repression provides dual benefits for the regime of weakening the opposition group and improving economic opportunities. These participation and material wellbeing mechanisms provide a novel rationale for mass repression, and the joint usage of targeted and mass repression. Mass repression is not merely the result of weak intelligence gathering or low state capacity. Moreover, for the government these two types of repression are, in some cases, complements. Regimes able to afford more targeted repression will also employ more mass repression. Departing from existing literature, my model shows that when the cost of targeted repression is low—when other scholars would expect no mass repression—the economic mechanism I identify instead generates complementarities between targeted and mass repression. However, under some circumstances, governments will prefer to substitute targeted for mass repression, or vice versa. Mass repression is a less costly substitute for particularly low capacity states, while targeted repression is desirable for more capable regimes

when repression's effects on citizens' incentives are not reinforcing.

My model's predictions of the conditions under which targeted and mass repression complement, or substitute for, each other provide clear, and testable, explanations for observed patterns of repression. Further, the endogenous interaction between state policies of repression and economic opportunity indicators, like wages, suggest scholars should be cautions when incorporating proxies for material wellbeing in regressions explaining repression. My theory indicates empirically estimating the opportunity cost of conflict leveraging exogenous shocks to material wellbeing incentives will provide more consistent estimates of the effects of variation in opportunity cost of opposition membership.

CHAPTER 3

Forced Economic Migration

3.1 Introduction

The movement and displacement of people is among the most visible consequences of civil conflict. The number of individuals displaced by conflict and violence has steadily increased over the preceding decade, reaching 70.8 million at the end of 2018, with more than half of those displaced by conflict internally displaced within their home countries.[1] Actions of the belligerents of civil conflict—governments and insurgent groups—are often the proximate cause of citizens' migration (Davenport, Moore & Poe 2003). However, displacement is often viewed as either an unfortunate non-strategic byproduct of ongoing conflict or the product of strategic cleansing of a particular population. Between these extremes, in many conflict contexts combatants play a more deliberate but less devastating role in the migration of citizens. Why do government forces, which are the most capable of affecting migration patterns, forcibly resettle citizens in conflict?

I develop a theory of forced resettlement in civil conflict that demonstrates how the economic incentives that drive citizens' migration affect governments and show that the economic consequences of conflict-induced migration spur resettlement. It is well understood that individuals who emigrate often do so to seek economic opportunities unavailable to them in their home countries or regions (Borjas 1989, Sellars 2019). Economic concerns, alongside considerations for health and security, continue to drive individual citizens' migration choices during conflict (Zolberg, Suhrke & Aguayo 1989, Lundquist & Massey 2005). In my framework, government violence increases the flow of refugees and internally displaced persons fleeing conflict, and forced resettlement is a strategic response by government forces to economic distortions caused by this migration.

To understand the economic motivations for forced resettlement, I incorporate violence and resettlement in a partial equilibrium model of an economy with two sectors. A government aims to maximize the revenue it collects from these sectors, which in the model is revenue from taxes on

[1] See UNHCR (2019) on total displacement and Internal Displacement Monitoring Center (2020) on internal displacement.

production. The *uncontested sector* is firmly under regime control while in the *contested sector*, the government's authority is challenged by an insurgent group. Because the government does not have complete control over the contested sector, it can only collect a portion of the tax revenue generated by production in that sector. The government can use force to increase its control over the contested sector, increasing its share of tax revenues. Citizens in the contested sector may flee in anticipation of, or in response to, both violence and its downstream economic consequences. As the government increases its use of force, and control over resources shifts, citizens' economic opportunities in both sectors change, affecting their willingness to migrate.

Government violence changes citizens' tradeoff between the expected returns of remaining and migration, increasing the net benefits of economic participation in the uncontested sector relative to citizens' economic opportunities in the contested sector. In other words, violence reduces the opportunity cost of migration. Unimpeded by government intervention, citizens face a choice of whether to leave in anticipation of violence or wait, with the option to flee in reaction to conflict (Kunz 1973). The regime's counterinsurgent efforts impose costs on citizens, which make citizens more willing to migrate either as refugees or as internally displaced persons. An increased migration rate has two consequences for the government. First, an increase in the flow of refugees, who leave the country, reduces the population of citizens who participate in the labor markets of the contested and uncontested sectors, reducing the government's tax revenue. Second, the government risks internally displaced citizens flooding the labor market of the uncontested sector, exerting downward pressure on wages and reducing marginal productivity in the contested sector. This creates a more subtle problem for the government. While a higher rate of migration to the uncontested sector increases government revenue, the government may be better off if citizens are more evenly distributed between the two sectors.

These economic effects of emigration and internal displacement can lead the government to forcibly resettle citizens. Forced resettlement establishes control over the interned population for certain, but requires investment in securing relocated citizens, and thus is costly for the government. I compare two forms of forced resettlement. In the first case, resettled citizens are compelled to labor in the contested sector, as was the case in model villages in Guatemala in the 1980s (Schirmer 1998). I show that resettling citizens in the contested sector may create a negative feedback loop for the government where forced resettlement begets more forced resettlement. Forced resettlement may allow the government to avoid an oversupply of labor in the uncontested sector, but resettlement depresses wages in the contested sector by increasing the labor supply. This lowers the opportunity cost of migration to the uncontested sector, and the government may increase resettlement to compensate. In addition, resettlement can increase citizens' willingness to flee as refugees, seeking to avoid forced relocation. This too may trigger higher levels of forced resettlement because significant refugee outflows reduce available labor in both sectors.

However, this is not the only case in which the government may increase its level of forced resettlement to pursue economic gains. When the effects of forced resettlement on citizens' willingness to migrate are small, resettlement and government violence are complements. Therefore, forced resettlement reinforces the government's counterinsurgent efforts, allowing the government to maximize its tax revenue by increasing its control over the contested sector while relying on forced resettlement to ensure that sector has a sufficiently large labor supply to optimize production.

Alternatively, I consider the government's strategy when its forced displacement efforts lead to citizens' relocation outside of both the uncontested and contested sectors, for example in displacement camps as in Sri Lanka (Amnesty International 2009) or Sudan (Pape & Sharma 2020). In this case, resettled citizens participate in neither sector's labor force, though these displaced citizens are not the same as those who make the choice to migrate from the contested sector to the uncontested sector as internally displaced persons. Counter-intuitively, the government still has an economic motive for forced resettlement. This form of displacement leads either to high levels of violence and resettlement or substitution of violence and resettlement, depending on the relative economic prospects of the contested and uncontested sectors. When the uncontested sector has more economic potential, the government will use the maximally feasible levels of violence and resettlement because both tactics drive more citizens to migrate to the uncontested sector, increasing production. Even though the government removes a larger number of citizens from the labor force, doing so increases the relative benefits of working in the uncontested sector and more citizens choose to migrate, increasing the labor force in the more valuable sector. Alternatively, if the contested sector is more valuable, the government will choose a higher level of violence to retake control of this sector but will reduce its level of forced resettlement to encourage citizens to remain and participate in the uncontested sector's labor force.

My model explains how variation in governments' counterinsurgency strategies can depend on the resource endowment and productive potential of the contested territory, and the willingness of the population to flee in response to violence. I also show that simply increasing economic opportunities for citizens, and therefore tax revenue for governments may not have the intended effect of reducing forced resettlement. Aid in the form of an increase in available capital in the uncontested sector, which increases wages for citizens who work in that sector, can increase forced resettlement. Improved economic opportunity in the uncontested sector both increases internal migration and decreases refugee emigration. The government may then increase forced resettlement to increase labor force participation in the contested sector because an increase in the resources in the uncontested sector may not compensate for the decrease in tax revenue in the contested sector driven by the reduction in labor supply.

Government violence, in the model, reasserts regime control over contested territory, and

in doing so increases its ability to extract tax revenue. Though the specific form of benefits differs, this is in keeping with theories of government violence in which regimes use force to increase their hold on the population, and gain resources and support from these individuals (Steele 2011, Rueda 2017). Though citizens in my framework do vary in their willingness to migrate, the model does not rely on informational or assortative mechanisms that have been used to explain strategic forced migration (Lichtenheld 2020, Hägerdal 2019). Instead, what drives both the citizens' migration decisions and, more importantly, the regime's counterinsurgency strategy are the endogenously determined economic returns for citizens in the contested and uncontested sectors. In centering an economic mechanism, my theory is in keeping with many popular descriptions of forced displacement campaigns during, and independent of, civil conflicts. For example, Saddam Hussein depopulated areas in both the Kurdish north of Iraq and in the Tigris-Euphrates marshlands with a dual motive of suppressing opposition and gaining control over oil-rich and agriculturally productive territory (Fawcett & Tanner 2002). In this case, displacement allowed the Saddam regime to counter growing opposition movements and increase revenues by exerting control over resources and assets, like oil fields, highlighting other forms of economic benefits beyond tax revenue government's might seek to gain by forcibly resettling citizens. I use the implications of my theory to explain forced resettlement patterns in civil conflicts in Guatemala and Kenya, demonstrating how economic incentives affected the governments' displacement tactics.

3.2 Related Literature

Much of the literature on migration in civil conflict has focused on identifying what triggers migration, and who chooses to leave their homes. Determinants of migration are often categorized as 'push' factors, which increase the likelihood of outmigration, or 'pull' factors, features of a destination that make migration appealing. Experience or threat of violence is consistently identified as a strong predictor of migration in civil conflict (Schmeidl 1997, Moore & Shellman 2004, Rubin & Moore 2007, Melander, Öberg & Hall 2009, Adhikari 2012). Higher intensity conflict is associated with increased levels of migration, both internally and abroad (Morrison 1993, Bohra-Mishra & Massey 2011).

Economic concerns also push and pull citizens exposed to repression or conflict to migrate (Engel & Ibáñez 2007, Czaika & Kis-Katos 2009). Combined, these results suggest that those who suffer economic losses due to exposure to violence face low opportunity costs of migration and are more likely to move, a result born out in surveys of individuals exposed to conflict (Adhikari 2013). Similar arguments about exposure to violence and opportunity cost predict whether individuals will remain within their country of origin as internally displaced persons (IDP) or will travel to another country as refugees (Moore & Shellman 2006), and where IDPs will settle (Balcells 2018).

The timing of migration during conflict is also influenced by both security and economic factors. Individuals who choose to leave because they fear violence, but are not directly threatened, are more influenced by economic concerns than individuals who leave after experiencing violence (Ibáñez & Vélez 2008).

Though many studies identify government or insurgent perpetrated violence as a major determinant of migration in conflict, less work has assessed armed actors' decision to trigger migration. Forcing displacement may serve to deny resources or support to an opponent (Azam & Hoeffler 2002). Armed groups may coerce individuals to leave to gain territory or to punish disloyal individuals (Steele 2011, Balcells & Steele 2016). Forcible resettlement has been viewed as a product of informational asymmetry; states with the capacity to move citizens but without information to identify insurgents may choose forced displacement as a low-cost way to reduce the size of an insurgency (Zhukov 2015).

Substantively, (Lichtenheld 2020) poses a similar question, and provides evidence, from a cross-national analysis and a case study of Uganda, for four distinct logics that correspond to three types of forced displacement. All three types of displacement are driven by an informational mechanism—attempting to compel citizens to move can help a regime identify supporters of the insurgency as those individuals who remain or refuse to move to regime-controlled territory. Which strategy of displacement is adopted by the government, cleansing, depopulation, or forced relocation, depends on the value of this information. This article reflects a common omission in the literature on strategic forced displacement—a lack of clarity in how factors other than violence affect the independent migration decisions of citizens, though there is robust evidence that socioeconomic factors also influence migration choices, even in conflict (Schultz 1971, Morrison & Lafaurie 1994, Morrison & May 1994, Neumayer 2005, Alvarado & Massey 2010). My framework considers citizens and counterinsurgents together to explore governments' direct influence on displacement through violence, and indirect influence through changing citizens' opportunity cost of migration.

Formally, conflict-induced migration can be conceptualized as an individual choice made by citizens weighting the risks and benefits of migrating, or a coordination problem where communities must decide whether to flee collectively.[2] The former resembles the classic notion of 'exit,' where citizens who migrate make a conscious choice to leave instead of exercising voice (Hirschman 1978, Herbst 1990). Migration carries some cost but may be worthwhile if the expected benefits of staying, either offered by or bargained over with the government, are low, or if an individuals' outside option is sufficiently valuable (Gehlbach 2006). Other theories incorporate this basic tradeoff into a coordination problem. Specifically, migration incentives affect whether

[2]A significant literature in economics addresses voluntary migration, relying on similar opportunity cost mechanisms. For a review see (Borjas 1989).

citizens are willing to mobilize against the regime, or how expectations of violence influence collective migration choices. Incentives to leave reduce willingness to mobilize politically, and thus may reduce the expected size of insurgences (Sellars 2019). Communities that prefer to migrate collectively may fail to flee and avoid violence because uncertainty over the likely level of either government or insurgent repression generates coordination failure (Camarena 2020).

More generally, my framework speaks to the literature on the role of opportunity cost in both citizens' and regimes' decision making in conflict. Opportunity cost provides a well-established explanation for the occurrence of conflict (Becker 1968, Grossman 1991), opposition group participation (Collier & Hoeffler 1998, Chassang & Padro-i Miquel 2009, Blattman & Miguel 2010), and government violence (Dube & Vargas 2013, Esteban, Morelli & Rohner 2015, Sun 2019). (Dal Bó & Dal Bó 2011) is similar to my setup in that they consider distinct sectors, focusing on labor-intensive and capital-intensive industries. They find positive shocks to labor-intensive industries reduce the risk of conflict while positive shocks to capital-intensive industries increase the likelihood of conflict.

3.3 Model

I model a government that maximizes tax revenue its collects from two sectors: an uncontested sector from which the regime extracts all tax revenue and a contested sector from which both the government and an insurgent group collect taxes. The government can use force to increase its control of the contested sector. Citizens, in my framework, have an opportunity to flee either before or following the government's attempt to retake control. However, the government can interfere with citizens' migration and forcibly resettle citizens who attempt to leave the contested sector. The game proceeds as follows: (1) citizens choose whether to migrate away from both the contested and uncontested sectors in anticipation of government violence, with those that leave becoming refugees; (2) the government chooses a counterinsurgency strategy, comprising an effort choice that determines its portion of tax revenue from the contested sector, and a level of forcible resettlement; (3) citizens decide whether to migrate from the contested sector to the uncontested sector as internally displaced persons and markets clear; (4) payoffs are received.

3.3.1 Contested and Uncontested Sectors

The economy in the model comprises two sectors, X, which is uncontested and fully controlled by the government, and Y, control over which is contested by the government and an insurgent group. Each sector therefore is associated with a distinct geographic area with different factor endowments. The uncontested sector may, for example, be the area around a national capital,

firmly under the government's control, while the contested sector may be a more peripheral region occupied partially by an insurgent group.

The government extracts tax revenue from both sectors, represented by t_j for $j \in \{X, Y\}$, in the form of excise taxes on production. Each sector consists of a labor market, production technology, and a goods market, and is assumed to be relatively small and closed with full employment. Both are characterized by Cobb-Douglas production technologies. In the uncontested sector, production is given by $X(K_x, L_x) = K_x^{\alpha} L_x^{\beta}$ and good x is produced using a capital endowment K_x and labor L_x, with output elasticities α and β such that $\alpha + \beta \leq 1$, i.e. returns to scale are weakly decreasing. Similarly, production in the contested sector is $Y(K_y, L_y) = K_y^{\alpha} L_y^{\beta}$.[3] Tax revenue in the uncontested sector is therefore $t_x X(K_x, L_x)$, while in the contested sector the government's tax revenue is a proportion of total tax revenue $v t_y Y(K_y, L_y)$.

In each sector, labor is demanded at a rate $L_j^{\dagger}$, and representative firms hire citizens to produce goods via the production technology such that $L_X + L_Y \leq 1$.[4] Firms are price takers and production sets are closed, non-empty, and satisfy free-disposal such that aggregate production is captured by the representative producers in each sector (Mas-Colell, Whinston & Green 1995, 147-149). Wages are paid to individuals who supply labor to the economy, given by $w(L_j)$, where $w(\cdot)$ is the marginal product of labor and is strictly decreasing in L_j and strictly increasing in K_j. Capital endowments in each sector are exogenously fixed at the beginning of the game. Wages, the supply of goods x and y, and prices for those goods in each economy are determined endogenously for a given capital endowment, production technology, and labor pool.

Individuals who participate in either the contested or uncontested sector have a consumption budget $w(L_j) \geq p_j \cdot c_j$ for $j \in \{X, Y\}$, such that the amount consumed of good x or y for a given price p_j cannot exceed their wage. Citizens consume goods such that supply and demand for goods are equal.

3.3.2 Citizens

At the outset of the game, there are two groups of citizens. First, a group of citizens $\ell > 0$ resides in the uncontested sector. Second, a unit mass of citizens normalized to 1 initially reside in the contested sector. Each citizen in the contested sector is endowed with an individual cost for migration, θ_i, distributed uniformly from $[0, 1]$. The difference in individual costs for migration may capture earning potential in reception sites, risk preferences, familial ties outside of the contested territory or, conversely, affinity for the insurgency that makes citizens more or less willing to leave.

[3] Generalizing the production technology makes the formal results more ambiguous, though all results presented in the text hold for some range of parameters.

[4] These firm are strategic actors in that they are optimizing profits given all other players' strategic decisions, but otherwise have no effect on the government's chosen levels of violence and the citizens' decisions.

Lower values of θ indicate lower costs of migration and therefore a greater willingness to leave.

Prior to the realization of any violence by the government, citizens in the contested sector face a decision of whether to flee their home country, leaving the contested sector as refugees. I denote the decision to leave for an individual citizen as $m_i^F = 1$, where F indicates the citizen is migrating to a foreign territory, while $m_i^F = 0$ implies an individual chooses to remain in the contested sector. Citizens that migrate as refugees receive a benefit from migration, b, and pay a cost, θ_i, for leaving. The migration benefit, b, is constant and represents the value of the exit option for any citizen.

Citizens that choose to remain in the contested sector have a second opportunity to migrate following the government's use of force. These citizens can migrate to the uncontested sector, a choice I denote $m_i^D = 1$, where D indicates a citizen has moved domestically as an internally displaced person. Internal displacement again bears cost θ_i for each individual that moves to the uncontested sector. Those citizens who remain in the contested sector choose $m_i^D = 0$. Citizens in the contested and uncontested sectors (i.e. all citizens who do not choose to become refugees) participate in the economy in each sector by supplying labor. In return, they earn a wage and consume goods. A citizen's individual utility from supplying labor is represented by $u(c_j)$, where utility is a strictly increasing, strictly concave function of consumption.

3.3.3 Government Force

The government, denoted by G, aims to maximize the sum of tax revenue from the uncontested and contested sectors. The government must use force in order to collect tax revenue from the contested sector, choosing a level of violence $v \in [0, 1]$ that corresponds to the proportion of excise taxes in the contested sector collected by the government. This violence may take the form of capturing territory from the insurgent group, maintaining a police or military presence in the contested sector, or carrying out repression against citizens in order to collect taxes. The government's combined tax revenue is $t_x\big(X(K_x, L_x)\big) + vt_y\big(Y(K_y, L_y)\big)$.

Tax revenue for the government depends on the labor supply in both the uncontested and contested sectors. Therefore, the government has a vested interest in manipulating the migration of citizens between and out of these sectors. The government may use forcible resettlement to alter the distribution of citizens between the two sectors, choosing a level of resettlement , $r \in [0, 1]$. Forced resettlement interns some portion of the population, placing them under government control. Both violence and resettlement are costly for the government. These costs are captured by the function $z(v, r)$, which is strictly increasing in both tactics. Importantly, $z(\cdot)$ is convex in v and concave in r. This assumption implies that the marginal cost of violence is increasing, while the marginal cost of additional forced resettlement is decreasing. Substantively, the government faces increasingly burdensome costs to retaking the contested sector and, though the regime incurs

substantial costs for high level of forced resettlement, a small increase in the level of resettlement translates to a less significant increase in cost.

3.3.4 Utilities

Following the government's use of force and citizens migration choices, the citizens from the contested sector have divided into four groups: (1) those citizens who have become refugees; (2) citizens who have moved from the contested to the uncontested sector; (3) citizens remaining in the contested sector by choice; and (4) forcibly resettled citizens. The portion of citizens who are forcibly resettled is represented by r, and the payoff for an individual who has been resettled is normalized to 0. The government's resettlement effort prevents citizens r from migrating out of the contested sector. Since there is full employment in the contested sector, these citizens supply labor in that sector.

The citizen's utility, which captures an individual's tradeoff between migration and remaining depends on the government's violence and forced resettlement, as well as her individual cost for migration. A citizen's expected utility is

$$U(m_i^F, m_i^D, \theta_i) = m_i^F(b-\theta_i)+(1-m_i^F)\Big(m_i^D\Big[(1-r)\big(u(c_x)-\theta_i\big)\Big]+(1-m_i^D)\Big[(1-r)\big(u(c_y)-v\big)\Big]\Big), \tag{3.1}$$

where citizens are forcibly resettled at random.

Because individual citizens have unique costs for migration, their relative weighting of the costs and benefits of migration, versus their exit option and the wages earned through labor force participation, generate two cutoffs in θ that represent the refugee flow and internal displacement rate respectively. The refugee migration rate is $\mu_F = \int_0^1 m_i^F di$. Citizens who are forcibly resettled cannot choose to move to the uncontested sector, thus the internal displacement rate is $(1-r)\mu_D = (1-r)\int_0^1 m_i^D di$. The proportion of citizens who remain in the contested sector is represented by $(1-r)1-\mu_D$.[5]

Labor supply in the contested and uncontested sectors depend on citizens' migration as well as the government's forced resettlement choice. The labor supply in the uncontested sector is $L_x = \ell + (1-r)\mu_D$ and the labor supply in the contested sector is $L_y = r + (1-r)(1-\mu_D)$. This allows us to state the conditions necessary for markets to clear in the contested and uncontested sectors.

Lemma 3.1 *Market clearing is characterized by:*

1. *Optimal labor force participation:* μ_D^* *and* $1-\mu_D^*$

[5]Note that the proportion of non-refugees is $(1-\mu_F)\Big[r+(1-r)\big(\mu_D+(1-\mu_D)\big)\Big]$.

2. *Profit maximization:* $w_j^* = p_j \cdot J_L(L_j^\dagger)$ *for* $j \in \{X, Y\}$

3. *Labor supplied equals labor demanded:* $L_x^\dagger = \ell + (1-r)\mu_D^*$ *and* $L_y^\dagger = r + (1-r)(1-\mu_D^*)$

4. *Goods supplied equal goods demanded:* $p_j^*(1-t_j)J(L_j^\dagger) = c_j^*$,

which must hold for both the contested and uncontested sectors.

Proof of this lemma, and proofs for all other results, are in the appendix.

The solution concept is subgame perfect Nash equilibrium. An equilibrium to the model has three components. First, market clearing conditions as defined in Lemma 3.1 must hold for the contested and uncontested sectors, characterized by $\Big(w_x^*(v,r,\mu_D), c_x^*(v,r,\mu_D), p_x^*(v,r,\mu_D)\Big)$ and $\Big(w_y^*(v,r,\mu_D), c_y^*(v,r,\mu_D), p_y^*(v,r,\mu_D)\Big)$, respectively.

Second, the citizens strategy is given by the pair (θ_F^*, θ_D^*), where a cutoff strategy in θ determines the proportion of refugees and internally displaced citizens. The marginal type indifferent between migrating as an internally displaced person to the uncontested sector and remaining in the contested sector is

$$\underbrace{u(c_x) - \theta_i}_{\text{uncontested sector}} = \underbrace{u(c_y) - v}_{\text{contested sector}} \Longrightarrow \theta_D^* = u(c_x) - u(c_y) + v.$$

Notice that forced resettlement drops out of this citizen's calculus because only a citizen not forcibly resettled can choose between the contested and uncontested sectors. Any citizen with migration cost higher than θ_D^* will remain in the contested sector. The citizen choosing between remaining and migrating as a refugee necessarily has a cost at least as low as θ_D^*, therefore the relevant comparison for any citizen choosing to migrate prior to government violence is between the refugee payoff and the internal displacement payoff

$$\underbrace{b - \theta_i}_{\text{refugee}} = \underbrace{(1-r)\Big(u(c_x) - \theta_i\Big)}_{\text{IDP}} \Longrightarrow \theta_F^* = \frac{b - u(c_x)}{r}.$$

Citizens with costs for migration $\theta_i \leq \theta_F^*$ will choose to migrate as refugees.

Finally, the government chooses levels of violence and resettlement that solve

$$\max_{v,r} \;\; t_x\Big(\big(K_x\big)^\alpha\big(\ell + (1-r)\mu_D\big)^\beta\Big) + vt_y\Big(\big(K_y\big)^\alpha\big(r + (1-r)(1-\mu_D)\big)^\beta\Big) - z(v,r). \quad (3.2)$$

3.4 Comments on the Model

Before proceeding, I offer comments on a few features and assumptions of the model. First, it is important to emphasize that this model's aim is to offer an explanation of an observed phenomenon–government efforts to influence migration in civil conflict–not offer a prescriptive theory for countering insurgent groups.

Tax Revenue: The government may derive benefits from a number of different revenue streams, both licit and illicit, including but not limited to tax revenue. For ease of presentation, I focus only on tax revenue. The excise tax collected by the government can represent taxes collected from business through legal of extralegal means. For example, this tax may capture revenue generated by extortion. It is reasonable to assume that the government can extract some kind of tax on production regardless of what good is being produced, in either the contested or uncontested sector. Tax collection may be systematic, through nationalized tax collection, or thorough protection rackets or bribery schemes. However, it is less likely that the government could, for example, collect income tax in both sectors if the goods being produced in the contested sector are illicit or if taxes are collected in the form of bribes.

My framework shows how economic concerns affect the tactical decisions of the government and the migration choices of citizens. Given this focus, the economy is simplified such that representative firms produce goods x and y in a competitive market, where equilibrium production ($x(p_x^*)$ and $y(p_y^*)$) in each sector represents the aggregate supply correspondence for firms in X and Y. The parsimonious partial equilibrium framework with aggregate production has a number of substantively useful features, including that benefits—wages—increase if a given sector is capital-rich and decrease when more citizens participated in a given labor market, while abstracting from additional economic factors that less directly affect the government's tactical decision.

Forced Resettlement and Labor Force Participation: The model makes a strong assumption that those individuals who are forcibly resettled by the regime participate in the labor force. I relax this assumption below and consider a variant of the model in which citizens who are forcibly resettled are interned outside of both economic sectors. However, this assumption in the baseline model captures two substantively meaningful features of civil conflict. First, in many instances when citizens are forcibly resettled, they are also forced to labor (e.g. concentration camps in the Boer War (Downes 2007, 430), villagization in the Mau Mau uprising (Anderson 2005, 294), collectivization by the Khmer Rouge (Kiernan 2002)). Second, the key mechanism that drives citizens' decision is the endogenous link between the size of the population in each sector and wages. Interpreting the wage figuratively as the resources, perhaps rations, land allotments, or social services, given to an individual who supplies labor in the contested sector, when the government must supply similar resources to individuals who are forcibly resettled there are fewer resources available for workers.

By assuming resettled individuals are part of the labor supply, the model incorporates this effect of allocating finite resources in the citizens' utility.

Refugees and the Internally Displaced: Citizens who choose to migrate, either in reaction to conflict or in anticipation of violence, flee the geographic area represented by the uncontested sectors. These individuals conceptually can be classified as refugees or IDPs, setting aside a policy debate on whether individuals who flee conflict and are motivated in part by economic opportunities can be considered refugees (Stanley 1987, Richmond 1993, Zetter 2007).

Insurgency in the Contested Sector: The model does not include an insurgent group as a strategic actor in the contested sector. Incorporating a strategic decision by an insurgent group that would affect the government's strategy may take two forms, either altering the benefits of participating in the contested sector labor force or generating costs for the government. The former would complicate the citizens' migration decision such that citizens would have lower incentives to migrate, while the latter would add a constraint on the government's counterinsurgency strategy. In either case, the incentives generated by government violence would remain. Since the aim of my framework is to highlight how governments seek to exert influence over migration flows, and how citizens respond, I opt for the more parsimonious model presented here.

Cost of Violence: The government pays a cost for both using violence to increase its control over the contested sector and for forced resettlement, captured formally by the function $z(\cdot)$. The cost of both tactics is increasing, such that high levels of force are particularly costly for the government. However, violence and forced resettlement have different marginal effects on the government's utility. The marginal cost of violence to recapture the contested sector is increasing. This implies that is it particularly costly for the government to entirely recapture the contested sector from the insurgent group. The marginal cost of resettlement is decreasing. Resettlement requires additional effort and resources relative to alternative counterinsurgency tactics, but once this investment is made, the relative cost of resettling an additional citizen decreases. These costs may include population management, transportation costs, and security provision for resettled citizens—costs that are high up front but may not necessarily vary substantially based on the size of the resettled population.

3.5 Migration and Counterinsurgent Violence

Government force maximizes the regime's share of tax revenue by increasing control of the contested sector and restricting citizens' movement. Violence by the government also imposes costs on citizens that change their incentives to migrate. To determine citizens' optimal migration choices and the government's counterinsurgency strategy, I proceed backwards, considering each stage of the model in turn. The citizens decide last whether to migrate to the uncontested sector or remain,

and thus I consider their decision first.

The marginal individual, who is indifferent between supplying labor in the uncontested and contested sector, reflects the relative willingness of citizens to migrate as internally displaced persons. Those citizens who move to the uncontested sector do so because their valuation of the economic benefits of labor force participation in that sector are higher than the costs of migration. The threshold below which citizens migrate to the uncontested sector and above which they remain is represented by the marginal ideological type $\theta_D^* = u(c_x) - u(c_y) + v$. This marginal individual characterizes the unique equilibrium rate of migration from the contested sector in the final stage of the game, as well as the labor force participation rate in both sectors. Wages are endogenously generated, depending on the proportion of citizens who participate in each sector.

The government's counterinsurgency strategy is chosen to maximize tax revenue, accounting for the effects of violence on citizens' migration choices, both for citizens who leave as IDPs and as refugees. Proceeding to the government's strategy, the regime maximizes the sum of tax revenue in both sectors, which implies gaining control of as large a portion of the contested sector as possible and ensuring optimal labor force participation in both sectors to maximize their combined output. The regime's choice is given by (3.2).

Given the government's problem, it is possible to characterize the possible levels of counterinsurgent violence and forced resettlement that may be optimal for the regime. The government can choose a counterinsurgency policy $v \in [0, 1]$ and a level of forced resettlement, $r \in [0, 1]$, both of which are constrained by costs. The optimal levels of counterinsurgent force and forcible resettlement for the regime, given the migration choice of citizens μ_D, are implicitly defined by

$$t_x\Big(X_L(1-r)\frac{\partial \mu_D}{\partial v}\Big) + t_y\Big(Y\Big) - vt_y\Big(Y_L(1-r)\frac{\partial \mu_D}{\partial v}\Big) - z_v(v,r) = 0,$$
$$t_x\Big(X_L\big((1-r)\frac{\partial \mu_D}{\partial r} - \mu_D\big)\Big) + vt_y\Big(Y_L\big(\mu_D - (1-r)\frac{\partial \mu_D}{\partial r}\big)\Big) - z_r(v,r) = 0,$$

where X_L and Y_L are the derivatives of the production technology with respect to the labor input, and z_j is the derivative of the cost function with respect to $j \in \{v, r\}$.

Unless the cost of using force is particularly high, the government will not choose $v = 0$, because doing so would imply foregoing all possible tax revenue from the contested sector. Alternatively, if the cost is sufficiently high, choosing $v = 1$ will be too expensive and the government will choose an interior v^*. Any level of forcible resettlement may be optimal for the government, depending on the cost $z(\cdot)$ and the effect of resettlement on citizens' migration choices. I return to the government's optimal choice of r below.

Lastly, some citizens may choose to migrate as refugees prior to the government's execution of its counterinsurgency strategy. The marginal citizens indifferent between leaving as a refugee and remaining initially in the contested sector is given by $\theta_F^* = \frac{b-u(c_x)}{r}$. Having characterized θ_D^*

and θ_F^*, it is possible to characterize the citizens' migration decision at each stage by the migration rates μ_D and μ_F.

Lemma 3.2 *For fixed levels of resettlement r and counterinsurgent violence v, the marginal citizen who migrates as a refugee is characterized by a unique μ_F^*, the equilibrium rate of refugee migration,*

$$\mu_F^* = \frac{b - u(c_x)}{r\left(\theta_F^*\right)}, \tag{3.3}$$

and the marginal citizen that migrates as an IDP is characterized by a unique μ_D^*, the equilibrium internal displacement rate, where

$$\mu_D^* = \frac{u(c_x) - u(c_y) + v - \theta_F^*}{1 - \theta_F^*}. \tag{3.4}$$

Notices these migration rates imply citizens with migration costs $\theta_i \in [0, \theta_F^*]$ migrate as refugees, citizens with costs $\theta_i \in (\theta_F^*, \theta_D^*]$ leave as internally displaced persons, and citizens with costs $\theta_i \in (\theta_D^*, 1]$ remain in the contested sector. The rates of migration both depend on the expected level of counterinsurgent violence and forced resettlement chosen by the government, as well as expected labor force participation in both sectors, because all of these factors affect the earning potential of individual citizens.

The thresholds strategies characterized by μ_D^* and μ_F^*, and the government's optimal counterinsurgency strategy v^* and r^* represent the citizens' and regime's best responses and give the equilibrium levels of migration and force.

Proposition 3.1 *There exists a subgame perfect Nash equilibrium characterized by $(v^*, r^*, \mu_F^*, \mu_D^*)$, where the regime captures a proportion v^* of tax revenue from the contested sector and forcibly resettles r^* citizens, μ_F^* represents the unique migration rate of refugees, and μ_D^* is the unique internal displacement rate following counterinsurgent efforts.*

3.6 Violence-Driven Labor Market Distortions

Both citizens and the government face tradeoffs—for citizens between supplying labor and migration and for the government between increasing control over the contested sector and forced resettlement. The equilibrium characterized in Proposition 3.1 implies that these tradeoffs are interrelated. The citizens' opportunity cost for migration is influenced by the government's counterinsurgency strategy, while the optimal tactics for the government are affected by citizens' migration. The government can influence citizens' migration decision through two channels—by increasing the cost of remaining in the contested sector through violence and by manipulating the

benefit of labor force participation in either sector through forced resettlement. While the government will always choose to assert control over the contested sector, it is not immediately apparent why the government would choose to forcibly resettle citizens. To understand what drives forced resettlement, consider the sub-game beginning with the government's decision and let the government maximize tax revenue by choosing only a level of violence v.

The regime's aim is to gain control of as large a portion of tax revenue from the contested sector as possible. It seems natural then that, if violence were costless, the government's optimal counterinsurgency strategy would be to exert sufficient effort such that it captures all of the contested sector, by choosing $v = 1$. However, this inference ignores how counterinsurgent effort affects the migration incentives of citizens in the contested sector.

Remark 3.1 *The government will choose $v^* < 1$ if the cost, $z(v, r)$ is sufficiently high or if the marginal effect of violence on the contested sector, $vt_y\big(Y_L \frac{\partial \mu_D}{\partial v}\big)$, is sufficiently large.*

The government's level of violence may be constrained in two ways. First, naturally, if costs are high the government is not willing to bear those costs in order to take full control of the contested sector. Second, violence changes citizens' willingness to participate in the labor force in the contested sector. This effect is captured by $\frac{\partial \mu_D}{\partial v}$, the marginal effect of violence on the internal displacement rate. As the government increases its level of violence, citizens are increasingly willing to pay the cost of migration and so more citizens choose to leave for the uncontested sector, i.e. $\frac{\partial \mu_D}{\partial v} > 0$.

A higher level of internal displacement does not necessarily hurt the government. An increase in the supply of labor to the uncontested sector increases production and therefore the government's tax revenue. This comes at the expense, however, of production in the contested sector which experiences a decline in its workforce. Moreover, the marginal gains in the X sector are decreasing as more citizens choose to leave as IDPs. If losses in the contested sector are large enough, and not compensated by gains in the uncontested sector, the government may choose to forgo total control of the contested sector in favor of collecting the majority of tax revenue from a more productive sector with a larger labor force.

From the government's perspective, the downstream effect of its use of force on the rate of internal displacement highlights an inefficiency in the government's counterinsurgency strategy. While violence certainly increases the government's share of tax revenue, the marginal gains in the uncontested sector and output in the contested sector are both decreasing with higher levels of violence. Therefore, the government must choose between total control over a less productive contested sector and ceding some tax revenue to the insurgent group to maintain a larger labor force in the Y sector. The government would benefit from another means by which to influence citizens' migration choices. Because violence alone distorts the labor market in a way that reduces its po-

tential benefits, the government has an incentive to use forced resettlement to affect the distribution of citizens between the two sectors.

3.7 Economic Motives for Forced Resettlement

Does forced resettlement compensate for the labor market distortions caused by government violence? When the government forcibly resettles citizens, it generates a population that supplies labor in the contested sector with certainty, and thus can substitute for violence v to build a labor force that is immune to the labor market effects of counterinsurgency. In this way, increasing the level of forced resettlement may solve the regime's labor force problem. Though costly, forced resettlement increases production in the contested sector and affords the government the strongest guarantee that there will be sufficient labor force participation in both sectors. Therefore, the government may find it worthwhile to incur the cost of forced resettlement.

Because forced resettlement allows the government to forcibly redistribute citizens between the two sectors, the government's incentive to use forced resettlement is strongest when it chooses the maximally feasible level of violence. To state this result formally,

Proposition 3.2 *There exists a range of parameters such that the optimal level of forced resettlement r^* is increasing in violence.*

Violence that reasserts government control over the contested sector and forced resettlement may be gross complements. This complementarity holds under three conditions. First, when the marginal effect of forced resettlement on the rate of internal displacement is relatively small. Second, if the marginal effect of forced resettlement on internal displacement is decreasing in the level of government violence. Third, if the marginal effect of violence on the cost of forced resettlement is small. Combined, these conditions suggest that forced resettlement may allow the government to increase its violence without suffering the consequences of economic distortions if forced resettlement's effect on citizens' migration decision is small.

The economic incentives underlying a government strategy where forced resettlement reinforces regime violence explain the destructiveness and the internment policies adopted by the Guatemalan military in the 1980s. During the presidency of Romeo Lucas García (1978-1982) the Guatemalan military used violence indiscriminately to reassert control territory contested by a leftist insurgent group, conducting sweep operations which led to the displacement of thousands (Schirmer 1998, 42). Concurrently, the Guatemalan military's hold on power was threatened by economic crisis. Increasing violence led to substantial capital flight and disrupted key industries like tourism (Garrard-Burnett 2010, 50). An increasing number of citizens were fleeing the violence in northern and eastern Guatemala, but no economic sector in uncontested parts of the country

could offer sufficient employment opportunities for the arriving workforce. Guatemala City and the more economically prosperous southern coast exceeded their capacity to absorb migrants into the local economy (Gellert 1999, 118).

General Efraín Ríos Montt overthrew the Lucas regime in a 1982 coup and implemented a new counterinsurgency strategy that emphasized not only violent reassertion of government control, but also economic development in the rural highlands held by guerrillas. This strategy, known as Plan Victoria 82, involved substantial forcible resettlement of citizens. A primary aspect of the regime's new strategy was a rural pacification campaign, nicknamed *Fusiles y Frijoles*—Bullets and Beans—where the beans component indicated the regime's aim to reestablish control over the citizens in contested areas through manipulating their economic incentives (Schirmer 1998, 37). This control was achieved by moving citizens into model villages, concentrated in areas called Poles of Development (Archdiocese of Guatemala 1999, 56). Citizens concentrated in these villages were forcibly recruited into Food for Work programs that allowed the government to control the labor force and substitute rations for wages, employing citizens to build infrastructure projects and compelling them to conduct 'civil patrols' (Schirmer 1998, 73).

The Guatemalan case exemplifies the conditions required for complementarity between violence and forced resettlement. The Guatemalan military's model village program did not appear to significantly increase migration to uncontested areas. Instead, as the government recaptured territory and resettled remaining citizens, others voluntarily moved to military-run villages and recaptured areas. Many of the displaced returned because the military-initiated rural redevelopment offered better economic opportunities for internally displaced persons who were increasingly expelled from Guatemala's urban centers (Gellert 1999, 119; Garrard-Burnett 2010, 97).

For the regime, two factors made the high costs of the massive forced displacement and resettlement acceptable (Schirmer 1998, 38). First, after violence alone failed to suppress the insurgency, the military believed it was within two to three years of losing the war to the insurgents. Second, in addition to this security motive for violence and resettlement, the economic consequences of losing control over the highlands and conflict-induced rural to urban migration threatened the alliance between the military and Guatemala's wealthy elite. The government needed to increase its tax revenue to fund its counterinsurgency efforts and its forced resettlement campaign restructured the highlands in ways favorable to the business class (Persky 1984, 162). The military cleared land informally owned by peasants, which could then be expropriated by military officers or Guatemala's elites, and created a captive labor force willing (or compelled) to work for low wages. For example, citizens forced into model villages often became temporary laborers on coffee plantations (Smith 1990). Security concerns alone cannot explain the Guatemalan military's rural pacification campaign. Instead, the economic mechanism highlighted in my model contributes to a more complete explanation for the military's strategy, and its widespread use of forced resettlement.

3.7.1 A Negative Feedback Loop of Resettlement

The complementarity result that explains resettlement in Guatemala only holds when forced resettlement has small marginal effects on citizens' migration. However, if forced resettlement has a significant effect on internal displacement, the government may avoid resettling a large portion of citizens and instead accept higher labor force participation in the uncontested sector. Forced resettlement has its own effect on citizens' labor force participation and if the government resettles a large portion of, participation in the contested sector becomes less appealing for non-interned citizens. Resettled citizens drive down the per capita real wage in the contested sector by increasing the labor supply. Wages decrease because the marginal effect on economic output of hiring an additional citizen to work is decreasing with each additional laborer. This effect on wages is apparent in limited instances in Guatemala. Individuals resettled into Poles of Development in Quiché received such depressed wages that some citizens who had chosen to relocate voluntarily to newly recaptured government territory considered emigrating to find better paying work (PAVA 1984, 81 in Schirmer 1998, 74).

The wage effect of forced resettlement increases citizens' incentive to migrate to the uncontested sector. Formally the internal displacement rate is increasing in forced resettlement, $\frac{\partial \mu_D}{\partial r} > 0$. Forced resettlement can create its own negative feedback loop. As the government uses forced resettlement to compensate for its choice of violence, it drives more citizens to become IDPs, increasing the need to use forced resettlement to compel citizens to supply labor to the contested sector.

This negative feedback loop can be exacerbated when accounting for the effect of forced resettlement on refugee migration. Because forced resettlement alters the distribution of the labor supply between the contested and uncontested sectors, it changes the relative expected benefits of migrating as a refugee.

Remark 3.2 *The government's optimal level of forced resettlement may be increasing in the refugee migration rate.*

Forced resettlement has two competing effects on the flow of refugees from the contested sector. First, it increases incentives for citizens to leave as refugees because those citizens that remain face an increased risk of falling victim to the government's forced resettlement. Second, those citizens that might choose to become refugees have relatively low costs of migration, which implies they also would face relatively low costs for moving to the uncontested sector. Forced resettlement increases the labor supply in the contested sector, thus potentially increasing economic opportunities for citizens with low migration costs in the uncontested sector. As the government increases its level of forced resettlement, the potential costs of victimization dominate the potential benefits in the uncontested sector. Therefore, refugee migration increases.

Moreover, as more citizens leave as refugees, the internal displacement rate also increase. A higher rate of refugee migration means less competition in the uncontested sector for internally displaced persons, which encourages more internal migration. This indirect effect of refugee migration on internal displacement leads the government to increase its level of forced resettlement, simultaneously managing and exacerbating the government's migration problem.

This feedback loop is evident in the Kenyan government's effort to contain an insurgency in its Northern Frontier district shortly after independence, known as the *shifta* conflict. When an insurgency led by ethnically Somali militants emerged shortly after independence in 1963, the Kenyan government sought to assert control over the region in part by adopting a population control strategy. In 1966 the government began forcing villagization and 'closed' the area where the *shifta* operated. In addition, the government adopted a law that allowed authorities to "legally define and enforce residency of certain groups to certain areas," (Whittaker 2014, 118). The villagization policy was rationalized as a way to simultaneously support operations against the insurgents and win the hearts and minds of citizens through economic development of the rural area. In practice, the regime did little to support development in the "prohibited zone," though some infrastructure projects like fencing and trench digging were accomplished through communal labor (Whittaker 2014, 119). As predicted by the model, villagization also led to significant emigration, with some estimates suggesting that up to half of the population of the controlled area fled to Ethiopia or Somalia (Hornsby 2013, 97; Whittaker 2014, 115-119).

The population control approach carried a substantial cost beyond the initial counterinsurgency efforts, and Kenyan politicians grew concerned about the cost of housing the interned population, providing irrigation to the new villages, and maintaining control over the region's nomadic population (Whittaker 2014, 111). However, for both local and national-level administrators the combined security and economic benefits of forcibly resettling the population of northeastern Kenya outweighed the government's cost. Though it increased migration incentives for much of the ethnically Somali population, villagization also allowed the regime to achieve its goal of inhibiting emigration of potential refugees, mirroring the incentives highlighted in Remark 3.2, and extend control over the regional economy by facilitating development, regulating trade, and collecting taxes (Fratkin & Roth 2006, 2; Whittaker 2014, 117).

3.7.2 Resettlement Without Economic Participation

The construction of model villages like the Poles of Development or the Strategic Hamlet Program in Vietnam is a particularly costly form of forced resettlement, and is often motivated, as in the Guatemalan case, by a more explicit economic argument than other forms of resettlement. In many conflict contexts, citizens are not forcibly resettled in a contested sector and instead are

held in internal displacement camps that are operated outside any preexisting economic sector. Governments, in these cases, may deliberately resettle citizens into camps or use force to expel them from their homes, leaving third parties like the United Nations or aid groups to establish displacement camps for citizens uprooted by violence. Similar economic motivations can also drive this form of forced resettlement. To see this, I consider a different formalization of forced resettlement and show that the economic motives for forced resettlement in some cases persist.

Instead of compelling forcibly resettled citizens to participate in the contested sector, in this extension of the model resettled citizens are interned outside of both sectors, and resettlement enters the government's payoff through a function $f(r)$, which is strictly increasing and strictly concave. The government can benefit from forced resettlement if displacement inhibits citizens from supporting the insurgent group, or if displacement creates opportunities to expropriate aid supplied by NGOs intended to benefit resettled citizens. Payoffs for citizens remain the same, though in this case the labor supply in the contested sector is $L_y = (1-r)(1-\mu_D)$, which changes citizens' expected wages in this sector.[6] The government now chooses optimal violence and forced resettlement to solve

$$\max_{v,r} \; t_x\Big(\big(K_x\big)^{\alpha}\big(\ell + (1-r)\mu_D\big)^{\beta}\Big) + vt_y\Big(\big(K_y\big)^{\alpha}\big((1-r)(1-\mu_D)\big)^{\beta}\Big) + f(r) - z(v,r).$$

Notice this new resettlement choice does not have a direct effect on the level of violence v^*. Instead, the relevant comparisons are between the levels forced resettlement r^* and the effect of resettlement on migration.

Proposition 3.3 *When resettled citizens are held in camps outside of either the contested or uncontested sectors, if tax revenue from the uncontested sector is sufficiently high, the government will choose the maximally feasible levels of violence $v^* \to 1$ and resettlement $r^* \to 1$. Otherwise, the government substitutes forced resettlement for violence.*

Resettling citizens outside of the regular economy affords the government a direct benefit, which comes from $f(\cdot)$, and can serve to increase the government's tax revenue, either as a complement or substitute for government violence. This effect of forced resettlement may explain, in part, why counterinsurgents turn to temporary internment camps, or other forced relocation sites, with alarming regularity.

As was the case when resettled citizens participated in the contested sector, government violence increases migration to the uncontested sector. If the marginal increase in productivity in the X sector that is driven by this increase in the labor supply is sufficiently valuable for the government, it will choose to employ the maximally feasible level of violence, constrained only by the

[6] Labor market participation for IDPs in displacement camps is very low (Pape & Sharma 2020).

cost from $z(\cdot)$. A prosperous uncontested sector also increases the internal displacement rate, as more citizens prefer to receive higher wages in the uncontested sector. The high internal displacement rate persists even as the government increases its level of forced resettlement, even though resettled citizens are no longer artificially depressing wages in the contested sector. Under these circumstances, the government has the strongest incentives to employ high level of violence and forced resettlement. It derives benefits independently from increased production in the X sector, more control over the Y sector, and forced resettlement.

Even under less favorable circumstances, the option to resettle citizens in camps still provides economic benefits for the government. If the effects of violence on the contested sector are large, this may prompt the government to moderate its violence to avoid triggering substantial internal displacement and a drop in production in the Y sector. However, the regime may see displacement as a way to compensate for some of these losses. In this case, increasing the level of forced resettlement does not flood the labor market in the contested sector. Resettlement can increase prosperity in the contested sector and generate a decrease in the level of migration caused by resettlement. Therefore, even if the government gains control of a smaller portion of the contested sector's tax revenue, production increases and the regime still derives an outside benefit from forced resettlement.

If the contested sector, Y, is economically prosperous, resettling citizens outside of both sectors may lead to a reduction in internal displacement, i.e. $\frac{\partial \mu_D}{\partial r} < 0$. In this case, the government may choose to substitute violence or forced resettlement—increasing its capture of the contested sector but limiting its forced resettlement. This seems counterintuitive because reducing displacement by carrying out resettlement would seem to benefit the government. However, as the internal displacement rate decreases, the size of the labor force in the contested sector, $1 - \mu_D$, is increasing, with diminishing marginal returns in terms of productive output. Violence then serves two purposes, increasing the government's control over a lucrative contested sector and driving internal displacement to the uncontested sector, redistributing the labor force.

3.7.3 Benefits and Pitfalls of Economic Improvements

The labor market pressure generated by forced resettlement is independent of other factors that shape economic opportunity, namely the availability of capital. Therefore, a forced resettlement strategy may be adopted by regimes in both capital rich and capital poor contexts. However, a change in the capital endowments of either the contested or uncontested sectors affect both the levels of migration and the government's optimal counterinsurgency strategy. A change in capital endowments increases productivity and wages for citizens who participate in the labor force. While an increase in capital endowments may not change the government's violence incentives—the

government may want to use more violence if the contested sector becomes more productive—intuitively, this kind of economic inducement should reduce incentives to use forced resettlement.

To assess the effect of economic inducements on forced resettlement, I consider an exogenous increase in the capital endowment in the uncontested sector.[7]

Proposition 3.4 *An increase in capital endowment in the uncontested sector, K_x, can increase the optimal level of forced resettlement, r^*.*

An increase in K_x has an expected effect on the rate of internal migration. As capital increases, so do wages in the uncontested sector, which increases the level of internal displacement. The increase in IDPs is not the only factor, however, that can drive an increase in the rate of forced resettlement. A larger capital endowment in the X sector also decreases the incentive for citizens to leave as refugees because their expected wages following the government's use of force is higher. Thus, there are more citizens with lower costs for migration remaining in the contested sector when the government chooses its counterinsurgency strategy. Anticipating that a large number of these citizens would choose to migrate to the now more prosperous uncontested sector, the government may have stronger incentives to employ forcible resettlement. Through resettlement, the regime creates an alternative to a large influx of citizens in the uncontested sector.

3.8 Conclusion

A government's counterinsurgency strategy has clear consequences for the likelihood that citizens choose to migrate, either in anticipation of or as a response to conflict. The labor market pressures created by both violence and forced resettlement itself provide a clear rationale for emigration in the face of conflict, even when migration costs are high. Clearly specifying the effects of underlying economic conditions on citizens' migration choices, and more importantly how underlying economic conditions endogenously shape the regime's counterinsurgency strategy, explains variation in both the timing of migration and the size of refugee populations fleeing violence.

Counterinsurgent regimes have both the opportunity and incentives to manipulate migration in civil conflict. My model shows governments may rely on forced resettlement when the portion of citizens who migrate would otherwise be high. Alternatively, counterinsurgent violence indirectly, and perhaps incidentally, induces migration by changing citizens' opportunity cost of fleeing. This can increase the government's reliance on forced resettlement as a tool to redistribute the population between economic sectors. Moreover, I show this incentive persists when the government

[7] An increase in the capital endowment in the contested sector, K_y, has more ambiguous effects because this increases incentives for government violence while reducing inducing internal displacement incentives. A similar result on increasing forced resettlement holds for some combinations of parameters.

relies on displaced persons camps to trap resettled citizens outside of the regular economy and when the sector controlled by the government becomes more prosperous.

The mechanisms that drive the regime's strategic choices and citizen's migration decisions are present outside the limited context of counterinsurgency in which an insurgent group has some control over territory. For example, my framework suggests how economic factors may have influenced the large of refugees that fled Burundi following a coup attempt in 1993, the majority of whom left before the outbreak of widespread violence (United Nations Security Council 1996). Though there was no clear insurgent group holding territory in Burundi, significant capital flight in years prior to the coup depressed economic opportunities for individuals who chose to stay (Ngaruko & Nkurunziza 2008).[8] Given the poor economic conditions, it is not particularly surprising that Burundians chose to leave when it became clear that reprisals would follow the coup attempt. What my framework explains is why more than 70,000 Burundians fled to Rwanda the day of the coup, though violence did not escalate until days later, and why so many others chose to stay (Reuters 1993, Huband 1993). Citizens may have anticipated that clashes between the military and the opposition would worsen their economic situation, triggering a large wave of migration, but following this outflow of refugees, economic prospects would improve, leading many more citizens to remain.

In addition, the economic incentives for displacement explain forcible resettlement outside the context of civil conflict. Displacement of ethnic minorities by successive Iraqi regimes, including the Saddam Hussein regime, from the area around Kirkuk exhibits similar economic motives (Fawcett & Tanner 2002). Displacement allowed for the regime to exercise greater control over oil fields and valuable arable land by encouraging loyal Arab Iraqis to migrate to the Kirkuk region. Though the logic differs slightly from the main model, this forced resettlement served to increase labor force participation by the regime's preferred co-ethnics and allowed the government to extract more oil rents, demonstrating how related economic ends were achieved by similar means.

My framework has two major implications for policymakers: underlying economic factors influence the way in which counterinsurgents displace citizens and improving economic opportunities may not solve the problem of forced displacement. If governments expect an influx of internally displaced citizens fleeing areas of conflict, they may implement forcible resettlement policies to avoid a spike in internal migration and control the movement of non-combatants. If contested areas are particularly valuable economically, or typically support labor-intensive industries like agriculture, governments may restrict citizens movement to ensure a stable labor supply. Finally, aid to the government, particularly aid intended to improve economic opportunities for those fleeing conflict or to support development in areas under government control, may exacerbate government's incentives to effectuate forced displacement by increasing internal migration.

[8]From 1985 to 1992, the year prior to the conflict, capital flight represented 30% of government total revenue.

Development initiatives or other forms of investment made equally across regions and economic sectors may avoid labor and resource distribution problems, lessening incentives for forced relocation.

CHAPTER 4

Targeting Lives and Livelihoods in Civil Conflict

4.1 Introduction

The consequences of civil conflict follow an established pattern of tragic loss of life, destruction of property and industry, and setbacks to economic development (Collier, Elliott, Hegre, Hoeffler, Reynal-Querol & Sambanis 2003). Across civil conflicts, there is considerable variation in the extent to which these consequences are realized, including the scope and scale of violence against non-combatants and destruction of natural and produced capital. While a substantial body of research has explained why combatants perpetrate violence against citizens[1], the destruction of physical assets is often discussed as a byproduct of armed group's efforts to target their opponents. Yet the deliberate targeting of non-military capital is a regular feature of civil conflict, including governments spraying herbicides to destroy coca fields in Colombia (González & Lopez 2007) and poppy fields in Afghanistan (Blanchard 2009), armed groups killing cattle in Mozambique (Brück 2003), and the widespread destruction of industrial capacity in Tajikistan (Vassiliev 2013).

Why do some combatants, whether government forces or insurgents, direct violence against physical capital, particularly when other tactics and targets are available to them? Specifically, what motivates the destruction of natural and produced capital that is used to support non-military economic activity, either instead of or in addition to violence directed against an opponent and its supporters? Because the deliberate destruction of capital has long-run economic consequences for the victor, it is counterintuitive for combatants to destroy physical assets unless there is a clear strategic benefit.

I develop a model of civil conflict in which a government and an insurgent group compete for support from citizens, where each side faces a choice of directing violence against non-combatants and destroying natural and produced capital—targeting the lives and livelihoods of individuals who may choose to support the other side. I show that violence against citizens is driven by the zero-sum nature of their support decision. Because citizens take sides, either the government or

[1] See Davenport (2007), Blattman & Miguel (2010), and Valentino (2004) for overviews.

the insurgents will choose to target citizens and deny that support to their opponent. Further, I demonstrate that under many circumstances, targeting physical capital is a substitute for targeting citizens. Destruction of an opponent's capital increases support from citizens without risking costs from backlash against the use of force. However, targeting capital bears a direct effort cost and when this cost is high, violence against citizens increases.

These incentives that lead combatants to destroy capital and direct violence against citizens generate three implications for governments' and insurgent groups' tactical choices, and the consequences of these decisions on citizens support for each side. First, both sides derive greater benefits, typically with fewer costs, from targeting capital than targeting citizens. Second, weaker insurgents often substitute violence against citizens for destruction of capital because they lack the capacity to efficiently target the government's capital stock. In turn, the government increases its efforts to destroy the insurgents' capital and reduces its violence against citizens, which increases support for the government. Third, even when capital targeting is costly for both sides, prompting each to increase its violence against citizens, the government may increase the size of its support base at the expense of the insurgent group, in spite of backlash to this violence.

In my framework, these results are driven by an economic mechanism. Both the government and the insurgents choose to target citizens or capital, aiming to minimize the tax revenue the other is able to collect on economic production in territory it controls. Each side's use of force has two effects: first, it directly reduces the opponent's revenues by reducing productive capacity and second, by eliminating their opponent's pool of resources violence minimizes the benefits each side can offer to citizens that form its base of support. This indirect effect on citizens can generate not only losses for the opponent but gains in support for the side less affected by violence. Citizens face a choice of which side to support, and this choice shapes both combatants' strategies. Both the government and the insurgents prefer to avoid backlash against their use of force, which drives citizens to support their opponent.

To demonstrate the incentives for, and effects of, destroying capital, I first consider a benchmark conflict context in which violence is effectively costless. In the absence of constraints, both the government and the insurgent group employ extreme levels of violence, and in particular destroy as much of their opponent's capital as possible. In addition, the side less favored by citizens will choose a total war strategy, targeting capital and citizens to deny support to its opponent. I then consider a more realistic conflict context by introducing two types of constraints. Both sides face a resource constraint that increases the cost of destroying capital and a backlash constraint, which represents a decrease in citizens' willingness to support a side that employs violence against non-combatants. Under these constraints, violence against citizens and destruction of capital are substitutes. As the cost of targeting capital increases, despite backlash in response to violence against citizens, it is the resource constraint that binds. Each side may accept some reduction in

support, resulting both from backlash and violence itself, in order to deny supporters to its opponent.

However, if the cost of capital targeting increases for only one side of the conflict, the effect on tactical choices is more complex. For instance, if the cost of destroying the government's capital stock increases for the insurgent group, the insurgents will substitute violence against the government's supporters. The government's forces will, in turn, increase their targeting of the insurgent group's capital and reduce the level of violence against citizens. The inverse shift in insurgent and government tactics is driven by the backlash constraint. In the event the government suffers fewer costs from targeting capital relative to the insurgents, it will reduce violence against citizens which, combined with the increase in the level of violence against citizens perpetrated by the insurgents, increases backlash against insurgent violence and prompts more citizens to support the government.

The way citizens respond to violence by both the government and insurgents ultimately determines which side earns support from a larger share of citizens. I show that even when backlash against government violence increases more swiftly than backlash against insurgent violence, a larger proportion of citizens may choose to support the regime. When the marginal effect of backlash against government violence is decreasing as insurgents also increase their violence, more citizens support the government.

Two key features of the framework underly the government and insurgent groups' tactical choices. First, the government has inherent advantages that make the resource constraint less pressing. I assume the regime has a larger initial stock of capital than the insurgent group, giving the government a resource advantage from the outset. Further, the government destroys capital more effectively than the insurgent group. This implies that if the government and the insurgent group chose the same level of capital targeting, the government would destroy more of the insurgents' capital, exacerbating the insurgents' resource disadvantage. Second, citizens' support is effectively zero-sum. Because citizens must choose to support either the government or the insurgent group, any increase in support for the insurgent group means an equivalent loss in support for the government. This in part leads the combatants to target citizens because, while violence against non-combatants reduces potential support for one side, it also implies fewer citizens can support the other side.

The remainder of the article proceeds as follows, first I review the literature on tactical decision making in civil conflict and violence against citizens. Then I present my theoretical framework and offer some comments on some of the features of the model. Next, I consider a benchmark model in which neither the government nor the insurgent group faces any constraints on targeting citizens or destroying capital. Having established this baseline, I introduce the resource and backlash constraints and describe how these constraints change both the government's and insurgents' tactics.

The final section concludes.

4.2 Military Tactics & the Economics of Conflict

Military tactics are a well-studied aspect of civil conflict (e.g. Nagl 1999, 3-24 2006). Insurgent tactics and government tactics are typically considered separately, their difference arguably driven by the disproportionate resources behind government efforts. Weaker insurgents adopt guerrilla or terror tactics, which allow them to contest state authority without the force or firepower typically possessed by governments (Fearon & Laitin 2003, Polo & Gleditsch 2016). These tactical choices, however, are not independent of government counterinsurgency strategies (Cunningham, Skrede Gleditsch & Salehyan 2009). Insurgent groups may choose to use terror tactics in an effort to avoid significant retaliation by governments, or strategically adopt guerrilla tactics in an effort to provoke a forceful response that creates grievances among citizens (Carter 2016). The tactics adopted by combatants in civil conflict shape outcomes—both for how conflict ends and for post-conflict peace (Balcells & Kalyvas 2014, Fortna 2015).

A significant body of research seeks to explain how governments and insurgents select targets of violence (Lyall & Wilson 2009, Blattman & Miguel 2010, Kalyvas & Balcells 2010). I contribute to the literature on when and why combatants target their opponent's support base and resources—perpetrating violence against citizens or natural and produced capital. Current explanations for violence against citizens suggest that when combatants lack the information necessary to selectively punish opponents, they may substitute indiscriminate violence for intelligence (Kalyvas 2006, Toft & Zhukov 2012) or use violence indiscriminately in response to poor battlefield outcomes (Valentino, Huth & Balch-Lindsay 2004, Pape 2006, Eck & Hultman 2007, Downes 2008). Indiscriminate violence against civilians and deliberate destruction of capital are often linked (Lyall 2009, Kocher, Pepinsky & Kalyvas 2011, Dell & Querubin 2018). Widespread targeting of natural and produced capital is often described as a hallmark of 'scorched earth' tactics (Valentino 2004, Downes 2007) or of efforts to force migration (Adhikari 2012, Sun 2020*a*). I offer a novel mechanism that explains violence and destruction of capital by linking economic activity and the willingness of citizens' to support each side of a civil conflict.

The effects of economic incentives on both government and insurgent violence has been studied in a number of contexts. Negative economic shocks to labor-intensive industries and positive shocks to capital-intensive sectors are shown to increase repression (Dal Bó & Dal Bó 2011, Dube & Vargas 2013). Shocks that increase government revenues are shown to hasten the end, and reduce the lethality of civil conflicts, in part by increasing governments' capacity as counterinsurgents (Bazzi & Blattman 2014). My model considers a different type of economic incentive for combatants. Rather than consider the effect of a shock to prices, technology, or revenue, I show

that economic performance endogenously affects tactical selection through the linkage between violence and citizens' labor force participation.

A unique feature of civil conflict is that both the government and insurgents compete over the same pool of resources, namely the citizens that can support either side (Castanheira & Tyson 2017). My framework formalizes this competition and the ways in which each side chooses its strategy to gain citizens' support. Civilian support for insurgent groups increases their odds of winning civil conflicts and gaining concessions from regimes (Arreguín-Toft 2001, Wimmer, Cederman & Min 2009, Wucherpfennig, Metternich, Cederman & Gleditsch 2012). As such, insurgent groups may try to win support of citizens by offering economic incentives (Weinstein 2005, Collier, Hoeffler & Rohner 2009) or through coercion and punishment of citizens who provide intelligence to the government (Kalyvas 1999, Rueda 2017). Support for the government may increase because insurgents fail to protect their supporters (Kalyvas 2006, 167) or the regime takes steps to 'win hearts and minds,' like providing public goods (Berman, Shapiro & Felter 2011) or direct cash transfers (Crost, Felter & Johnston 2016).

The driving force behind citizens decisions in my framework is opportunity cost. Citizens choose the support the side whose associated economy offers better prospects. The opportunity cost mechanism has previously been used to explain conflict incidence (Becker 1968, Grossman 1991), support for insurgents (Collier & Hoeffler 1998, Collier & Hoeffler 2004, Chassang & Padro-i Miquel 2009), and government violence (Esteban, Morelli & Rohner 2015, Sun 2019). Similar to Bueno de Mesquita (2013), I study how endogenous tactical choices are influenced by the opportunity cost for citizens of supporting insurgents (or the government). However, I additionally incorporate an endogenous tactical choice for government forces. This allows me to assess how opportunity cost for citizens is shaped by the strategies of both sides of conflict.

4.3 Model

I develop a model of insurgent and government tactics in civil conflict. Both combatants can choose to target their opponent's resources—natural and produced capital—or supporters. In the baseline model, each side chooses its optimal tactics aiming only to defeat the other, leading to high levels of violence and destruction of capital. I then extend the model to demonstrate how additional strategic considerations moderate the strategies chosen by both the government and insurgents.

The timing of the model is as follows: (1) the insurgent group chooses a level of violence against citizens and capital destruction, and attacks the government, (2) the government, in response to insurgent violence, uses force to retaliate, its decision also comprising levels of violence against citizens and capital destruction, (3) citizens choose whether to support the insurgent group or the government and markets clear, (4) payoffs are received.

4.3.1 Citizens

At the outset of the game, there is a unit mass of citizens normalized to 1 prior to any government or insurgent violence. Each citizen is endowed by Nature with a preference for the insurgent group, θ_i, distributed uniformly from $[0, 1]$. Higher values of θ indicate a greater willingness to support the insurgent group and may represent, for example, ethnic or class-based ties to the insurgents or dissatisfaction with the regime.[2] I denote the decision to support the insurgent group as $s_i = 0$, while $s_i = 1$ implies an individual supports the government. Supporters of the government participate in an economy that is affiliated with and provides benefits to the regime, while insurgent supporters participate in the insurgent economy, detailed below.

The support choices generate a cutoff in θ that represents both government and insurgent support, where the proportion of citizens who support the government is represented by $\lambda = \int_0^1 s_i di$ and the insurgents' support is $(1 - \lambda)$. Citizens receive benefits from either the government or the insurgent group, whichever side they support, which in my model are derived from consumption goods produced in the respective economies. A citizen's individual utility is represented by $u(c)$, where utility is a strictly increasing, strictly concave function of consumption.

4.3.2 Combatants

An insurgent group, denoted by R, rebels against a government, denoted by G. The two sides then wage a civil conflict, their tactics chosen to defeat their opponent. The government and insurgent group can choose to employ one, or both, of two tactics, using force against citizens or destroying capital. Each side's military strategy comprises a level of violence against citizens, $v_j \in [0, 1]$, and a level of destruction of natural and produced capital, $d_j \in [0, 1]$. Violence against citizens can represent lethal force, detention, or forced migration, and is used by each side to prevent citizens from providing support to its opponent. Though citizens choose which side's affiliated economy to supply labor to, the labor pool is a shared resource between the combatants. Violence against citizens, by either combatant, reduces the common labor pool evenly and indiscriminately, with no anticipation of which side any affected citizens would have chosen to work for.

Destruction of capital reduces the size of a capital stock K_j for $j \in \{R, G\}$ possessed by each combatant. Unlike violence against citizens, destruction of capital is targeted and only affects the opponents capital supply. The government and insurgents are equally capable of employing violence against citizens, but their destructive efforts are not equally effective. Reflective of the government's military advantage relative to the insurgents, the insurgents capital stock following the regime's use of force is $K_R e^{-\delta d_G}$ for $\delta \geq 1$, where $K_R(1 - e^{-\delta d_G})$ of the insurgent endow-

[2] Inclination for the insurgents can be considered a commonly known type for each individual. Conceiving of θ_i as a privately known type requires Bayesian perfection as a solution concept but does not alter the results.

ment is destroyed, while the government's remaining supply of capital following the insurgents' destructive effort is $K_G e^{-d_R}$ and $K_G(1-e^{-d_R})$ of the government's endowment is destroyed. Both the government and the insurgents seek to minimize the other's tax revenue, which by extension minimizes the benefits their opponent can offer to citizens. Both sides choose tactics to defeat the other by depleting their opponent's resources.

4.3.3 Production and Consumption

The government and the insurgent group are each affiliated with an economy, which produces goods using an endowment of capital and labor supplied by supporters. Each sides' supporters receive benefits in the form of wages and consumption goods, while the government and the insurgent group extract tax revenue from their respective economies, represented by t_j for $j \in \{G, R\}$. The government and insurgent economies each consist of a labor market, production technology, and a goods market, and are assumed to be relatively small and closed with full employment. The economies are characterized by the Cobb-Douglas production technology $Y^j(K_j, L_j) = K_j^\alpha L_j^\beta$, which produces a single good, y_j, using the capital endowment, K_j, and labor, L_j, with output elasticities α and β such that $\alpha + \beta \leq 1$, i.e. returns to scale are weakly decreasing.[3] The government and insurgent group's tax revenue is given by $t_j Y^j(K_j, L_j)$, thus each collects an excise tax on the output produced in the economy.

In each of the government and insurgent economies, labor is demanded at a rate $L_j^\dagger$, and representative firms hire citizens to produce goods via the production technology such that $L_G + L_R \leq 1$.[4] Firms are price takers and production sets are closed, non-empty, and satisfy free-disposal such that aggregate production is captured by the representative producers in each sector (Mas-Colell, Whinston & Green 1995, 147-149). Wages paid to individuals who supply labor to the economy are given by $w(L_j)$, where $w(\cdot)$ is the marginal product of labor and is strictly decreasing in L_j and strictly increasing in K_j. The initial capital endowment in the insurgent-affiliated economy is given by K_R and the government-affiliated economy's initial capital endowment is given by K_G. Both endowments are fixed at the beginning of the game. To reflect the government's strength relative to the insurgents, $K_G \geq K_R \geq 1$. Wages, the supply of goods, and prices for those goods in each economy are determined endogenously for a given capital endowment, production technology, and labor pool of supporters.

Individuals who participate in either the government or insurgent economy have a consumption budget $w(L_j) \geq p_j \cdot c_j$ for $j \in \{G, R\}$, such that the amount consumed of good y_j for a given price

[3] Generalizing the production technology makes the formal results more ambiguous, though all results presented in the text hold for some range of parameters.

[4] These firm are strategic actors in that they are optimizing profits given all other players' strategic decisions, but otherwise have no effect on the combatants' chosen levels of violence and the citizens' decisions.

p_j cannot exceed their wage. Citizens consume goods such that supply and demand for goods are equal.

Lemma 4.1 *Market clearing is characterized by:*

1. *Optimal labor force participation:* λ^* *and* $1-\lambda^*$
2. *Profit maximization:* $w_j^* = p_j \cdot Y_L^j(L_j^\dagger)$ *for* $j \in \{G, R\}$
3. *Labor supplied equals labor demanded:* $L_G^\dagger = (1-v_G)(1-v_R)\lambda^*$ *and* $L_R^\dagger = (1-v_G)(1-v_R)(1-\lambda^*)$
4. *Goods supplied equal goods demanded:* $p_j^*(1-t_j)Y^j(L_j^\dagger) = c_j^*$,

which must hold for both the government-affiliated economy and insurgent-affiliated economy.

Proof of this lemma, and proofs for all other results, are in the appendix.

4.3.4 Equilibrium

The solution concept is subgame perfect Nash equilibrium. An equilibrium to the model has four components. First, market clearing conditions as defined in Lemma 4.1 must hold for the government economy and the insurgent economy, each characterized by the triple $\Big(w_j^*(d_G, d_R, v_G, v_R), c_j^*(d_G, d_R, v_G, v_R), p_j^*(d_G, d_R, v_G, v_R)\Big)$. Wages and goods consumed in both economies depend on both insurgent and government violence and destruction of capital.

Second, the citizens strategy is given by θ^*, which is a cutoff strategy in θ that determines the portion of citizens in each economy. Given the government's and insurgent's tactics, a citizen's expected utility is

$$U(s_i, \theta_i) = s_i\Big((1-v_G)(1-v_R)u(c_G) - b(v_G, v_R)\Big) + (1-s_i)\Big((1-v_G)(1-v_R)u(c_R) + b(v_G, v_R)\theta_i\Big), \tag{4.1}$$

where citizens who are the victims of either government or insurgent violence have payoffs normalized to 0, and violence by both sides affects citizens at random. The function $b(\cdot)$ represents backlash, which changes the willingness of citizens to support each side in response to violence against citizens. Therefore, $b(\cdot)$ is strictly increasing and concave in v_G, such that higher levels of government violence against citizens increase the benefit for individuals of supporting the insurgent group. Conversely, $b(\cdot)$ is strictly decreasing and convex in v_R.[5] Backlash against government violence decreases the payoff for an individual who supports the government while backlash against the insurgent group increase the benefit of supporting the regime (the direction of the

[5] I make no assumptions on the cross-partial $\frac{\partial^2 b}{\partial v_G \partial v_R}$.

backlash effect is the opposite for insurgent supporters). The effect of backlash on an individual citizen's support decision is scaled by their type, so the backlash effect is stronger for citizens' with more affinity for the insurgent group and backlash against the insurgent group disproportionately decreases for individuals already inclined to support the insurgency.

Citizens' choices determine the labor supply for the government, $L_G = (1 - v_G)(1 - v_R)\lambda$, and the labor supply for the insurgent group, $L_R = (1 - v_G)(1 - v_R)(1 - \lambda)$. The marginal type indifferent between supplying labor to the government and the insurgent group solves

$$\underbrace{(1 - v_G)(1 - v_R)u(c_G) - b(v_G, v_R)}_{\text{government incentives}} = \underbrace{(1 - v_G)(1 - v_R)u(c_R) + b(v_G, v_R)\theta_i}_{\text{insurgent incentives}}.$$

Third, the government chooses violence against citizens and destruction of capital that solve,

$$\min_{d_G, v_G} \; t_R\left(\left(K_R e^{-\delta d_G}\right)^{\alpha}\left((1 - v_G)(1 - v_R)(1 - \lambda^*)\right)^{\beta}\right) + z(d_G), \tag{4.2}$$

where $z(\cdot)$ is a strictly increasing, strictly concave function that captures the cost of destroying insurgent capital. This cost may represent the cost of acquiring more sophisticated weaponry like artillery, costs for specialized training like bombmaking, or reputational costs the government may face for targeting the insurgent group's capital stock. Finally, the insurgent group chooses violence against government supporters and destruction of capital that solve,

$$\min_{d_R, v_R} \; t_G\left(\left(K_G e^{-d_R}\right)^{\alpha}\left((1 - v_G^*)(1 - v_R)\lambda^*\right)^{\beta}\right) + \zeta(d_R), \tag{4.3}$$

where $\zeta(\cdot)$ is a strictly increasing, strictly concave function that captures the cost of destroying the government's capital.

4.4 Comments on the Model

Before proceeding, I offer comments on a few features and assumptions of the model. First, it is important to emphasize that this model's aim is to offer an explanation of observed phenomena– violence against citizens and destruction of capital perpetrated both by government forces and insurgent groups. It is not a prescriptive theory of insurgency or counterinsurgency.

Economy: The economy in the model represents the benefits citizens provide to combatants, through supplying their labor and fueling production, which is taxed, and the benefits the government and insurgents offer to citizens, through consumption goods. Both the government and the insurgents value economic output because a strong economy implies they are better able to attract supporters and are better able to sustain themselves by increasing tax revenues (Londregan

& Poole 1990, O'Kane 1993, Marinov 2005, Weinstein 2007, Miller 2012). Moreover, weakening the opponent's economy leads to an increase in citizen support. For example, if the government is unable to offer citizens opportunities to meet their material needs, the opportunity cost for citizens for joining the insurgent group is reduced and insurgent participation may increase (Collier & Hoeffler 2004, Bueno De Mesquita 2005, Collier, Hoeffler & Rohner 2009).

However, the economy and its outputs need not be interpreted literally. The role the economy plays in the model is to represent how economic concerns affect the tactical decisions of a government and insurgent group engaged in civil conflict. Given this focus, the economies are simplified such that representative firms produce goods y_G and y_R in competitive markets, where equilibrium production ($y_G(p_G^*)$ and $y_R(p_R^*)$) in each economy represents the aggregate supply correspondence for firms. The parsimonious partial equilibrium framework with aggregate production has a number of substantively useful features, including that benefits—wages—increase if the combatants are endowed with more resources and decrease when more citizens participated in a given labor market, while abstracting from additional economic factors that less directly affect the combatants' tactical decisions.

Sequence of Play: The insurgent group chooses its level of capital destruction and violence against citizens first, and the government's tactical choice follows, to reflect that in many civil conflict circumstances, the type of violence captured in my framework is initiated by an insurgent group making its presence and strength known by attacking the government (Davenport 1995). While repression by the government may precede and foster the formation of the insurgent group, this initial stage is outside the scope of the model (on the repression-dissent nexus see, e.g. Lichbach 1987, Moore 1998). Moreover, this model captures the underlying economic mechanisms that influence tactical decision making, and does not capture how combatants' strategies may evolve across repeated interactions (for tactical decision making in a dynamic setting see, e.g. Smith 1998, Bueno de Mesquita 2013, Gibilisco 2018).

Tax Revenue: The excise tax collected by both the government and the insurgent group on goods produced in their respective economies can represent taxes collected from business through legal of extralegal means. For example, this tax may capture revenue generated by extortion. I rely on this excise tax because it is reasonable to assume that both a government and insurgent group can extract some kind of tax on production regardless of what good is being produced, whether through systematic, nationalized tax collection or thorough protection rackets or bribery schemes. However, it is less likely that both groups could, for example, collect income tax if the goods being produced are illicit and thus the economy in the model represents a black market.

Capital Targeting: Capital destruction is represented by an exponential decay function of the form $e^{-\delta d_j}$ where δ is the exponential decay constant. The difference in exponential decay constants, $\delta = 1$ for the insurgent group and $\delta \geq 1$ for the government, reflects a military advantage

for the government. Generally, government forces are more capable and have additional resources than insurgents. This additional capacity is assumed to result in more insurgent capital destroyed for a given level of d_G than would be feasible for the insurgent group at an equivalent level d_R. I employ the exponential decay function for its familiarity and ease of technical use, though it is possible to generalize to any functional form with decreasing returns to capital destruction.[6]

I assume the capital stocks in the economies affiliated with both combatants are fixed at the outset of the game and neither side is able to increase its capital stock through investment or foreign assistance. These assumptions highlight that while the economies provide benefits to supporters of each side of the conflict, the combatants themselves do not control the markets and instead collect tax revenue on production by independent firms. In the supplemental appendix, I consider an exogenous increases in the insurgent group's capital stock, which may represent foreign assistance, and show that this increase can have negligible effects on citizens' support for the group and can either increase or decrease the government's level of capital targeting.

Finally, only violence against citizens elicits a backlash response in my framework. However, in some cases destruction of capital triggers backlash. For example, U.S. led poppy eradication efforts in Afghanistan are linked with an increase in support for the Taliban, with citizens turning to the Taliban to protect their remaining fields instead of supporting the Afghan government when their livelihoods were threatened (Felbab-Brown 2009). This is a clear scope condition for the model, though the results below hold if this backlash is smaller than the direct effect of capital destruction. For example, if backlash against capital destruction leads some citizens to support the insurgent group because they are angered by the destruction of property, but more citizens lose their livelihoods and reject the insurgents, then the government still benefits from destroying capital.

4.5 Waging Civil Conflict

To explicate the implications of combatants targeting citizens lives and livelihoods, and the effects of economic concerns on government and insurgent tactics, I first establish how citizens decide which side of the conflict to support. The citizens make this choice after the realization of both insurgent and government violence, and thus I consider their decision first.

The marginal citizen indifferent between supporting the government and the insurgent group represents the relative level of support for each side of the conflict. All citizens who value the potential benefits from the insurgents less than this individual choose to support the government, which in my framework implies supplying labor to the government-affiliated economy, and all citizens who value benefits from the insurgents more support the insurgent group. The marginal

[6]For example, exponential decay is sometimes used to represent depreciation, or wear and tear, of physical capital.

citizen has a type θ^* that solves Equation (4.1). Since by Lemma 4.1, the real wage can be substituted for consumption in the citizen's expected utility, the marginal citizen's type is

$$\theta^* = \frac{(1-v_G)(1-v_R)\big(u((1-t_G)Y_L^G) - u((1-t_R)Y_L^R)\big)}{b(v_G, v_R)} - 1, \tag{4.4}$$

where Y_L^j represents the marginal product of labor. Citizens' choices are influenced by two factors, economic incentives and their affinity for the insurgent group. It is not necessarily the case that citizens whose type falls below θ^*, and who therefore choose to participate in the government-affiliated economy, 'like' the regime. If wages offered in the government economy are high enough, many citizens with high θ_i may choose the government's side, even though they have relatively high affinity for the insurgent group. Economic opportunity can trump ideology for all but the most ardent insurgent supporters, and support for each side reflects a combination of opportunistic and ideological support.

The individual with the marginal type given by Equation (4.4) characterizes the unique equilibrium labor force participation rate for each economy. Given that the citizens' affinity for the insurgent group is distributed uniformly over $[0, 1]$, the labor force participation rate is equivalent to (4.4) and $\theta^* = \lambda^*$. Thus, the citizens' strategy can also be characterized by the equilibrium labor force participation rate.

Lemma 4.2 *For fixed levels of destruction of capital, d_G and d_R, and fixed levels of violence against citizens, v_G and v_R, the marginal citizen θ^* is characterized by a unique $\lambda^*(d_G, d_R, v_G, v_R)$, the equilibrium labor force participation rate.*

The government and insurgents both account for this labor force participation rate when choosing their military tactics, and influence the citizens' willingness to support each side through their use of force. Both the government and insurgent group value citizens' support because increasing the size of the labor force in their affiliated economies increases production, which allows them to collect more tax revenue. Proceeding backwards to the government's decision, the government's aim is to minimize tax revenue collected by the insurgent group. This serves the dual purpose of defeating the opponent by reducing the insurgents' resources and, in turn, increasing the proportion of citizens who will choose to support the government.

Recall the government's problem given by (4.2). Before assessing the government's optimal choice of violence against citizens and destruction of capital, it is important to note that the regime will never choose to use violence at a level so high that it targets all the citizens. Formally, the regime will not choose $v_G = 1$ because doing so would imply eliminating its own potential labor

force. The optimal levels of capital destruction and violence against citizens solve, respectively,

$$t_R\Big(Y_K^R\Big(-\delta K_R e^{-d_G}\Big) - Y_L^R\Big((1-v_G)(1-v_R)\frac{\partial\lambda^*}{\partial d_G}\Big)\Big) + z'(d_G) = 0,$$
$$t_R\Big(Y_L^R\Big(-(1-v_R)(1-\lambda^*) - (1-v_G)(1-v_R)\frac{\partial\lambda^*}{\partial v_G}\Big)\Big) = 0.$$

The insurgent group is the first to use violence against the government and its supporters. Having characterized the citizens' support decision and the government's strategy we can proceed to consider the insurgents' choice of tactics. Like the government, the insurgents' aim is to minimize government tax revenue. Reducing the government's resources also has an indirect benefit for the insurgents of making citizens more willing to support their side of the conflict. The insurgent's problem is given by (4.3). As is the case for the government, the insurgents also do not want to choose a level of violence against citizens that is so high, there are no citizens remaining to support them. The insurgent's chosen levels of capital destruction and violence against citizens solve, respectively

$$t_G\Big(Y_K^G\Big(-K_G e^{-d_R}\Big) + Y_L^G\Big((1-v_G^*)(1-v_R)\frac{\partial\lambda^*}{\partial d_R}\Big)\Big) + \zeta'(d_R) = 0$$
$$t_G\Big(Y_L^G\Big(-(1-v_G^*)\lambda^* + (1-v_G^*)(1-v_R)\frac{\partial\lambda^*}{\partial v_R}\Big)\Big) = 0$$

Having characterized the citizen's, government's, and insurgent group's decisions, I proceed to consider first a benchmark in which neither the government nor the insurgent group faces a backlash constraint and pays no cost for destroying their opponent's capital. Then, I contrast the chosen levels of violence against citizens and destruction of capital when these constraints on the use of force bind for both the government and insurgents.

4.5.1 Benchmark: Unconstrained Combatants

In this benchmark, neither the government nor the insurgents are subject to either the backlash constraint or the resource constraint imposed by the cost functions $z(\cdot)$ and $\zeta(\cdot)$ that limit capital targeting. This represents a conflict context in which violence has virtually no consequences for combatants. Despite the fact that each actor faces no explicit cost for employing violence against citizens or destroying capital, one side of the conflict will choose to restrain its violence to ensure a sufficiently large labor pool such that it is able to reap the benefits of collecting tax revenue. By contrast, the other side chooses extremely high levels of violence to deny its opponent these economic benefits. To see why this is the case, consider the insurgents' objective in this benchmark

(the government's objective is defined analogously), given by

$$\max_{d_R, v_R} \; t_G\Bigg(\Big(K_G e^{-d_R}\Big)^{\alpha}\Big((1-v_G)(1-v_R)\tilde{\lambda}\Big)^{\beta}\Bigg),$$

where $\tilde{\lambda}$ denotes the proportion of citizens who support the government in the benchmark.

Notice the production function, and by extension tax revenue, is strictly decreasing in d_R while production may be increasing or decreasing in both v_G and v_R. This implies that the government and the insurgent group have strong incentives to choose $d_j = 1$ while neither will choose a comparably high level of violence against citizens. Both sides' optimal strategy involves more destruction of capital than use of lethal force. Destruction of the government's capital endowment has no negative direct effect on the insurgent group and has a positive indirect effect through its influence on wages offered to potential supporters (and vice versa for the government). Reducing the government's capital stock reduces wages in the government-affiliated economy and as a consequence increases the wage differential between the government and insurgent economy. Since production in both economies is strictly decreasing in destruction of capital, without constraints then both the insurgents and government choose the maximum level of capital destruction.

Tax revenue for the insurgents and government may be increasing or decreasing in the level of violence against citizens chosen by the other side. Using the first order conditions for violence against opponent supporters, the optimal levels of violence for the government and insurgents, respectively, are

$$\tilde{v}_G = \frac{(1-\tilde{\lambda})}{\left(\frac{\partial\tilde{\lambda}}{\partial v_G}\right)} + 1 \qquad\qquad \tilde{v}_R = 1 - \frac{\tilde{\lambda}}{\left(\frac{\partial\tilde{\lambda}}{\partial v_R}\right)}. \tag{4.5}$$

The optimal choice of violence against citizens depends on the downstream effect of violence on labor force participation. The effects of both violence by the government and violence by the insurgents have the same direction—regardless of the perpetrator, violence reduces the size of the potential labor pool by preventing some portion of the citizenry from supporting any side. Thus, violence either changes citizens' incentives to favor the government or the insurgents and cannot benefit both. Because the effect of violence against citizens is, in this way, zero-sum, the sign of these labor force participation effects also determine which side chooses a higher level of violence against the other's supporters.

Formally, if $\frac{\partial\tilde{\lambda}}{\partial v_G} > 0$ and $\frac{\partial\tilde{\lambda}}{\partial v_R} > 0$, then $v_G \geq v_R$. If support for the government ($\tilde{\lambda}$) is increasing in both government and insurgent violence, the government will choose a higher level of violence against citizens. Doing so minimizes the insurgent group's tax revenue by dramatically shrinking the potential labor pool. Citizens who are not victims of violence are increasingly likely

to support the government, but this effect is conditional on the government's labor force being sufficiently small. If the potential labor pool is large enough, wages in the government-affiliated economy will decline and some citizens will switch to support the insurgent group. The government chooses an extreme level of violence to minimize this possibility, and deny support to the insurgents. The insurgent group, on the other hand, chooses a lower level of violence, aiming to reduce the potential labor pool for the government while maintaining a sufficiently large citizen population to ensure some level of support. Thus, because one only one side benefits from the downstream effects of violence against citizens on labor force participation, without any constraints on violence the disadvantaged side moderates its own use of violence against citizens.

Proposition 4.1 *In any equilibrium without constraints, both the government and the insurgents choose* $\tilde{d}_G = \tilde{d}_R = 1$ *and either the government chooses* $\tilde{v}_G \approx 1$ *or the insurgent group chooses* $\tilde{v}_R \approx 1$*, with* $\tilde{v}_R \leq \tilde{v}_G \approx 1$ *if* $\frac{\partial \tilde{\lambda}}{\partial v_G} > 0$ *and* $\frac{\partial \tilde{\lambda}}{\partial v_R} > 0$*.*

This result highlights that either the government or insurgents' optimal tactics always approach a corner solution $(\tilde{d}_j, \tilde{v}_j) = (1, 1)$.[7] The side that will not benefit from downstream wage effects prefers to reduce the size of the potential labor pool for both sides as much as possible. The beneficiary of the wage effects (determined by the sign of $\frac{\partial \tilde{\lambda}}{\partial v_j}$) will choose a lower level of violence in an effort to ensure more citizens remain in the potential labor pool.

To illustrate, consider the wage effects when citizens utility is linear in consumption.[8] In this case, support for the government is always increasing in levels of violence against citizens chosen by both sides, i.e. $\frac{\partial \tilde{\lambda}}{\partial v_j} > 0$, and thus the government chooses the corner solution. The insurgent group's problem may be increasing or decreasing in its chosen level of violence. This implies that in some cases, the insurgents will also choose a corner solution while otherwise choosing a level of violence significantly lower than the government's. Figure 4.1 shows the level of violence against citizens, $\tilde{v}_R$, chosen by the insurgents and proportion of citizens that support the government, $\tilde{\lambda}$, for varying levels of the insurgents' initial capital endowment. This figure illustrates three key aspects of the benchmark result. First, support for the government is very high as shown by the dashed lines. Because supporting the government becomes marginally more appealing as both the government and insurgent group choose higher levels of violence, nearly all citizens will choose to participate in the government-affiliated economy. Second, again illustrated by the dashed lines, support for the government decreases as the size of the insurgents' initial capital stock approaches the government's initial capital stock. Thus, even with extreme violence and destruction of capital, citizens still respond to market forces and are marginally more supportive

[7] Neither will choose $\tilde{v}_j = 1$ because this pushes wages to infinity.

[8] This example is particularly simplistic but lends itself to easy computational analysis. I provide an additional example with log-utility in the appendix.

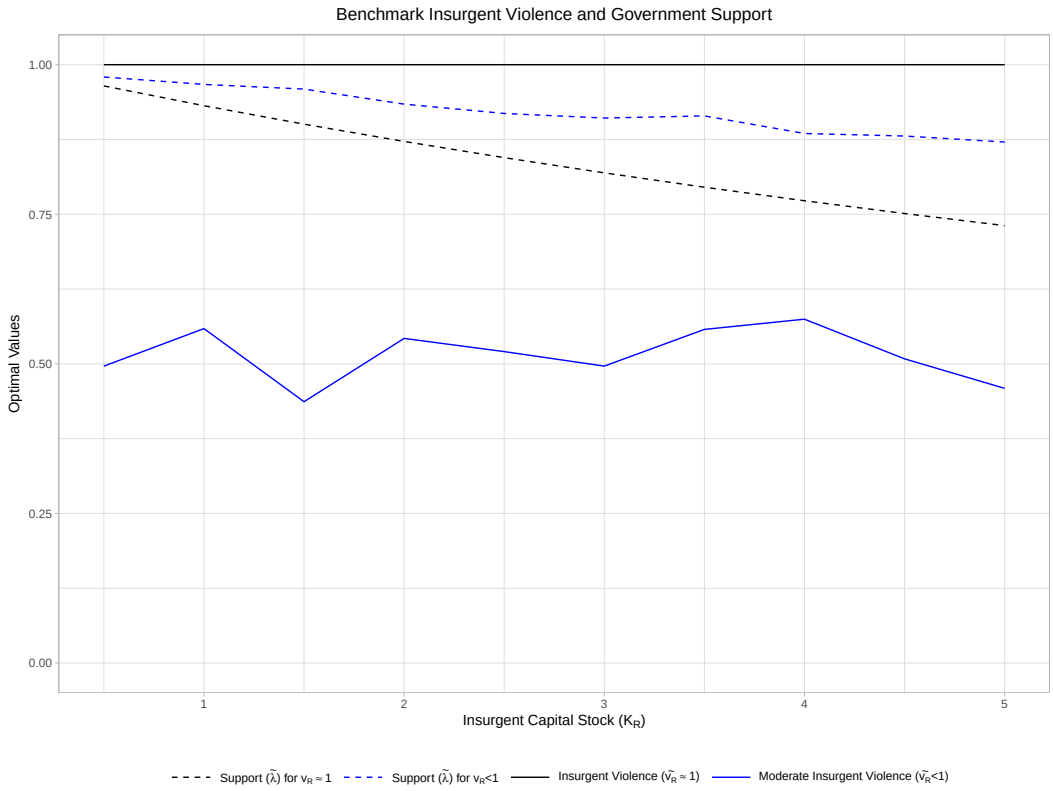

Figure 4.1: The black lines correspond to the case where $\tilde{v_R} \approx 1$ and the blue lines correspond the case where $\tilde{v_R} < 1$. The solid lines represent the Insurgent's optimal level of violence while the dashed lines give the corresponding support for the government, $\tilde{\lambda}$, for each case.
For this illustration I assume that returns to scale parameters $\alpha = \beta = \frac{1}{2}$, the decay constant for government destruction of capital is $\delta = 2$, the tax rate for both sides is $t_j = 0.1$, and the government's capital stock is initially $K_G = 5$.

of the insurgent group when a larger capital supply reduces the wage differential between the government and insurgent group. Third, when government tax revenue is increasing in insurgent violence, the level of violence chosen by the group is far from $\tilde{v}_G \approx 1$. This is represented by the solid blue line. Though the insurgent group faces no explicit constraints on its chosen level of violence against citizens, the insurgents' choose to moderate their use of force because doing so is the only way to marginally increase support from citizens in the face of massive government violence.

To summarize, the government and insurgent group's choices of tactics are largely determined by their downstream effects on the citizens' support decision. Destroying the opponent's capital directly increases the wage differential that drives citizens' choice, while violence against citizens directly reduces the potential labor pool for both sides but indirectly benefits whichever side's wages increase more rapidly as the labor pool shrinks. This benchmark demonstrates that because each side is trying to minimize the other's tax revenue without concern for cost or backlash, one side adopts a total war strategy while the other side's choice of violence is more restrained. The incentives for the government and the insurgent group lead both sides to target the other's capital stock indiscriminately, without regard for any downstream consequences on their own productive capacity and tax revenue. Because there is no possibility for one side to take the other's natural and produced capital, and given the zero-sum nature of citizens' support, at least one side is best off by choosing a scorched earth strategy.

4.5.2 Tactical Choice Under Constraints

Having established how, when targeting citizens and destruction of capital is effectively costless, both the government and insurgents may employ extremely destructive strategies, I proceed to characterizing all player's optimal choices under the resource and backlash constraints.

Proposition 4.2 *There exists a subgame perfect Nash equilibrium characterized by the triple* $\big((d_R^*, v_R^*); (d_G^*, v_G^*); \lambda^*\big)$*, where for sufficiently high resource costs, the government and insurgent group choose interior levels of violence and capital destruction,* $(d_j, v_j) \in \big((0,1),(0,1)\big)$*, and* λ^* *represents the unique level of support for the government.*

It is immediately clear that, intuitively, constraints moderate both the government's and insurgents' tactical choices. When targeting capital is costly, neither side is willing to incur the high cost of destroying the other's capital stock entirely. Further, the backlash constraint reduces the level of violence against citizens because, for example, if the government chooses a high level of violence, citizens will shift their support to the insurgent group. Importantly, as was the case in the benchmark, for some parameter ranges both the government and insurgent group prefer to destroy capital rather than target citizens, and doing so more effectively minimizes the other's tax revenue.

What remains to be seen is which constraint 'binds.' Does the backlash constraint reduce the chosen level of violence against citizens more so than the resource constraint lowers the level of capital targeting? Or, do these constraints reduce the use of both types of force simultaneously? To illustrate how the mechanisms that determine the government and insurgent group's tactical choices arise in real-world conflicts, I assess the model's predictions in the context of the civil war in Sri Lanka (1983-2009). Briefly, the Liberation Tigers of Tamil Elam (LTTE) waged a decades-long insurgency against the Sri Lankan government in an effort to create a separate, ethnically-Tamil state. The conflict resulted in substantial loss of life and destruction of property, carried out both by insurgents and the government (Bandara 1997). LTTE collected taxes on commerce in regions under its control and was supported by a base of ethnically-Tamil citizens to whom it provided public goods like education and legal services that helped maintain economic activity (Mampilly 2012, Hashim 2013). Sri Lanka represents a difficult case for my theory because much of the fighting between LTTE and the government was conventional, involving battles over military positions and bases. Thus, demonstrating that the incentives highlighted by my framework persist in this type of conflict context demonstrate their broad applicability.

To understand how backlash and the cost of targeting capital constrain the government and the insurgents, it is important to determine whether these two tactics are substitutes or complements. If they are complements, then both constraints reinforce each other to restrain violence. This would imply that stringent constraints would lead to sharp decreases in both violence against citizens and destruction of capital. Alternatively, if destruction of capital and violence against citizens are substitutes, then increasing one constraint leads to an increase in the other form of violence. Consider, without loss of generality, an increase in the cost of targeting the government's natural and produced capital for the insurgent group, which corresponds to a shift of the function $\zeta(\cdot)$ such that the cost function is more concave. The effect of this change in the resource constraint on the level of violence against citizens chosen by the insurgent group determines whether these two tactics are gross substitutes. By the chain rule, this effect is given by $\frac{dv_R^*}{d\zeta} = \frac{dv_R^*}{dd_R^*}\left(\frac{dd_R}{d\zeta}\right)$.

Because the cost of targeting capital is increasing (i.e. $\zeta'(\cdot) > 0$) and the marginal cost of destroying capital is greater, an increase in cost will decrease the level of capital destruction by the insurgent group. Thus, determining the relationship between the resource constraint and the level of violence against civilians requires establishing whether it is optimal for the insurgent group to choose higher levels of capital destruction and violence at the same time, or trade off these two tactics. Returning to the insurgent's problem, $\frac{dv_R^*}{dd_R^*}$ simplifies to

$$\frac{dv_R^*}{dd_R^*} = (1 - v_R)\frac{\partial^2 \lambda^*}{\partial v_R \partial d_R} - \frac{\partial \lambda^*}{\partial d_R}.$$

Key to understanding the tradeoff between capital destruction and violence against citizens is to establish the combined effect of these tactics on citizens' support for the government, λ^*.

Destroying government capital decreases support for the government and increases support for the insurgent group, but under most circumstances, the marginal effect of capital destruction is decreasing for higher levels of violence against citizens.[9] This implies that violence against citizens and destruction of capital may have countervailing effects on citizens' support decision, and backlash against violence against citizens undoes some of the support the insurgents earn by destroying part of the government's capital stock. Thus, violence against citizens and destruction of capital are gross substitutes.

Proposition 4.3 *As the cost of targeting capital increases, for many combinations of parameters the level of violence against citizens increases. Destruction of capital and violence against citizens are (gross) substitute tactics.*

This substitution effect implies that a shock to the cost of destroying the opponent's capital endowment should lead to a decrease in capital targeting and increase in violence against citizens. For example, in July 2001 LTTE carried out a notable attack on the capital stock of the government-affiliated economy, targeting Sri Lanka's main international airport and destroying an estimated third of the national civil aviation fleet (Marks 2007, 512; Hashim 2013, 114). However, after the September 11 terrorist attacks, a global crackdown on financing for terrorism dramatically reduced LTTE's ability to acquire weapons and strained its resources, constraining its ability to interrupt economic activity. Further, the international community grew increasingly willing to take steps to combat groups viewed as terrorists, prompting LTTE to agree to a ceasefire with the Sri Lankan government, imposing additional reputational costs on LTTE violence (Hashim 2013, 114). The insurgents switched from attacking commercial activity to perpetrating violence against citizens. LTTE captured territory in the Eastern Province and engaged in ethnic cleansing of the non-Tamil (predominantly Sinhala and Muslim) populations of the region—citizens who were viewed as loyal to the government (Hashim 2013, 133).

How does the government respond to the substitution of violence against citizens for destruction of capital by the insurgent group? The government's tactical decision is made to account for the insurgent group's strategy, which implies that a change in the insurgents' resource constraint also affects the government's choice. When the insurgent group increases its level of violence against citizens, the government increasingly targets the insurgents' capital.

[9]The specific range of parameters for which $\frac{\partial^2 \lambda^*}{\partial d_R \partial v_R} < 0$ is provided in the appendix.

Proposition 4.4 *If* $\frac{\partial v_R^*}{\partial \zeta} > 0$*, then, for many combinations of parameters, government violence against citizens is decreasing in the insurgents' cost of capital targeting,*

$$\frac{\partial v_G^*}{\partial \zeta} = \frac{\partial v_G^*}{\partial v_R^*}\left(\frac{\partial v_R^*}{\partial \zeta}\right) < 0.$$

As the cost of targeting capital increases for the insurgent group, the insurgents choose a higher level of violence against citizens while the government reduces its violence against citizens and increases its destruction of insurgent capital. The government's tactics are the inverse of the insurgent group's tactics. Thus, if the cost of targeting capital increases for the insurgents, this affords the government a significant advantage. Destroying the insurgent's capital stock increases support for the government because it reduces the benefits the group is able to offer citizens who supply labor in its economy. Violence against citizens, by contrast, has a non-monotone effect on support for each side because, though per capita benefits increase, violence also increases backlash against this use of force. If the government is able to choose less violence against citizens and a higher level of targeting the insurgent's capital, while the insurgent group increases violence against citizens as destroying government capital becomes cost-prohibitive, more citizens will choose to support the government.

This substitution, and the government's inversion of insurgent tactics, are seen in Sri Lanka in 2006 and early 2007. One of the first military campaigns that ended the unsteady ceasefire between the Sri Lankan government and LTTE, which lasted from 2002-2006, was an attack by the government on physical capital LTTE's supporters relied on for their economic activity. The government successfully recaptured the Mavil Aru reservoir in August 2006 (*Sri Lanka forces attack reservoir* 2006). LTTE had closed the dam, redirecting water to Tamil villages, and after the government victory the military restarted the flow of water to rice paddies in government-aligned villages.[10] This initiated a series of battles that signaled the beginning of the Elam War IV.[11] LTTE still faced high costs for targeting capital, which were exacerbated by the group's losses during the 2004 Indian Ocean Tsunami. After initial military setbacks, the insurgents increased their victimization of citizens, launching terror attacks like planting bombs on buses and using civilians as human shields (Weerasinghe 2007). In February 2007, the government retook the village of Vakarai. During this battle the Sri Lankan military used its material advantage to launch artillery and air strikes that destroyed many buildings in the village, but the military coordinated its efforts

[10]Retaking control of the reservoir had two related economic consequences: land farmed by government supporters was irrigated, increasing its value while water was directed away from land that sustained ethnic Tamils. While in this case Tamil capital, nor the reservoir itself, were destroyed, this victory by the government served to reduce the value of capital supporting Tamils and increase the value of capital supporting government supporters—the capital targeting mechanism is present though the shift in the value of capital does not arise from total destruction of property.

[11]The history of the Sri Lankan civil war is often divided into four phases, Elam I (1983-1987), Elam II (1990-1995), Elam III (1995-2002), and Elam IV (2006-2009).

to afford citizens an opportunity to flee to safety (*Sri Lanka president offers talks from former Tiger town* 2007; Hashim 2013, 138). As LTTE increased its attacks on citizens, the government reduced its violence against non-combatants and, with its superior firepower, increased its destruction of LTTE capital. The fighting led many citizens formerly under LTTE control to flee to government-controlled refugee camps (Francis 2007).

4.6 Backlash Backfires?

If the insurgent group's cost of targeting the government's capital supply increases, the government gains an advantage by substituting capital targeting for violence against citizens. Does this advantage persist if instead the backlash constraint increases?

The government faces a more stringent backlash constraint because violence against citizens by the government increases citizens' willingness to support the insurgent group more than insurgent violence shifts support toward the government. The extent to which citizens' unwillingness to countenance government violence aids the insurgent group is largely determined by how backlash against the government changes as both sides increase their violence against citizens. Recall that support for the government, λ^*, is not monotone in either government or insurgent violence against citizens. Determining the effect of an increase in the levels of violence against citizens perpetrated by both sides of the conflict requires establishing the effect this same increase in violence has on backlash. If the marginal effect of backlash against government violence is decreasing as insurgents also increase their violence, then despite strong backlash against the government, the proportion of citizens supporting the regime may increase.

Proposition 4.5 *Support for the government may be increasing in both violence against citizens by the government and by the insurgents,* $\frac{\partial^2 \lambda^*}{\partial v_G \partial v_R} > 0$*, if* $\frac{\partial^2 b(v_G, v_R)}{\partial v_G \partial v_R} < 0$*.*

Whether an increase in backlash against insurgent violence reinforces growing backlash against government violence or moderates it determines the relative value of benefits citizens receive from each side. When the marginal effect of backlash against government violence is decreasing as insurgents increase violence against citizens, the citizens face a particularly difficult choice. Though citizens are less willing to support the government, their view of the insurgent group is increasingly negative. Thus, when choosing between the two sides, the government's resource advantage, and the higher per capita benefits that result from this advantage, lead relatively more citizens to support the government. This is not to say this support is not begrudging. Instead, the government in this case can be viewed as the lesser of two evils, or at minimum the more materially beneficial side to support.

In 2009, shortly before the end of the Sri Lankan civil war, both the Sri Lankan military and LTTE both employed high levels of violence against citizens. As LTTE lost territory, it allegedly increased forced recruitment and attacked citizens attempting to leave areas under its control, while the government claimed this made all citizens in this area combatants, justifying its indiscriminate use of force (Human Rights Watch 2009, 6). Initially, as predicted by the model, there was some backlash against both sides but few LTTE deserters. Though in the fall of 2008 the Sri Lankan Army had attempted to drive non-combatants away from the front lies before attacking the insurgents, Tamil citizens continued to retreat with LTTE, fearing reprisals by the government, highlighting the higher levels of backlash against government violence (Weiss 2011, 96). However, in the spring of 2009, as the military's victory grew increasingly assured, and the indiscriminateness of its attacks increased, citizens began to flee (*Mass Tamil exodus from rebel area* 2009). Despite the high levels of violence and tensions between Tamil citizens and the Sinhalese-dominated government, more citizens displaced from combat zones chose to seek shelter in government-controlled areas, foregoing opportunities to remain with LTTE. When both sides increased their violence against citizens, and LTTE grew increasingly incapable of providing benefits to its supporters, the marginal increase in backlash against the government's violence decreased in the face of increased LTTE violence against its own supporters.

4.7 Conclusion

Governments and insurgent groups, in choosing their battlefield tactics, face a tradeoff. They choose between destroying their opponent's natural and produced capital, reducing the resources they can use to provide benefits to supporters, versus directing violence against citizens who may support the other side. I show that, in the absence of constraints on the use of force, both sides choose to destroy as much of their opponent's capital as possible, while one side also chooses to target citizens indiscriminately. This violence is moderated when combatants face costs for capital targeting and violence against citizens, but targeting capital largely remains the preferred tactic for both sides.

My results offer one explanation for why insurgent groups may fare so poorly against government forces, as was the case for LTTE which was eventually defeated by the Sri Lankan government. As the cost of targeting the government's natural and produced capital increases, insurgents may resort to violence against citizens as a means of targeting potential government supporters. The government, on the other hand, then has the opportunity to use its resource advantage, targeting the insurgent group's capital while relying less on violence against citizens. In the aggregate, this leads to more support for the government. Moreover, even when the government is relatively disadvantaged, both the government and insurgents' tactical choices may result in an increase in

support for the government. When the marginal effect of backlash against government violence is decreasing as insurgents also increase their violence, then the proportion of citizens supporting the regime may increase. Thus, despite stronger backlash against government violence against citizens relative to insurgent violence against citizens, the government garners more support.

My framework centers economic concerns as a driver of citizens' support either for the government or the insurgent group. Material incentives for many citizens might be a second order concern, and their support choice may be determined more by other factors like security concerns or ethnic affiliations. In my framework, these potential first-order concerns are reflected by the backlash constraint. Intense backlash suggests that violence's economic consequences do not trump the negative sentiment it generates, either because force was directed against co-ethnics or because more violence increases citizens' individual risk of victimization. The direct and indirect consequences of combatants' use of force, for citizens' physical security and economic opportunities respectively, demonstrate that in my model, security concerns cannot be completely divorced from economic concerns. I show how, given that both factors can affect citizens' support choice, governments and insurgent groups influence citizens by making tactical choices that activate these concerns.

Importantly, violence against citizens in my model is always indiscriminate—neither the government nor the insurgents can target those individuals who are most supportive of their opponent discriminatingly, nor does the model explicitly incorporate clashes between both sides' soldiers. Future work should consider whether the government's resource advantage extends to increasing the regime's ability to employ discriminate violence, and whether the government's advantages persist when the insurgent group is able to discriminatingly target government supporters.

CHAPTER 5

Conclusion

My dissertation offers an explanation of governments' strategies for using force in civil conflict. Combined, these papers make two primary contributions. First, each highlights why, counterintuitively, governments rely on tactics that have negative consequences—mass repression, forced resettlement, and destruction of property. Second, I show how opportunity cost shapes citizens' decision-making, leading them to take actions that reinforce governments' reliance on particularly destructive tactics.

In Chapter 2, The Wages of Repression, I consider variation in which individuals are targets of government repression. Building on a conceptual distinction between targeted repression (against opposition group members) and mass repression (against citizens broadly), I explain why regimes use both types of repression in combination. Targeted and mass repression have distinct effects on civilians' incentives to support an opposition. Targeted repression decreases the benefit of challenging the regime, activating security concerns. Mass repression affects individuals' material wellbeing, improving opportunities for participants in the labor market. These participation and material wellbeing mechanisms make targeted and mass repression jointly optimal for the regime. By identifying distinct logics for targeted and mass repression, I show in some cases, both types of repression are complements, meaning it is optimal for governments to employ more targeted and mass repression simultaneously.

Chapter 3, Forced Economic Migration, asks why governments manipulate the movement of citizens in conflict. I develop a model of forced resettlement that shows how economic incentives influence the form and intensity of displacement of residents of a contested area. Specifically, governments may use forced resettlement to affect labor markets. As the government uses force to retake contested territory, it decreases the opportunity cost of migration for citizens in conflict-affected areas. This can lead to an influx of migrants to government-controlled regions, increasing the supply of labor and exerting downward pressure on wages. Governments may forcibly resettle citizens to avoid an oversupply of labor in secure areas, or an undersupply in areas in which they regain control. I compare the economic incentives that lead to two common forms of resettlement, government-controlled model villages and internal displacement camps, and show that

increasing economic development in government-controlled regions may increase levels of forced resettlement.

Lastly, in Chapter 4, Targeting Lives and Livelihoods, I develop a model of civil conflict that explains why combatants choose to destroy capital under control of their opponents, as a substitute for or in combination with violence against non-combatants. A government and an insurgent group direct force against both citizens that may support their opponent and the natural and produced capital that enables each side to fight. The choice of tactics by each party affects citizens' decision of which side to support, which may lead to either moderation or escalation of the use of destructive war-fighting tactics. I show violence against citizens and destruction of capital are often substitute tactics, and that governments and insurgent groups adopt opposite strategies. One side chooses high levels of violence against citizens and the other side chooses high levels of capital destruction. Moreover, I show that despite backlash against the use of force, violence against citizens may benefit the government.

Across the three papers comprising the dissertation, the game theoretic models I use to examine the strategic interactions between governments and citizens serve two purposes. First, these models capture equilibrium behavior, meaning the strategies of citizens, governments, and insurgents defined in Propositions 2.1, 3.1, and 4.2 represent stable responses to the others' choices. Not designed to explain instantaneous decisions by every individual involved in a given conflict, these models instead capture how economic incentives specifically affect government policy and patterns of citizens' movement and participation in conflict. These frameworks are particularly helpful for exploring the dynamics of ongoing conflicts—when the end of a conflict is unknown, my models show how citizens and governments account for not only their immediate security concerns but also their medium- or long-term economic prospects. An example from Chapter 3 is particularly illustrative. If citizens face the prospect of a long period of displacement, economic opportunities clearly play a role in their decision to leave, as was the case in Guatemala in the 1980s and as is the case for individuals fleeing Syria today (Smith & Warner 2014).

Second, theoretical explanations provide insight in the absence of data. While in some cases, surveys can shed light on the motivations of citizens when they decide to join an opposition group, switch their allegiance, or flee their homes, even analyses of first-hand accounts suffer from well-known biases. Further, government actors typically do not offer explanations of the internal machinations of the regime, especially regarding decisions made in times of conflict and crisis. By studying how economic incentives impact decision-making in the context of formal models, I am able to isolate the causal effects of changes in underlying economic conditions, governments' costs, and citizens' characteristics on combatants' strategies for waging civil conflict in a way that is often not feasible using statistical models.

In many conflicts, governments use all of the tactics described across the three papers. For

example, in Aceh—an example highlighted in Chapter 2—the government of Indonesia employed targeted and mass repression, resettled citizens, and destroyed natural and produced capital in an effort to defeat an insurgent group known as GAM. Given that all the tactics studied in this dissertation are in governments' repertoires, which economic mechanism dominates, and therefore which model most effectively captures the dynamics of a particular conflict incident, can be determined by what factors are driving the decisions of citizens. To illustrate, consider an individual deciding between remaining in her home or leaving. If she is deciding between remaining in a contested area or fleeing to government-controlled territory, Chapter 3 suggest the government may respond with forced resettlement. If instead, she is facing a choice between remaining in an area primarily under insurgent control or fleeing to government-controlled territory, Chapter 4 indicates the regime might respond by destroying natural and produced capital in the area in which she resides. Two factors distinguish these examples and highlight the specific conflict contexts to which each of my models applies. These illustrations are distinguished first by the level of government control over contested territory (partial government control in the first case versus insurgent control in the second) and second, by the economic opportunities the individual weighs (whether, if she stays, she participates in a labor market partially or completely linked to an insurgent group). Though the outcomes of this individual's choice may be observationally equivalent—in either case she chooses to remain or leave and is influenced by her own tolerance for the risk of violence—isolating the specific economic factors involved in her decision point to the types of tactics governments may employ to influence her choice.

The relationship between these illustrations encapsulate the central argument of this dissertation. In all conflict contexts, citizens make decisions with their own economic opportunities in mind. While factors like security concerns, ideology, and preferences play a role in determining how citizens participate in conflict, recognizing the effects of citizens' material wellbeing concerns is equally important for understanding why some individuals take actions with significant consequences for their lives and livelihoods—like joining an opposition group or fleeing their homes—and others do not. The ways in which governments wage civil conflict are directly linked to citizens' economic incentives. This is because, from the perspective of the regime, given how underlying economic incentives affect citizens' decision-making, governments' security objectives are furthered when they make tactical choices with economic consequences in mind.

APPENDIX A

Appendix for The Wages of Repression

A.1 Proofs for Main Results

Proof of Lemma 2.1:

Recall each citizen that chooses to participate in the economy earns a wage and consumes goods subject to the budget $w \geq c \cdot p$. Because utility is increasing in consumption, by Walras's law the budget will be satisfied with equality for each citizen. An individual citizen's expected utility from supplying labor is $(1-m)u(c)$, which can be rewritten as $(1-m)u\left(\frac{w}{p}\right)$ given the budget constraint. All citizens for whom $(1-m)u\left(\frac{w}{p}\right) \geq (1-m)(1-t)\theta_i$ join the labor force. The labor force participation rate is given by λ. Labor supply, then, is $L = (1-m)\lambda$.

The firm is profit maximizing, where profits are given by $pY(L) - w \cdot L$ where p is the price of the good y produced by the firm, and $Y(\cdot)$ is the production technology. The firm then solves

$$\max_{L} \;\; pY(L) - w \cdot L,$$

with first order condition $pY'(L) = w$. Posit an $L^{\dagger}$, which is the labor supply that solves the firm's problem. For a given wage w and optimally chosen labor supply $L^{\dagger}$, the firm's profit is

$$\pi(w) = p \cdot Y(L^{\dagger}(w)) - w \cdot L^{\dagger}.$$

For the labor market to clear, the labor supplied by the citizens must equal the labor demanded by the firm in equilibrium. Formally, labor market clearing requires $(1-m)\lambda^{*} = L^{\dagger}$. For this to hold, there must exist a wage w^{*} such that labor supply equals labor demand, given that citizens are choosing optimally whether or not to supply labor and the firm is maximizing profits.

Labor market clearing requires the threshold strategy that determines citizens' participation decision and the first order condition for the firm hold simultaneously. Using the firm's FOC and

substituting for the wage in the citizen's strategy yields

$$(1-m)u\Big(\frac{pY'(L)}{p}\Big) \geq (1-m)(1-t)\theta_i. \tag{A.1}$$

Of interest is the unknown L in this expression. The L that solves this equation is the equilibrium level of employment, which I will refer to as $L^* = (1-m)\lambda^*$. From the first-order condition of the firm, L^* is the labor supply that ensures the value of the marginal product of labor equals the wage, i.e. $p^*Y'(L^*) = w^*$. Notice the right-hand side of Equation (A.1) is constant in w. Citizen's utility $u(\cdot)$ is continuous in wages w and $\lim_{w\to 0} u(w) = 0$, while as $\lim_{w\to\infty} u(w) = \infty$. Thus, by the Intermediate Value Theorem L^* exists and is unique.

Given equilibrium employment, it is straightforward to determine equilibrium wages and consumption. Returning to the firm's FOC, the wage in equilibrium is $w^* = pY'((1-m)\lambda^*)$. Consumption is $c^* = \frac{pY'((1-m)\lambda^*)}{p}$. The last condition on consumption ensures household consumption equals the output from production. Optimal consumption, labor market clearing, and the satisfaction of the household budget constraint imply the goods market clears.

This price is treated as the numeraire for the remainder of the analysis, thus p^* is normalized to 1. ■

Proof of Lemma 2.2: First, assume a fixed t and m. This allows for focus on the relationship between θ and λ while bracketing out their mutual dependency on repression.

Consider the individual citizen's tradeoff $(1-m)u(c) \lesseqgtr (1-m)(1-t)\theta_i$. She will choose to join the opposition if the left-hand side is smaller than the right-hand side. This reduces to the comparison

$$u(Y'(L)) \lesseqgtr (1-t)\theta_i,$$

substituting for consumption as in Lemma 2.1. The marginal citizen that is indifferent between joining the opposition or participating in the economy is the citizen for which this equation is satisfied with equality.

Rearranging the payoff comparison for the marginal type

$$\theta^* = \frac{u(Y'(L))}{(1-t),}$$

gives a threshold in the ideological space above which all individuals will join the opposition. Since ideology is distributed uniform from $[\underline{\theta}, \overline{\theta}]$, the labor force participation rate (i.e. the proportion of citizens who opt to participate in the economy) is derived from the CDF of the continuous uniform

distribution.

$$\lambda^* = \begin{cases} 0 & \text{if } \theta^* < \underline{\theta} \\ \frac{\frac{u(Y'(L(t,m)))}{(1-t)} - \underline{\theta}}{\overline{\theta} - \underline{\theta}} & \text{if } \theta^* \in [\underline{\theta}, \overline{\theta}) \\ 1 & \text{if } \theta^* \geq \overline{\theta}. \end{cases}$$

Thus λ^* is uniquely determined by θ^*, and λ^* can be used to characterize the equilibrium labor force participation threshold strategy for the citizens. ■

Proof of Lemma 2.3: For mass repression, $m = 1$ cannot solve the first order condition as the left-hand side would equal infinity. For targeted repression $t = 1$, the optimal labor force participation rate λ^* is undefined. Moreover, as t^* approaches 1, the direct cost of targeted repression restrains the regime such that the benefits of repression can never compensate if k is sufficiently high, i.e. $k > Y((1-m)\lambda^*)$. ■

Proof of Proposition 2.1:

Uniqueness of λ^* follows from Lemma 2.2. By construction, the choice of t and m that solve the government's optimization problem are sequentially rational. Thus any solution to the government's problem, given λ^*, characterizes an equilibrium.

The regime's problem is

$$\max_{t \in [0,1], m \in [0,1]} \quad Y((1-m)\lambda^*) - k \cdot t.$$

Since the production function is continuous in t and m and $[0, 1]$ is compact, a solution exists by the Extreme Value Theorem.

The solution is characterized by the first order conditions

$$\begin{aligned} Y'((1-m)\lambda^*)((1-m)\lambda_t^*) - k = 0 \\ Y'((1-m)\lambda^*)((1-m)\lambda_m^* - \lambda^*) = 0. \end{aligned} \tag{A.2}$$

To characterize the equilibrium in a more substantively interesting way, first solve the first order condition for m for $(1-m)$,

$$(1-m) = \frac{\lambda^*}{\lambda_m^*}.$$

Then, this value can be substituted into the first order condition for t,

$$Y'((1-m)\lambda^*)((1-m)\lambda_t^*) = k$$
$$(1-m)\lambda_t^* = \frac{k}{Y'((1-m)\lambda^*)}$$
$$\frac{\lambda^*\lambda_t^*}{\lambda_m^*} = \frac{k}{Y'((1-m)\lambda^*)}.$$

Simplifying the left hand side and rearranging yields

$$\underbrace{\frac{Y'((1-m)\lambda^*)}{Y''((1-m)\lambda^*)}}_{\substack{\text{responsiveness of} \\ \text{wages to repression}}} = -\underbrace{\frac{u'(Y'((1-m)\lambda^*))}{u(Y'((1-m)\lambda^*)}}_{\substack{\text{responsiveness of} \\ \text{citizen's utility} \\ \text{to repression}}} \cdot \underbrace{(1-t)}_{\substack{\text{magnitude} \\ \text{of security} \\ \text{concern}}} \cdot \underbrace{k}_{\substack{\text{cost of targeted} \\ \text{repression}}}$$

To show an interior solution (t^*, m^*) exists, notice Lemma 2.3 rules out the corner solutions $(1,1)$, $(t^*,1)$, and $(1,m^*)$ for sufficiently high k. Next, consider the case where the government employs neither type of repression, i.e. $(t^*,m^*) = (0,0)$. Let $\lambda_0^* = u(Y'(\lambda^*))$ be the optimal labor force participation rate for $(t,m) = (0,0)$, normalizing $[\overline{\theta}, \underline{\theta}]$ to $[0,1]$ for clarity of exposition. An interior requires that there exists some $\epsilon_t > 0, \epsilon_m > 0$ such that the government receives higher utility from choosing $(t^*,m^*) = (\epsilon_t, \epsilon_m)$ than $(0,0)$.

Considering ϵ_m first, an interior solution implies $Y((1-\epsilon_m)\lambda^*) > Y(\lambda_0^*)$, holding $t=0$ fixed temporarily. Since $Y(\cdot)$ is increasing in $L = (1-m)\lambda^*$, the relevant comparison is $(1-\epsilon_m)\lambda^* > \lambda_0^*$, which holds if the effect of a small increase in mass repression generates an increase in labor force participation greater than the proportion of the labor pool it eliminates. This comparison is $\frac{\partial Y}{\partial m} < \frac{\partial Y}{\partial \lambda^*}$, which is

$$Y'((1-m)\lambda^*)((1-m)\lambda_m^* - \lambda^*) < Y'((1-m)\lambda^*)(1-m),$$

which holds when

$$(1-m)\lambda_m^* - \lambda^* < (1-m).$$

At equilibrium, $\lambda^* = (1-m)\lambda_m^*$. Substituting for $(1-m)$ on the left hand side, $(1-m)\lambda_m^* - (1-m)\lambda_m^* = 0 < 1-m$, establishing $(1-\epsilon_m)\lambda^* > \lambda_0^*$. In addition, $\epsilon_t > 0$, is optimal when $Y((1-\epsilon_m)\lambda^*) - k\epsilon_t > Y((1-\epsilon_m)\lambda^*)$. This holds for sufficiently small k such that $\frac{\partial Y}{\partial t} > 0$.

■

Proof of Remark 2.1: The government's repression decision absent the material incentive mechanisms can be thought of as assessing the effect of t and m for a fixed wage that does not depend on repression.

The government's problem is to maximize output

$$\max_{t,m} \; Y((1-m)\lambda) - k \cdot t,$$

where $Y(\cdot)$ represents the production function. The regime's chosen repression levels, $t^\dagger$ and $m^\dagger$, represent a strategy for the government's sub-game (and are thus not equilibrium strategies). Let the fixed wage be $\hat{Y} = Y'((1-m)\lambda^*)$ where λ^* does not depend on t or m. The government solves:

$$\hat{Y} \cdot (1-m)\lambda_t^* - k = 0,$$
$$\hat{Y} \cdot \Big((1-m)\lambda_m^* - \lambda^*\Big) = 0.$$

While wages are fixed, the citizens' security concern arising from targeted repression remains. Therefore, by generating a cost for participation in the opposition group, targeted repression still has a positive effect on the labor force participation rate, i.e. $\lambda_t^* > 0$. The government's choice $t^\dagger \geq 0$ solves the first order condition for targeted repression.

However, since mass repression's effect operates through the wage, the marginal effect of mass repression on labor force participation when wages are fixed is zero, meaning $\lambda_m^* = 0$. However, the direct effect of mass repression on the labor force persists. Mass repression removes some citizens from the labor supply but not all citizens, i.e. $\lambda^* > 0$. Thus, mass repression, in this case, only has a direct effect of reducing the labor pool. Therefore, the government will always choose $m^\dagger = 0$. Mass repression arises exclusively through its effect on the labor market. ■

Proof of Remark 2.2:

Implicitly differentiating $\lambda^\dagger$,

$$\frac{d\lambda^\dagger}{dt} = -\frac{\frac{1}{\overline{\theta}-\underline{\theta}}\left(\frac{u(Y'(L))}{(1-t)^2}\right)}{\frac{1}{\overline{\theta}-\underline{\theta}}\left(\frac{u'(Y'(L))Y''(L)(1-m)}{1-t}\right) - 1} > 0 \tag{A.3}$$

■

Proof of Remark 2.3:

Implicitly differentiating $\lambda^\dagger$,

$$\frac{d\lambda^\dagger}{dm} = -\frac{\frac{1}{\overline{\theta}-\underline{\theta}}\left(\frac{u'(Y'(L))Y''(L)(-\lambda^*)}{1-t}\right)}{\frac{1}{\overline{\theta}-\underline{\theta}}\left(\frac{u'(Y'(L))Y''(L)(1-m)}{1-t}\right) - 1} > 0 \tag{A.4}$$

■

Proof of Proposition 2.2:

To determine gross complementarity and substitutability, of interest is $\frac{dm}{dk}$, the relationship between the cost of targeted repression and the level of mass repression. By the chain rule, this is

$$\frac{dm^*}{dk} = \frac{dm^*}{dt^*}\left(\frac{dt^*}{dk}\right).$$

Since t^* is characterized by the first order condition for the regime with respect to t^*, by the implicit function theorem,

$$\frac{dt^*}{dk} = -\frac{-1}{Y''((1-m)\lambda^*)((1-m)\lambda_t^*)^2 + Y'((1-m)\lambda^*)(1-m)\lambda_{tt}^*},$$

which is negative when $\lambda_{tt}^* < 0$.

Taking λ_t^* from the first order condition, and taking its derivative with respect to t, gives:

$$\frac{\partial^2 \lambda^*}{\partial t^2} = \frac{k \cdot Y''((1-m)\lambda^*)(1-m)^2\lambda_t^*}{Y'((1-m)\lambda^*)(1-m)} < 0.$$

Since the first order conditions for the government also characterize m^*, $\frac{dm^*}{dt^*}$ is equivalent to $\frac{\partial^2}{\partial m \partial t} Y(L(t,m))$ where $Y(\cdot)$ represents the regimes problem. The cross-partial of the regime's objective function thus signs the relationship between targeted and mass repression.

$$\frac{\partial^2 Y}{\partial m \partial t} = Y''((1-m)\lambda^*)((1-m)\lambda_t^*)((1-m)\lambda_m^* - \lambda^*) + Y'((1-m)\lambda^*)((1-m)\lambda_{mt}^* - \lambda_t^*). \quad \text{(A.5)}$$

Observe from the first order conditions that, in equilibrium, $\lambda_m^* = \frac{\lambda^*}{1-m}$. This implies the first term of A.5 is 0. Complementarity then requires

$$Y'((1-m)\lambda^*)((1-m)\lambda_{mt}^* - \lambda_t^*) > 0.$$

λ_m^* can be rewritten as

$$\lambda_m^* = \frac{1}{\overline{\theta} - \underline{\theta}}\Big(\frac{u(Y'((1-m)\lambda^*)) - \underline{\theta}}{(1-t)(1-m)}\cdot\Big)$$

The derivative with respect to t is

$$\lambda_{mt}^* = \frac{(1-t)(1-m)u'(Y'(L))Y''(L)(1-m)\lambda_t^* - u(Y'((1-m)\lambda^* L)) - \underline{\theta}\cdot(-(1-m))}{\big((1-t)(1-m)\big)^2}.$$

The numerator is positive when

$$(1-t)(1-m)\frac{u'(Y'(L))}{u(Y'(L))}Y''(L)\lambda_t^* > -1. \tag{A.6}$$

Having established the conditions under which λ_{mt}^* is positive (or negative), the cross-partial of the government's objective can be re-expressed as

$$Y'((1-m)\lambda^*)((1-m)\lambda_{mt}^* - \lambda_t^*) > 0. \Rightarrow (1-m)\lambda_{mt}^* > \lambda_t^*. \tag{A.7}$$

From the first order condition,

$$\lambda_t^* = \frac{k}{Y'(L)(1-m)}.$$

Substituting this into A.7, targeted and mass repression are complements for the government when

$$Y'((1-m)\lambda^*)(1-m)^2\lambda_{mt}^* > k, \tag{A.8}$$

and substitutes otherwise. If $\lambda_{mt}^* < 0$, targeted and mass repression are always substitutes. When $\lambda_{mt}^* > 0$ and k is small, targeted and mass repression are complements. ■

Proof of Proposition 2.3: The proof follows immediately from the proof of Proposition 2.2. The proposition holds when $\frac{dm}{dk} > 0$. ■

A.2 Supplement A: Functional Forms

To make the equilibrium and comparative static results more concrete, in this appendix I choose explicit functional forms for the production function and the citizen's utility. This serves to illustrate the reasonableness of the strict concavity assumptions in the main model and demonstrate the model's consistency with common assumptions about production technologies. Since the distribution of ideology does not change relative to the main model, I make the normalization $[\underline{\theta}, \overline{\theta}] = [0, 1]$ for clarity and ease of reading.

For this appendix, I assume that the production function is Cobb-Douglas, taking the form $Y = L^{\frac{1}{2}} = ((1-m)\lambda^*)^{\frac{1}{2}}$. The citizen's utility function is $u(c) = \frac{c^{1/2}}{\frac{1}{2}}$.[1] The optimal labor force participation rate, then, is

$$\lambda'^*(m,t) = \frac{\sqrt{2}((1-m)\lambda^*)^{-1/4}}{1-t}.$$

Before proceeding, it is worth noting that $\lambda'^*(m,t)$ is a partial differential equation, the solution

[1] All results from the main model also hold with Cobb-Douglas utility.

of which depends on the choice of functional forms. Changing the functional form for either production technology or the citizens' utility changes the solution to this PDE.

Having pinned down the citizen's choice under these assumptions, we prodceed to the government's choice of targeted and mass repression. The regime's problem is

$$\max_{t\in[0,1],m\in[0,1]} \ ((1-m)\lambda'^{*})^{\frac{1}{2}} - k\cdot t.$$

This gives first order conditions

$$\frac{1}{2}((1-m)\lambda'^{*})^{-\frac{1}{2}}(1-m)\lambda_t'^{*} - k = 0,$$
$$\frac{1}{2}((1-m)\lambda'^{*})^{-\frac{1}{2}}((1-m)\lambda_m'^{*} - \lambda'^{*}) = 0,$$

where

$$\lambda_t'^{\dagger} = -\frac{\frac{\sqrt{2}((1-m)\lambda'^{*})^{-1/4}}{(1-t)^2}}{\frac{\sqrt{2}((1-m)\lambda'^{*})^{1/4}(-\frac{1}{4}((1-m)\lambda'^{*}))^{-3/2}(1-m)}{1-t} - 1} > 0,$$

and

$$\lambda_m'^{\dagger} = -\frac{\frac{\sqrt{2}((1-m)\lambda'^{*})^{1/4}(-\frac{1}{4}((1-m)\lambda'^{*}))^{-3/2}(-\lambda'^{*})}{1-t}}{\frac{\sqrt{2}((1-m)\lambda'^{*})^{1/4}(-\frac{1}{4}((1-m)\lambda'^{*}))^{-3/2}(1-m)}{1-t} - 1} > 0.$$

Since the production function is continuous in t and m and $[0,1]$ is compact, a solution exists by the Extreme Value Theorem.

Turning now to the results on complementarity and substitution, of interest again is the effect of a change in the cost of targeted repression on the level of mass repression, given by

$$\frac{dm'^{*}}{dk} = \frac{dm'^{*}}{dt'^{*}}\Big(\frac{dt'^{*}}{dk}\Big).$$

Differentiating t'^{*} implicitly,

$$\frac{dt'^{*}}{dk} = -\frac{-1}{-\frac{1}{4}\big((1-m)\lambda'^{*}\big)^{-3/2}\big((1-m)\lambda_t'^{*}\big)^2 + \frac{1}{2}\big((1-m)\lambda *'^{*}\big)^{-1/2}(1-m)\lambda_{tt}'^{*},}$$

which is negative when $\lambda_{tt}'^{*} < 0$. The proof of Proposition 2.1 shows this holds in equilibrium.

The cross-partial of the regime's objective function signs the relationship between targeted and mass repression. Complementarity holds when

$$\frac{1}{2}((1-m)\lambda'^{*})^{-\frac{1}{2}}((1-m)\lambda_{mt}'^{*} - \lambda_t'^{*}) > 0.$$

Given the functional form assumptions,

$$\lambda'^{*}_{mt} = \frac{(1-t)(1-m)\Big(\sqrt{2}((1-m)\lambda'^{*})^{1/4}\Big)\Big(-\frac{1}{4}((1-m)\lambda'^{*})^{-3/2}\Big)(1-m)\lambda'^{*}_{t}}{\big((1-t)(1-m)\big)^{2}} - \frac{\Big(\sqrt{2}((1-m)\lambda'^{*})^{1/4}(-(1-m))\Big)}{\big((1-t)(1-m)\big)^{2}},$$

and is positive when[2]

$$(1-t)(1-m)\frac{-\sqrt{2}((1-m)\lambda'^{*})^{1/2}}{(1-t)\big(\sqrt{2}(1-m)-4(1-t)((1-m)\lambda'^{*})^{7/4}\big)} > -1.$$

Targeted and mass repression are complements for the government if

$$\frac{1}{2}((1-m)\lambda'^{*})^{-1/2}(1-m)^{2}\lambda'^{*}_{mt} > k.$$

A.3 Supplement B: Wages Increasing in Repression

In this appendix, I relax the assumption that wages are decreasing in labor supply and compare the government's choice of targeted and mass repression in each case. I call $Y(\cdot)$ the production technology where the wage is the marginal product of labor and wages are decreasing in the labor supply. This is the production technology employed for the main analysis. $Y^{\ddagger}(\cdot)$ is a production technology for which the equilibrium wage is still derived from the market clearing conditions in Lemma 2.1 as market clearing relies on no assumptions about the relationship between wages and changes in the labor force. However, the relationship between wages and labor supply for production technology $Y^{\ddagger}(\cdot)$ may be constant or increasing.

When wages are increasing in labor supply, $\lambda^{\ddagger}$ can only take one value, $\lambda^{\ddagger} = 1$. No individual will participate in the opposition because the economy will sustain a wage such that all citizens prefer the labor market to the opposition group. That is, for each individual that chooses to participate in the labor force, the wage rises, making even more individuals with higher types θ_i willing to work. This cascades until attaining full labor force participation.

When wages are increasing in labor supply, the regime will not find using either type of repression optimal in equilibrium. Since labor force participation is already full, i.e. $\lambda^{\ddagger^{*}} = 1$, repression can have no positive effect. Using targeted repression has a no effect and only generates a cost, as there are no opposition group members for the government to target. Therefore, the regime will

[2]Using Cobb-Douglas utility for citizens, λ'^{*}_{mt} is always positive.

avoid the cost from k and choose $t^{\ddagger^*} = 0$. The government will also choose $m^{\ddagger^*} = 0$ because using any $m^{\ddagger^*} > 0$ only has a direct effect of reducing the labor pool and no effect on labor force participation.

The case of constant wages is addressed in Remark 2.1.

APPENDIX B

Appendix for Forced Economic Migration

Proof of Lemma 3.1:

Because both the uncontested and contested sectors feature Cobb-Douglas production technologies, I consider market clearing conditions for both sectors simultaneously. An economy is represented by production technology $J(K_j, L_j)$ for $j \in \{X, Y\}$, which takes as inputs a stock of capital and a labor supply. The economies are assumed to be closed with full employment, perfect competition, and fixed factor supplies K_x, K_y, and $L_x + L_y = 1$ if there is no migration. Recall each citizen that chooses to participate in the economy earns a wage and consumes goods subject to the budget $w_j \geq c_j \cdot p_j$. An individual citizen's expected utility from supplying labor is $u(c_j)$. Because utility is increasing in consumption, by Walras's law the budget will be satisfied with equality for each citizen. Therefore, the individual's expected utility, given participation in the economy, can be rewritten as $u\left(\frac{w_j}{p_j}\right)$. Because markets clear following citizens final migration decision, all citizens for whom $u(c_x) - \theta_i \geq u(c_y) - v$ migrate and supply labor in the uncontested sector, while individuals for whom this inequality does not hold remain in the contested sector. The labor supply in the uncontested sector is $\ell + (1 - r)\mu_D$ while $(1 - r)(1 - \mu_D)$ is the labor supply in the contested sector.

There exists, in each sector, a number of profit maximizing firms indexed by i with production sets $X_1, X_2, ..., X_I$ and $Y_1, Y_2, ..., Y_I$. Each J_i for $J \in \{X, Y\}$ is non-empty, closed, and satisfies the free disposal property. Let $\pi_i(p_j)$ be the profit function and $j_i(p_j)$ the supply correspondence for each firm i in each sector j. Then the aggregate supply correspondence for sector X is,

$$\begin{aligned} x(p_x) =& \sum_{i=1}^{I} x_i(p_x) \\ =& \left\{ x \in \mathbb{R}^L | x = \sum_{i=1}^{I} x_i \text{ for some } x_i \in x_i(p_x), i = 1, ..., I \right\}, \end{aligned}$$

which is the sum of the individual supply correspondences. The aggregate supply correspondence for sector Y is defined analogously. Let each supply correspondence $x_i(p_x)$ and $y_i(p_y)$ be a differ-

entiable function of prices. The aggregate production set for sector X is,

$$\begin{aligned} X &= X_1 + X_2 + ... + X_I \\ &= \{x \in \mathbb{R}^L | x = \sum_{i=1}^{I} x_i \text{ for some } x_i \in X_i, \text{ for } i = 1, ..., I\}, \end{aligned}$$

again with the aggregate production set for sector Y defined analogously. Let $\pi^*(p_j)$ be the profit function associated with the aggregate production set for each sector, $x^*(p_j)$ be the supply correspondence associated with the aggregate production set for sector X, and $y^*(p_y)$ be the supply correspondence associated with the aggregate production set for sector Y. Then for all $p \gg 0$, $\pi^*(p_j) = \sum_{i=1}^{I} \pi_i(p_j)$, for the X sector $x^*(p_x) = \sum_{i=1}^{I} x_i(p)$, and $y^*(p_y) = \sum_{i=1}^{I} y_i(p)$ for sector Y. In other words, the solution to the aggregate profit maximization problem in each sector for prices p_j is the sum of the corresponding individual profit maximization problems for firms in that sector. Therefore, for the remainder of the analysis I only consider the representative firm.

The representative firm in each sector has profits given by $p_j(1-t_j)J(K^j, L^j) - w_j \cdot L_j$ where p_j is the price of the good j produced by the firm and t_j represents taxes collected by the government or insurgent group. The firm then solves

$$\max_{L} \quad p_j(1 - t_j)J(K_j, L_j) - w_j \cdot L_j.$$

The first order condition is $p_x(1 - t_x)X_L(K_x, L_x) = w_x$, for the uncontested sector and $p_y(1 - t_y)Y_L(K_y, L_y) = w_y$, for the contested sector. Posit an $L_j^\dagger$, which is the labor supply that solves the firm's problem. For a given wage w_j and optimally chosen labor supply $L_j^\dagger$, the firm's profit is

$$\pi_j(w_j) = p_j(1 - t_j) \cdot J(K_j, L_j^\dagger(w_j)) - w_j \cdot L_j^\dagger.$$

For the labor market to clear, the labor supplied by the citizens in each sector must equal the labor demanded by the firm in each sector in equilibrium. Formally, labor market clearing requires $\ell + (1-r)\mu_D^* = L_x^\dagger$, and $(1-r)(1-\mu_D^*) = L_y^\dagger$ for given levels of violence and forced resettlement. For this to hold, there must exist a wage w_j^* such that labor supply equals labor demand, given that citizens are choosing optimally whether or not to migrate and the firm is maximizing profits.

Labor market clearing requires the threshold strategy that determines citizens' migration decision and the first order condition for the firms hold simultaneously. Using the firms' FOC for both sectors, and substituting for the wage in the citizen's strategy yields

$$u\Big(\frac{p_x(1 - t_x)X_L(K_x, L_x)}{p_x}\Big) - \theta_i \geq u\Big(\frac{p_y(1 - t_y)Y_L(K_y, L_y)}{p_y}\Big) - v. \tag{B.1}$$

Of interest are the unknown L_x and L_y in this expression. For the uncontested sector, from the first-order condition of the firm, L_x^* is the labor supply that ensures wages are the marginal product of labor, i.e. $w_x^* = X_L(L_x^*)$. Notice the left-hand side of (B.1) is increasing in w_x and the right-hand side is decreasing in w_x. Citizen's utility $u(\cdot)$ is continuous in wages w and $\lim_{w\to 0} u(w) = 0$, while as $\lim_{w\to\infty} u(w) = \infty$. Thus, by the Intermediate Value Theorem L_x^* exists and is unique.

The L_x and L_y that solve Equation (B.1) are the competitive equilibrium levels of employment, which I will refer to as $L_x^* = \ell + (1-r)\mu_D^*$ and $L_y^* = (1-r)(1-\mu_D^*)$. Given equilibrium employment, it is straightforward to determine equilibrium wages and consumption. The wage in equilibrium is the marginal revenue product of labor $w_j^* = p_j(1-t_j)J_L(K_j, L_j)$. Consumption is equivalent to the real wage, $c_j^* = \frac{p_j(1-t_j)J_L(K_j,L_j)}{p_j}$, which simplifies to $c_j^* = (1-t_j)J_L(K_j, L_j)$.

Given citizens' expenditure, what remains is to determine equilibrium prices for good j. The supply of j is $p_j(1-t_j)J$. Setting supply and demand equal, $p_j(1-t_j)J = (1-t_j)J_L(K_j, L_j)$, then price $p_j^* = \frac{J_L}{J}$, which is the semi-elasticity of production with respect to labor. Optimal consumption, labor market clearing, and the satisfaction of the household budget constraint imply the goods market clears. ■

Proof of Lemma 3.2: Proceeding backwards, assume a fixed v, r, and μ_F. This allows for focus on the relationship between θ_D and μ_D while bracketing out their mutual dependency on the government's use of force.

Consider the individual citizen's tradeoff between remaining in the contested sector versus migrating to the uncontested sector. She will choose to remain if, net the costs of violence and migration, her value for consumption benefits in the contested sector outweighs those in the uncontested sector. The marginal citizen that is indifferent between fleeing and participating in the economy is the citizen for which $u(c_x) - \theta_i = u(c_y) - v$ is satisfied with equality. Rearranging the payoff comparison for the marginal type

$$\theta_D^* = u(c_x) - u(c_y) + v.$$

gives a threshold in migration costs below which all individuals will migrate, whereas all individuals with migration costs higher than θ_D^* will remain.

Similarly, in the first stage citizens face a tradeoff between migrating as refugees and remaining. The relevant comparison for these citizens is between emigration and migration to the uncontested sector, since only those with sufficiently low migration costs might choose to emigrate. The marginal citizen indifferent between leaving as a refugee and moving to the contested sector is the citizen for which $b - \theta_i = (1-r^*)\Big(u(c_x) - \theta_i\Big)$, is satisfied with equality. Notice that the refugee migration choice is made accounting for the government's chosen equilibrium use of force.

Rearranging, the marginal type is

$$\theta_F^* = \frac{b - u(c_x)}{r^*}.$$

Citizens with migration costs below this type will emigrate whereas all individuals with higher migration costs will remain until after the realization of government violence.

Since migration costs are distributed uniform from $[0, 1]$, the migration rate for refugees and the internally displaced is derived from the CDF of the continuous uniform distribution. First, for refugees,

$$\mu_F^* = \begin{cases} 0 & \text{if } \theta_F^* < 0 \\ \frac{b - u\left(c_x\left(v^*, r^*\right)\right)}{r^* \cdot \theta_F^*} & \text{if } \theta_F^* \in [0, 1) \\ 1 & \text{if } \theta_F^* \geq 1. \end{cases}$$

Thus, μ_F^* is uniquely determined by θ_F^*, and (3.3) can be used to characterize the equilibrium refugee migration threshold strategy for the citizens.

The internal displacement rate is given by,

$$\mu_D^* = \begin{cases} 0 & \text{if } \theta_D^* < \theta_F^* \\ \frac{u\left(c_x\right) - u\left(c_y\right) + v - \theta_F^*}{1 - \theta_F^*} & \text{if } \theta_D^* \in [\theta_F^*, 1) \\ 1 & \text{if } \theta_D^* \geq 1. \end{cases}$$

Notice in this case the lower bound of the distribution of migration costs for citizens' that may be internally displaced is θ_F^*. This is because all citizens with types $\theta_i \leq \theta_F^*$ migrate as refugees. μ_D^* is uniquely determined by θ_D^*, and (3.4) can be used to characterize the equilibrium refugee migration threshold strategy for the citizens. ■

Proof of Proposition 3.1:

Uniqueness of μ_D^* and μ_F follow from Lemma 3.2. By construction, the choice of v and r that solve the government's optimization problem are sequentially rational. Thus any solution to the government's problem given μ_D^*, and the citizens' thresholds strategies, characterizes an equilibrium.

The regime's problem is

$$\max_{v \in [0,1], r \in [0,1]} \; t_x\Big(\big(K_x\big)^{\alpha}\big(\ell + (1-r)\mu_D\big)^{\beta}\Big) + v t_y\Big(\big(K_y\big)^{\alpha}\big(r + (1-r)(1-\mu_D)\big)^{\beta}\Big) - z(v, r).$$

Since the production function is continuous in v and r and $[0, 1]$ is compact, a solution exists by the Extreme Value Theorem.

The solution is characterized by the first order conditions

$$t_x\Big(X_L(1-r)\frac{\partial \mu_D}{\partial v}\Big)+t_y\Big(Y\Big)-vt_y\Big(Y_L(1-r)\frac{\partial \mu_D}{\partial v}\Big)-z_v(v,r)=0,$$
$$t_x\Big(X_L\big((1-r)\frac{\partial \mu_D}{\partial r}-\mu_D\big)\Big)+vt_y\Big(Y_L\big(\mu_D-(1-r)\frac{\partial \mu_D}{\partial r}\big)\Big)-z_r(v,r)=0.$$

■

Proof of Remark 3.1: Differentiating the government's objective with respect to v,

$$t_x\Big(X_L(1-r)\frac{\partial \mu_D}{\partial v}\Big)+t_y\Big(Y\Big)-vt_y\Big(Y_L(1-r)\frac{\partial \mu_D}{\partial v}\Big)-z_v(v,r)=0.$$

To sign the effects of violence on internal displacement, implicitly differentiate μ_D^* with respect to v.

$$\frac{\partial \mu_D^*}{\partial v}=-\frac{\frac{1}{1-\theta_F^*}}{\frac{u'(c_x)(1-t_x)X_{LL}(1-r)+u'(c_y)(1-t_y)Y_{LL}(1-r)}{1-\theta_F^*}-1}>0. \tag{B.2}$$

Notice then that the first two terms of the government's first order condition for v are strictly positive. If these are sufficiently large, the government's problem is strictly increasing in v and therefore the government's optimal level of violence is $v^*=1$. The government will always choose $v^*<1$ if $vt_y\Big(Y_L(1-r)\frac{\partial \mu_D}{\partial v}\Big)$ or $z_v(v,r)$ are large. ■

Proof of Proposition 3.2:

Forced resettlement and violence are gross complements if a decrease in the cost of violence leads to an increase in the level of forced resettlement, holding fixed the cost of resettlement. Of interest is $\frac{dr^*}{dz(v)}$, which by the chain rule is $\frac{dr^*}{dz(v)}=\frac{dr^*}{dv^*}\Big(-\frac{dv^*}{dz(v)}\Big)$.

By inspection, given $z_v(v,r)>0$ and $z_{vv}(v,r)>0$, $-\frac{dv^*}{dz(v)}>0$. Since the first order conditions for the government characterize r^*, $\frac{dr^*}{dv^*}$ is equivalent to $\frac{\partial^2}{\partial r\partial r}\Big(t_x(X)+t_y(Y)\Big)$ where $\Big(t_x(X)+t_y(Y)\Big)$ represents the regimes objective function. The cross-partial of the regime's objective function signs the relationship between violence and forced resettlement. Differentiating with respect to v, $\frac{\partial^2}{\partial r\partial r}\Big(t_x(X)+t_y(Y)\Big)$ is

$$t_x\Big(X_{LL}\Big((1-r)\frac{\partial \mu_D}{\partial v}\Big)\Big((1-r)\frac{\partial \mu_D}{\partial r}-\mu_D\Big)+X_L\Big((1-r)\frac{\partial^2 \mu_D}{\partial r\partial v}-\frac{\partial \mu_D}{\partial v}\Big)\Big)+t_yY_L\Big(\mu_D-(1-r)\frac{\partial \mu_D}{\partial v}\Big)$$
$$+vt_y\Big(Y_{LL}\Big(-(1-r)\frac{\partial \mu_D}{\partial v}\Big)\Big(\mu_D-(1-r)\frac{\partial \mu_D}{\partial r}\Big)+Y_L\Big(\frac{\partial \mu_D}{\partial v}-(1-r)\frac{\partial^2 \mu_D}{\partial r\partial v}\Big)\Big)-z_{rv}(v,r).$$

Signing this expression requires signing $\frac{\partial \mu_D}{\partial r}$, which by implicit differentiation is

$$\frac{\partial \mu_D^*}{\partial r} = -\frac{\frac{-u'(c_x)(1-t_x)X_{LL}\mu_D - u'(c_y)(1-t_y)Y_{LL}\left(1-(1-\mu_D)\right)}{1-\theta_F^*}}{\frac{u'(c_x)(1-t_x)X_{LL}(1-r)+u'(c_y)(1-t_y)Y_{LL}(1-r)}{1-\theta_F^*} - 1} > 0.$$

The optimal level of forced resettlement to be increasing in violence if $\mu_D > (1-r)\frac{\partial \mu_D}{\partial r}$, $\frac{\partial^2 \mu_D}{\partial r \partial v} < 0$, $X_L\Big((1-r)\frac{\partial^2 \mu_D}{\partial r \partial v} - \frac{\partial \mu_D}{\partial v}\Big)$ is small, and $z_{rv}(v,r)$ is either positive and small or negative (given that there are no assumptions on the cross partial of the cost function). Note there are other conditions under which $\frac{\partial r^*}{\partial v^*} > 0$, though I focus on those above for substantive reasons. ■

Proof of Remark 3.2: The refugee migration rate enters the government's payoff indirectly through the effect of refugee migration on subsequent internal displacement. A change in μ_F implies a change in θ_F^*, which affects μ_D:

$$\frac{\partial \mu_D^*}{\partial \theta_F^*} = -\frac{\frac{u(c_x)-u(c_y)+v-1}{1-\theta_F^*}}{\frac{u'(c_x)(1-t_x)X_{LL}(1-r)+u'(c_y)(1-t_y)Y_{LL}(1-r)}{1-\theta_F^*} - 1},$$

which may be positive or negative since $v \leq 1$. If more citizens migrate as refugees, those that remain face less competition in the uncontested sector's labor market but also have higher individual costs for migration. Wages in the uncontested sector determine the sign of $\frac{\partial \mu_D^*}{\partial \theta_F^*}$.

The effect of refugee migration on resettlement then is,

$$\frac{\partial r^*}{\partial \theta_F^*} =$$
$$-\frac{t_x\Big(X_{LL}\Big((1-r)\frac{\partial \mu_D}{\partial \theta_F^*}\Big)\Big((1-r)\frac{\partial \mu_D}{\partial r} - \mu_D\Big) + X_L\Big((1-r)\frac{\partial^2 \mu_D}{\partial r \partial \theta_F^*} - \frac{\partial \mu_D}{\partial \theta_F^*}\Big)\Big)}{t_x\Big(X_{LL}\Big((1-r)\frac{\partial \mu_D}{\partial r} - \mu_D\Big)^2 + X_L\Big((1-r)\frac{\partial^2 \mu_D}{\partial r^2} - 2\frac{\partial \mu_D}{\partial r}\Big)\Big) + vt_y\Big(Y_{LL}\Big(\mu_D - (1-r)\frac{\partial \mu_D}{\partial r}\Big)^2 + Y_L\Big(2\frac{\partial \mu_D}{\partial r} - (1-r)\frac{\partial^2 \mu_D}{\partial r^2}\Big)\Big)}$$
$$+\frac{vt_y\Big(Y_{LL}\Big(-(1-r)\frac{\partial \mu_D}{\partial \theta_F^*}\Big)\Big(\mu_D - (1-r)\frac{\partial \mu_D}{\partial r}\Big) + Y_L\Big(\frac{\partial \mu_D}{\partial \theta_F^*} - (1-r)\frac{\partial^2 \mu_D}{\partial r \partial \theta_F^*}\Big)\Big))}{t_x\Big(X_{LL}\Big((1-r)\frac{\partial \mu_D}{\partial r} - \mu_D\Big)^2 + X_L\Big((1-r)\frac{\partial^2 \mu_D}{\partial r^2} - 2\frac{\partial \mu_D}{\partial r}\Big)\Big) + vt_y\Big(Y_{LL}\Big(\mu_D - (1-r)\frac{\partial \mu_D}{\partial r}\Big)^2 + Y_L\Big(2\frac{\partial \mu_D}{\partial r} - (1-r)\frac{\partial^2 \mu_D}{\partial r^2}\Big)\Big)},$$

which may be increasing or decreasing. If $\frac{\partial \mu_D^*}{\partial \theta_F^*} > 0$ and μ_D is large then $\frac{\partial r^*}{\partial \theta_F^*}$ is more likely to be positive. ■

Proof of Proposition 3.3: Because forced resettlement enters citizens' utility through the probability of being resettled and through consumption in each sector, the statement of μ_D^* and μ_F^* remain unchanged, though their realized values will changed when resettled citizens do not participate in the economy.

The government's problem is now given by

$$\max_{v,r} \; t_x\Big(\big(K_x\big)^\alpha\big(\ell + (1-r)\mu_D\big)^\beta\Big) + vt_y\Big(\big(K_y\big)^\alpha\big((1-r)(1-\mu_D)\big)^\beta\Big) + f(r) - z(v,r).$$

The optimal levels of violence and forced resettlement are characterized by the first order conditions

$$t_x\Big(X_L(1-r)\frac{\partial \mu_D}{\partial v}\Big) + t_y\Big(Y\Big) - vt_y\Big(Y_L(1-r)\frac{\partial \mu_D}{\partial v}\Big) - z_v(v,r) = 0,$$
$$t_x\Big(X_L\big((1-r)\frac{\partial \mu_D}{\partial r} - \mu_D\big)\Big) - vt_y\Big(Y_L\big((1-\mu_D) + (1-r)\frac{\partial \mu_D}{\partial r}\big)\Big) + f'(r) - z_r(v,r) = 0.$$

The optimal choice of v remains qualitatively unchanged because $\frac{\partial \mu_D}{\partial v}$ is still positive. Therefore, the same incentives constrain government violence.

For forced resettlement, the effect of r on internal displacement μ_D^* is now

$$\frac{\partial \mu_D^*}{\partial r} = -\frac{\frac{-u'(c_x)(1-t_x)X_{LL}\mu_D + u'(c_y)(1-t_y)Y_{LL}\left(1-\mu_D\right)}{1-\theta_F^*}}{\frac{u'(c_x)(1-t_x)X_{LL}(1-r) + u'(c_y)(1-t_y)Y_{LL}(1-r)}{1-\theta_F^*} - 1},$$

which may be positive or negative. If the marginal effect of forced resettlement on citizens' utility in the uncontested sector is large, $\frac{\partial \mu_D^*}{\partial r} > 0$ and the marginal effect of resettlement on the government's utility from the Y sector is negative. However, if the benefits of an increase in productivity in the X sector driven by increased internal migration compensates for reduced productivity in the Y sector, the government will choose the maximal level of r subject to the cost from $z(\cdot)$.

Alternatively, if the marginal effect of forced resettlement on citizens' utility in the contested sector is large, $\frac{\partial \mu_D^*}{\partial r} < 0$ and the marginal effect of resettlement on the government's utility from the X sector is negative. In addition, since the internal displacement rate is decreasing and $1 - \mu_D^*$ is larger, reducing the government's benefits from the Y sector. This leads to two possible scenarios: 1) if these effects are large, despite the direct benefits from $f(r)$, the government may maintain its level of violence and reduce forced resettlement; and 2) the government may substitute forced resettlement for violence if the cost $z(v)$ is high. Performing a similar exercise as for Proposition 3.2, $\frac{dr^*}{dv^*}$ is

$$t_x\Big(X_{LL}\Big((1-r)\frac{\partial \mu_D}{\partial v}\Big)\Big((1-r)\frac{\partial \mu_D}{\partial r} - \mu_D\Big) + X_L\Big((1-r)\frac{\partial^2 \mu_D}{\partial r \partial v} - \frac{\partial \mu_D}{\partial v}\Big)\Big) - t_y Y_L\Big((1-\mu_D) + (1-r)\frac{\partial \mu_D}{\partial v}\Big)$$
$$+ vt_y\Big(Y_{LL}\Big(-(1-r)\frac{\partial \mu_D}{\partial v}\Big)\Big((1-\mu_D) + (1-r)\frac{\partial \mu_D}{\partial r}\Big) - Y_L\Big(\frac{\partial \mu_D}{\partial v} + (1-r)\frac{\partial^2 \mu_D}{\partial r \partial v}\Big)\Big) - z_{rv}(v,r).$$

which for some range of parameters is strictly negative. Therefore, an increase in the cost of violence would reduce v^* and increase r^*. If the benefits from $f(r)$ are large, and $\frac{\partial^2 \mu_D}{\partial r \partial v} < 0$ such that the marginal effect of resettlement on migration is decreasing at high levels of violence (making it more likely violence and resettlement are substitutes), the government will substitute resettlement for violence. ■

Proof of Proposition 3.4: Implicitly differentiating r^* with respect to K_x,

$$\frac{\partial r^*}{\partial K_x} =$$
$$- \frac{t_x\Big(\Big[X_{LK} + X_{LL}\big((1-r)\frac{\partial \mu_D}{\partial k}\big)\Big]\Big((1-r)\frac{\partial \mu_D}{\partial r} - \mu_D\Big) + X_L\Big((1-r)\frac{\partial^2 \mu_D}{\partial r \partial K_x} - \frac{\partial \mu_D}{\partial K_x}\Big)\Big)}{t_x\Big(X_{LL}\Big((1-r)\frac{\partial \mu_D}{\partial r} - \mu_D\Big)^2 + X_L\Big((1-r)\frac{\partial^2 \mu_D}{\partial r^2} - 2\frac{\partial \mu_D}{\partial r}\Big)\Big) + vt_y\Big(Y_{LL}\Big(\mu_D - (1-r)\frac{\partial \mu_D}{\partial r}\Big)^2 + Y_L\Big(2\frac{\partial \mu_D}{\partial r} - (1-r)\frac{\partial^2 \mu_D}{\partial r^2}\Big)\Big)}$$
$$+ \frac{vt_y\Big(Y_{LL}\Big(-(1-r)\frac{\partial \mu_D}{\partial K_x}\Big)\Big(\mu_D - (1-r)\frac{\partial \mu_D}{\partial r}\Big) + Y_L\Big(\frac{\partial \mu_D}{\partial K_x} - (1-r)\frac{\partial^2 \mu_D}{\partial r \partial K_x}\Big)\Big)}{t_x\Big(X_{LL}\Big((1-r)\frac{\partial \mu_D}{\partial r} - \mu_D\Big)^2 + X_L\Big((1-r)\frac{\partial^2 \mu_D}{\partial r^2} - 2\frac{\partial \mu_D}{\partial r}\Big)\Big) + vt_y\Big(Y_{LL}\Big(\mu_D - (1-r)\frac{\partial \mu_D}{\partial r}\Big)^2 + Y_L\Big(2\frac{\partial \mu_D}{\partial r} - (1-r)\frac{\partial^2 \mu_D}{\partial r^2}\Big)\Big)}$$

To sign this expression, implicitly differentiate μ_D^* with respect to K_x,

$$\frac{\partial \mu_D^*}{\partial K_x} = -\frac{\frac{u'(c_x)(1-t_x)X_{LK}}{1-\theta_F^*}}{\frac{u'(c_x)(1-t_x)X_{LL}(1-r)+u'(c_y)(1-t_y)Y_{LL}(1-r)}{1-\theta_F^*} - 1} > 0.$$

$\frac{\partial r^*}{\partial K_x}$ can be positive or negative, but is more likely to be positive when μ_D is concave in r, $\frac{\partial^2 \mu_D}{\partial r \partial K_X} < 0$, and $\mu_D > (1-r)\frac{\partial \mu_D}{\partial} r$. Notice these are similar conditions to those than establish complementarity between violence and forced resettlement.

Finally, to see that an increase in K_x can decrease μ_F^*, the effect of K_x on refugee migration is

$$\frac{\partial \mu_F^*}{\partial K_x} = -\frac{\frac{-u'(c_x)(1-t_x)\Big[X_{LK} + X_{LL}\Big((1-r)\frac{\partial \mu_D}{\partial K_x}\Big)\Big]}{r^* \cdot \theta_F^*}}{\frac{-u'(c_x)(1-t_x)X_{LL}\Big((1-r)\frac{\partial \mu_D}{\partial \theta_F}\Big)}{r^* \cdot \theta_F^*} - 1},$$

which, if $\frac{\partial \mu_D^*}{\partial \theta_F^*} < 0$, i.e. more refugee migration decreases internal displacement, is decreasing if the marginal effect of the capital increase on wages in the X sector is large. ■

APPENDIX C

Appendix for Targeting Lives and Livelihoods

C.1 Proofs for Main Results

Proof of Lemma 4.1:

Because both the government and insurgent-affiliated economies feature Cobb-Douglas production technologies, I consider market clearing conditions for both economies simultaneously. An economy is represented by production technology $Y^j(K_j, L_j)$ for $j \in \{G, R\}$, which takes as inputs a stock of capital and a labor supply. The economies are assumed to be closed with full employment, perfect competition, and fixed factor supplies K_G, K_R, and $L_G + L_R = 1$ if $v_j = 0$, i.e. no citizens are victims of violence. Recall each citizen that chooses to participate in the economy earns a wage and consumes goods subject to the budget $w_j \geq c_j \cdot p_j$. An individual citizen's expected utility from supplying labor is $u(c_j)$. Because utility is increasing in consumption, by Walras's law the budget will be satisfied with equality for each citizen. Therefore, the individual's expected utility, given participation in the economy, can be rewritten as $u\left(\frac{w_j}{p_j}\right)$. All citizens for whom $(1-v_G)(1-v_R)u(\frac{w_G}{p_G}) - b(v_G, v_R) \geq (1-v_G)(1-v_R)u(\frac{w_R}{p_R}) + b(v_G, v_R)\theta_i$ support the government by supplying labor to its affiliated economy, while individuals for whom this inequality does not hold support the insurgent group. The participation rate in the regime economy is given by λ while $1 - \lambda$ is the labor supply for the insurgent economy.

There exists, in each economy, a number of profit maximizing firms indexed by i. Slightly abusing notation, firms in the government affiliated economy are referred to by G with output y_G, while firms in the insurgent-affiliated economy are labeled R with output y_R. The firms have production sets $G_1, G_2, ..., G_I$ and $R_1, R_2, ..., R_I$. Each J_i for $J \in \{G, R\}$ is non-empty, closed, and satisfies the free disposal property. Let $\pi_i(p_j)$ be the profit function and $y_j^i(p_j)$ the supply correspondence for each firm i in each economy j. Then the aggregate supply correspondence for

the government-affiliated economy is,

$$\begin{aligned} y_G(p_G) &= \sum_{i=1}^{I} y_G^i(p_G) \\ &= \left\{ y_G \in \mathbb{R}^L | y_G = \sum_{i=1}^{I} y_G^i \text{ for some } y_G^i \in y_G^i(p_G), i = 1, ..., I \right\}, \end{aligned}$$

which is the sum of the individual supply correspondences. The aggregate supply correspondence for the insurgent-affiliated economy is defined analogously. Let each supply correspondence $y_j^i(p_j)$ be a differentiable function of prices. The aggregate production set for firms G is,

$$\begin{aligned} G &= G_1 + G_2 + ... + G_I \\ &= \{ y_G \in \mathbb{R}^L | y_G = \sum_{i=1}^{I} y_G^i \text{ for some } y_G^i \in G_i, \text{ for } i = 1, ..., I \}, \end{aligned}$$

again with the aggregate production set for firms R defined analogously. Let $\pi^*(p_j)$ be the profit function associated with the aggregate production set for each economy and $y_j^*(p_j)$ be the supply correspondence associated with the aggregate production set for each economy. Then for all $p \gg 0$, $\pi^*(p_j) = \sum_{i=1}^{I} \pi_i(p_j)$ and $y_j^*(p_j) = \sum_{i=1}^{I} y_j^i(p_j)$. In other words, the solution to the aggregate profit maximization problem in each economy for prices p_j is the sum of the corresponding individual profit maximization problems for firms in that economy. Therefore, for the remainder of the analysis I only consider the representative firm.

The representative firm in each sector has profits given by $p_j(1 - t_j)Y^j(K^j, L^j) - w_j \cdot L_j$ where p_j is the price of the good y_j produced by the firm and t_j represents taxes collected by the government or insurgent group. The firm then solves

$$\max_L \; p_j(1 - t_j)Y^j(K_j, L_j) - w_j \cdot L_j.$$

The first order condition is

$$p_j(1 - t_j)Y_L^j(K_j, L_j) = w_j.$$

Posit an $L_j^\dagger$, which is the labor supply that solves the firm's problem. For a given wage w_j and optimally chosen labor supply $L_j^\dagger$, the firm's profit is

$$\pi_j(w_j) = p_j(1 - t_j) \cdot Y^j(K_j, L_j^\dagger(w_j)) - w_j \cdot L_j^\dagger.$$

For the labor market to clear, the labor supplied by the citizens to each side of the conflict must equal the labor demanded by the firm in each economy in equilibrium. Formally, labor market

clearing requires $(1-v_G)(1-v_R)\lambda^* = L_G^\dagger$, and $(1-v_G)(1-v_R)(1-\lambda^*) = L_R^\dagger$ for given levels of violence and capital destruction. For this to hold, there must exist a wage w_j^* such that labor supply equals labor demand, given that citizens are choosing optimally whether or not to supply labor and the firm is maximizing profits.

Labor market clearing requires the threshold strategy that determines citizens' participation decision and the first order condition for the firm hold simultaneously. Using the firm's FOC for both insurgent and government economies, and substituting for the wage in the citizen's strategy yields

$$\begin{aligned}(1-v_G)(1-v_R)u\Big(\frac{p_G(1-t_G)Y_L^G(K_G,L_G)}{p_G}\Big) - b(v_G,v_R) \geq \\ (1-v_G)(1-v_R)u\Big(\frac{p_R(1-t_R)Y_L^R(K_R,L_R)}{p_R}\Big) + b(v_G,v_R)\theta_i.\end{aligned} \tag{C.1}$$

Of interest are the unknown L_G and L_R in this expression,. The L_G and L_R that solve this equation are the competitive equilibrium levels of employment, which I will refer to as $L_G^* = (1-v_G)(1-v_R)\lambda^*$ and $L_R^* = (1-v_G)(1-v_R)(1-\lambda^*)$. Given equilibrium employment, it is straightforward to determine equilibrium wages and consumption. The wage in equilibrium is the marginal revenue product of labor $w_j^* = p_j(1-t_j)Y_L^j(K_j,L_j)$. Consumption is equivalent to the real wage, $c_j^* = \frac{p_j(1-t_j)Y_L^j(K_j,L_j)}{p_j}$, which simplifies to $c_j^* = (1-t_j)Y_L^j(K_j,L_j)$.

Given citizens' expenditure, what remains is to determine equilibrium prices for good y_j. The supply of y_j is $p_j(1-t_j)Y^j$. Setting supply and demand equal, $p_j(1-t_j)Y^j = (1-t_j)Y_L^j(K_j,L_j)$, then price $p_j^* = \frac{Y_L^j}{Y^j}$, which is the semi-elasticity of production with respect to labor. ■

Proof of Lemma 4.2: First, assume a fixed d_G, d_R, v_G, and v_R. This allows for focus on the relationship between θ and λ while bracketing out their mutual dependency on violence against citizens and capital destruction.

Consider the individual citizen's tradeoff given by Equation 4.1. She will choose to support the insurgents if the left-hand side is smaller than the right-hand side. The marginal citizen that is indifferent between joining the opposition or participating in the economy is the citizen for which this equation is satisfied with equality.

Rearranging the payoff comparison for the marginal type

$$\theta^* = \frac{(1-v_G)(1-v_R)\big(u((1-t_G)Y_L^G) - u((1-t_R)Y_L^R)\big)}{b(v_G,v_R)},$$

gives a threshold in the ideological space above which all individuals will join the insurgent group. Since ideology is distributed uniform from $[0,1]$, the labor force participation rate in the government-affiliated economy (i.e. the proportion of citizens who opt to participate in this econ-

omy) is derived from the CDF of the continuous uniform distribution.

$$\lambda^* = \begin{cases} 0 & \text{if } \theta^* < 0 \\ \frac{(1-v_G)(1-v_R)\left(u((1-t_G)Y_L^G) - u((1-t_R)Y_L^R)\right)}{b(v_G,v_R)} & \text{if } \theta^* \in [0,1) \\ 1 & \text{if } \theta^* \geq 1. \end{cases}$$

Thus λ^* is uniquely determined by θ^*, participation in the insurgent-affiliated economy is $1-\lambda^*$, and λ^* can be used to characterize the equilibrium labor force participation threshold strategy for the citizens. ■

Proof of Proposition 4.1: For the first part of the result, that $\tilde{d_G} = \tilde{d_R} = 1$, fixing the levels of violence against citizens, v_G and v_R and implicitly differentiating λ with respect to d_G and d_R gives the effect of destruction of capital on labor force participation in the government's economy. These results can be considered intermediate comparative statics of the citizen's subgame because, from the citizens perspective, the choice of violence by the insurgents and government has been realized when they make their support decision. I denote government labor force participation for fixed levels of violence $\lambda^\dagger$ to highlight that this is not an equilibrium quantity.

Implicitly differentiating $\lambda^\dagger$ with respect to d_G,

$$\frac{\partial \lambda^\dagger}{\partial d_G} = -\frac{(1-v_G)(1-v_R)\Big(-u'\big((1-t_R)Y_L^R\big)\cdot(1-t_R)Y_{LK}^R(-\delta K_R e^{-\delta d_G})\Big)}{\big((1-v_G)(1-v_R)\big)^2\Big(u'\big((1-t_G)Y_L^G\big)\cdot(1-t_G)Y_{LL}^G + u'\big((1-t_R)Y_L^R\big)\cdot(1-t_R)Y_{LL}^R\Big) - 1} > 0.$$

Implicitly differentiating $\lambda^\dagger$ with respect to d_R,

$$\frac{\partial \lambda^\dagger}{\partial d_R} = -\frac{(1-v_G)(1-v_R)\Big(-u'\big((1-t_G)Y_L^G\big)\cdot(1-t_G)Y_{LK}^G(-K_G e^{-d_R})\Big)}{\big((1-v_G)(1-v_R)\big)^2\Big(u'\big((1-t_G)Y_L^G\big)\cdot(1-t_G)Y_{LL}^G + u'\big((1-t_R)Y_L^R\big)\cdot(1-t_R)Y_{LL}^R\Big) - 1} < 0.$$

These effects give that the government's problem is strictly decreasing in d_G while the insurgent's problem is strictly decreasing in d_R.

For the second part, using the first order conditions for violence against opponent supporters,

$$v_G^* = \frac{(1-\lambda^*)}{\left(\frac{\partial \lambda^*}{\partial v_G}\right)} + 1 \qquad\qquad v_R^* = 1 - \frac{\lambda^*}{\left(\frac{\partial \lambda^*}{\partial v_R}\right)}$$

The optimal choice of violence against opponent supporters depends on the downstream effect of violence on labor force participation. Performing the same intermediate comparative static exercise holding destruction of capital d_G and d_R fixed, where c_j is substituted for $(1-t_j)Y^j$ for space,

$$\frac{\partial \lambda^\dagger}{\partial v_G} = -\frac{(1-v_R)\Big((1-v_G)\Big(u'(c_R)(1-t_R)Y_{LL}^R(1-v_R)(1-\lambda^\dagger) - u'(c_G)(1-t_G)Y_{LL}^G(1-v_R)\lambda^\dagger\Big) - \Big(u(c_G)-u(c_R)\Big)\Big)}{\big((1-v_G)(1-v_R)\big)^2\Big(u'\big(c_G\big)\cdot(1-t_G)Y_{LL}^G + u'\big(c_R\big)\cdot(1-t_R)Y_{LL}^R\Big) - 1},$$

the sign of which may be positive or negative. Implicitly differentiating $\lambda^\dagger$ with respect to v_R,

$$\frac{\partial \lambda^\dagger}{\partial v_R} = -\frac{(1-v_G)\Big((1-v_R)\Big(u'(c_R)(1-t_R)Y_{LL}^R(1-v_G)(1-\lambda^\dagger) - u'(c_G)(1-t_G)Y_{LL}^G(1-v_G)\lambda^\dagger\Big) - \Big(u(c_G)-u(c_R)\Big)\Big)}{\big((1-v_G)(1-v_R)\big)^2\Big(u'\big(c_G\big)\cdot(1-t_G)Y_{LL}^G + u'\big(c_R\big)\cdot(1-t_R)Y_{LL}^R\Big) - 1},$$

the sign of which may also be positive or negative. Both $\frac{\partial \lambda^\dagger}{\partial v_G}$ and $\frac{\partial \lambda^\dagger}{\partial v_R}$ have the same sign. Therefore, the effect of both violence by the government and violence by the insurgents has the same direction, though the effect of violence may be positive or negative. The sign of these labor force participation effects also determines which side chooses a higher level of violence against the other's supporters. Formally, if $\frac{\partial \lambda^*}{\partial v_G} > 0$ and $\frac{\partial \lambda^*}{\partial v_R} > 0$, then $v_G \geq v_R$, noting that λ^* in this case is an equilibrium quantity.

Violence increases government labor force participation, i.e. $\frac{\partial \lambda^*}{\partial v_G} > 0$ and $\frac{\partial \lambda^*}{\partial v_R} > 0$, when

$$(1-v_G)(1-v_R)\Big(u'\big(c_G\big)(1-t_G)Y_{LL}^G(-\lambda^*)+u'\big(c_R\big)(1-t_R)Y_{LL}^R(1-\lambda^*)\Big) > u\big(c_G\big)-u\big(c_R\big). \quad \text{(C.2)}$$

Let citizens' utility of consumption be linear, such that $u\big((1-t_j)Y_L^j\big) = (1-t_j)Y_L^j$. Then Equation (C.2) can be rewritten as

$$(1-v_G)(1-v_R)\Big((1-t_G)Y_{LL}^G(-\lambda^*) + (1-t_R)Y_{LL}^R(1-\lambda^*)\Big) > (1-t_G)Y_L^G - (1-t_R)Y_L^R.$$

If $t_G = t_R$, this simplifies to

$$(1-v_G)(1-v_R) < \frac{(1-v_G)(1-v_R)}{1-\beta},$$
$$(1-\beta) < 1,$$

which is always true by assumption. Therefore, the government always chooses $v_G \approx 1$. This result is used to produce Figure 4.1.

Alternatively, let $u\big((1-t_j)Y_L^j\big) = \ln\big((1-t_j)Y_L^j\big)$. Then, rewrite Equation (C.2) as

$$(1-v_G)(1-v_R)\left(\left(\frac{1}{(1-t_G)Y_L^G}\right)(1-t_G)Y_{LL}^G(-\lambda^*) + \left(\frac{1}{(1-t_R)Y_L^R}\right)(1-t_R)Y_{LL}^R(1-\lambda^*)\right)$$
$$> \ln\big((1-t_G)Y_L^G\big) - \ln\big((1-t_R)Y_L^R\big)$$

If returns to scale for labor are the same in the insurgent and government affiliated economies then the left-hand side simplifies to 0. Thus, $v_G \approx 1$ if wages in the insurgent economy are higher than in the government economy. ■

Proof of Proposition 4.2: Uniqueness of λ^* follows from Lemma 4.2. By construction, the

choice of d_G and v_G that solve the government's optimization problem and the choice of d_R and v_R that solve the insurgent group's optimization problem are sequentially rational. Thus a solution to the insurgents' problem, a solution to the government's problem, given λ^*, and the citizens' thresholds strategy characterizes an equilibrium.

The government's problem is

$$\min_{d_G, v_G} \quad t_R\Big(K_R e^{-\delta d_G}\Big)^{\alpha}\Big((1-v_G)(1-v_R)(1-\lambda^*)\Big)^{\beta} + z(d_G).$$

Since the production function is continuous in d_G and v_G and $[0,1]$ is compact, a solution exists by the Extreme Value Theorem. The solution is characterized by the first order conditions

$$t_R\Bigg(Y_K^R\Big(-\delta K_R e^{-d_G}\Big) - Y_L^R\Big((1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial d_G}\Big)\Bigg) + z'(d_G) = 0,$$
$$t_R\Bigg(Y_L^R\Big(-(1-v_R)(1-\lambda^*) - (1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial v_G}\Big)\Bigg) = 0,$$

and may be interior. An interior choice of d_G is ensured by sufficiently high costs $z(d_G)$. The government will not choose $v_G = 1$ because this drives the wage, Y_L^G to infinity. If $\frac{\partial \lambda^*}{\partial v_G} < 0$, the government may choose $v_G = 0$. This may occur if the citizens place particularly high value on the benefits offered by the insurgent group. When $\frac{\partial \lambda^*}{\partial v_G} > 0$, an interior optimum exists. Implicitly differentiating λ^* with respect to v_G,

$$\frac{\partial \lambda^*}{\partial v_G} = -1 \times \frac{\frac{(1-v_R)\Big(b(v_G,v_R)\Big[(1-v_G)(1-v_R)\big(u'(c_G)(1-t_G)Y_{LL}^G(-\lambda^*)+u'(c_R)(1-t_R)Y_{LL}^R(1-\lambda^*)\big)-\big(u(c_G)-u(c_R)\big)\Big]-(1-v_G)\big(u(c_G)-u(c_R)\big)b_G(v_G,v_R)\Big)}{b\big(v_G,v_R\big)^2}}{b(v_G,v_R)\Big[\big((1-v_G)(1-v_R)\big)^2\Big(u'\big(c_G\big)(1-t_G)Y_{LL}^G - u'\big(c_R\big)(1-t_R)Y_{LL}^R\Big) - b(v_G,v_R)\Big]},$$

the sign of which may also be positive or negative. I restrict attention to interior solutions for the remainder of the analysis.

The insurgent's problem is

$$\min_{d_R, v_R} \quad t_G\Big(K_G e^{-d_R}\Big)^{\alpha}\Big((1-v_G^*)(1-v_R)\lambda^*\Big)^{\beta} + \zeta(d_R).$$

Since the production function is continuous in d_R and v_R and $[0,1]$ is compact, a solution exists by

the Extreme Value Theorem. The solution is characterized by the first order conditions

$$t_G\Big(Y_K^G\Big(-K_G e^{-d_R}\Big) + Y_L^G\Big((1-v_G^*)(1-v_R)\frac{\partial\lambda^*}{\partial d_R}\Big)\Big) + \zeta'(d_G) = 0$$

$$t_G\Big(Y_L^G\Big(-(1-v_G^*)\lambda^* + (1-v_G^*)(1-v_R)\frac{\partial\lambda^*}{\partial v_R}\Big)\Big) = 0$$

Similarly, I restrict attention to interior optima for the insurgents' problem.

The government' level of capital destruction is higher than the level of violence against citizens in two cases. First, if the government's problem is increasing in v_G and second, if $|\ \frac{\partial t_G Y^G}{\partial d_G}\ | > |\ \frac{\partial t_G Y^G}{\partial v_G}\ |$. The first condition holds if $\frac{\partial t_G Y^G}{\partial v_G}$ is negative and sufficiently large while the second condition holds when $\frac{\partial t_G Y^G}{\partial v_G}$ is positive and sufficiently large and the cost of destroying capital is relatively small. An analogous result holds for the insurgent group. ■

Proof of Proposition 4.3: Of interest is $\frac{dv_R^*}{d\zeta} = \frac{dv_R^*}{dd_R^*}\Big(\frac{dd_R}{d\zeta}\Big)$. Violence against citizens and capital destruction are substitutes when an increase in ζ leads to an increase in v_R. By inspection, given $\zeta'(\cdot) > 0$ and $\zeta''(\cdot) < 0$, $\frac{\partial d_R}{\partial \zeta} < 0$. Implicitly differentiating the first-order condition for v_R, $\frac{\partial v_R^*}{\partial d_R^*}$ is

Since the first order conditions for the insurgent group characterize v_R^*, $\frac{dv_R^*}{dd_R^*}$ is equivalent to $\frac{\partial^2}{\partial v_R \partial d_R}\Big(t_G\big(Y^G(v_R,d_R)\big)\Big)$ where $\Big(t_G\big(Y^G(v_R,d_R)\big)\Big)$ represents the insurgents' objective function. The cross-partial of the group's objective function signs the relationship between violence and capital targeting. Differentiating with respect to d_R, $\frac{\partial^2}{\partial v_R \partial d_R}\Big(t_G\big(Y^G(v_R,d_R)\big)\Big)$ is

$$t_G\Big(Y_{LK}^G\big(-K_G e^{-d_R}\big)\Big(-(1-v_G)\lambda^* + (1-v_G)(1-v_R)\frac{\partial\lambda^*}{\partial v_R}\Big) + Y_L^G\Big((1-v_G)(1-v_R)\frac{\partial^2\lambda^*}{\partial v_R \partial d_R} - (1-v_G)\frac{\partial\lambda^*}{\partial d_R}\Big).$$

In equilibrium, $\frac{\partial\lambda^*}{\partial v_R} = \frac{\lambda^*}{(1-v_R)}$. Substituting for $\frac{\partial\lambda^*}{\partial v_R}$, $\frac{\partial^2}{\partial v_R \partial d_R}\Big(t_G\big(Y^G(v_R,d_R)\big)\Big)$ simplifies to

$$\frac{\partial^2}{\partial v_R \partial d_R}\Big(t_G\big(Y^G(v_R,d_R)\big)\Big) = (1-v_G)(1-v_R)\frac{\partial^2\lambda^*}{\partial v_R \partial d_R} - (1-v_G)\frac{\partial\lambda^*}{\partial d_R}. \qquad \text{(C.3)}$$

Implicitly differentiating λ^* with respect to d_R gives $\frac{\partial\lambda^*}{\partial d_R}$,

$$\frac{\partial\lambda^*}{\partial d_R} = -\frac{\frac{-(1-v_G)(1-v_R)u'\big(c_G\big)(1-t_G)Y_{LK}^G\big(-K_G e^{-d_R}\big)}{b\big(v_G,v_R\big)}}{b(v_G,v_R)\Big[\big((1-v_G)(1-v_R)\big)^2\Big(u'\big(c_G\big)(1-t_G)Y_{LL}^G - u'\big(c_R\big)(1-t_R)Y_{LL}^R\Big) - b(v_G,v_R)\Big]} < 0,$$

where c_j is substituted for $(1-t_j)Y_L^j$. Performing the same exercise for v_R,

$$\frac{\partial \lambda^*}{\partial v_R} = -1\times \frac{\frac{(1-v_G)\left(b(v_G,v_R)\left[(1-v_G)(1-v_R)\left(u'(c_G)(1-t_G)Y_{LL}^G(-\lambda^*)+u'(c_R)(1-t_R)Y_{LL}^R(1-\lambda^*)\right)-\left(u(c_G)-u(c_R)\right)\right]-(1-v_R)\left(u(c_G)-u(c_R)\right)b_R(v_G,v_R)\right)}{b\left(v_G,v_R\right)^2}}{b(v_G,v_R)\left[\left((1-v_G)(1-v_R)\right)^2\left(u'(c_G)(1-t_G)Y_{LL}^G-u'(c_R)(1-t_R)Y_{LL}^R\right)-b(v_G,v_R)\right]},$$

the sign of which may be positive or negative. The sign of Equation (C.3) is determined by the sign of $\frac{\partial^2 \lambda^*}{\partial d_R \partial v_R}$, which is determined by its numerator,

$$\begin{aligned}
&b(v_G,v_R)\Big[\big((1-v_G)(1-v_R)\big)^2\big(u'(c_G)(1-t_G)Y_{LL}^G+u'(c_R)(1-t_R)Y_{LL}^R\big)-b(v_G,v_R)\Big]\times\\
&\frac{-K_G e^{-d_R}(1-v_G)\Big(u(c_G)(1-t_G)Y_{LK}^G b(v_G,v_R)-(1-v_R)u'(c_G)(1-t_G)Y_{LK}^G b_R(v_G,v_R)\Big)}{\big(b(v_G,v_R)\big)^2}+\\
&\frac{K_G e^{-d_R}(1-v_G)(1-v_R)u'(c_G)(1-t_G)Y_{LK}^G}{b(v_G,v_R)}\times\\
&\Big\{(1-v_G)(1-v_R)\big(u'(c_G)(1-t_G)Y_{LL}^G+u'(c_R)(1-t_R)Y_{LL}^R\big)\Big[b_R(v_G,v_R)(1-v_G)(1-v_R)\\
&-b(v_G,v_R)\big(2(1-v_G)\big)\big]-2b(v_G,v_R)b_R(v_G,v_R)\Big]\Big\}
\end{aligned}$$

the first term of which is positive while the second term is negative.

Violence against citizens and destruction of capital are substitutes, i.e. $\frac{\partial v_R^*}{\partial d_R^*}<0$, when $\frac{\partial^2 \lambda^*}{\partial d_R \partial v_R}<0$ and sufficiently large. If $\frac{\partial^2 \lambda^*}{\partial d_R \partial v_R}>0$ then $\frac{\partial v_R^*}{\partial d_R^*}>0$ and violence against citizens and destruction of capital are complements. ■

Proof of Proposition 4.4: Considering $\frac{\partial v_G^*}{\partial \zeta} = \frac{\partial v_G^*}{\partial v_R^*}\left(\frac{\partial v_R^*}{\partial \zeta}\right)$, having established conditions under which $\frac{\partial v_R^*}{\partial \zeta}<0$ what remains is to sign $\frac{\partial v_G^*}{\partial v_R^*}$. Notice for the government v_R^* is exogenous and the first order conditions defines v_G^* as an implicit function. Therefore, using the first order conditions of the government's and insurgents' problems, by implicit differentiation

$$\begin{aligned}
\frac{\partial v_G^*}{\partial v_R^*} = -1\times &\frac{t_R\Big(Y_{LL}^R\big(-(1-v_G)\lambda^*-(1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial v_R}\big)\big(-(1-v_R)(1-\lambda^*)-(1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial v_G}\big)+Y_L^G\big((1-\lambda^*)\Big)}{t_R\Big(Y_{LL}^R\big(-(1-v_R)(1-\lambda^*)-(1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial v_G}\big)^2+Y_L^R\big(2(1-v_R)\frac{\partial \lambda^*}{\partial v_R}-(1-v_G)(1-v_R)\frac{\partial^2 \lambda^*}{\partial v_G^2}\big)\Big)}\\
&-\frac{t_R\Big((1-v_R)\frac{\partial \lambda^*}{\partial v_R}-(1-v_G)(1-v_R)\frac{\partial^2 \lambda^*}{\partial v_G \partial v_R}\big)\Big)}{t_R\Big(Y_{LL}^R\big(-(1-v_R)(1-\lambda^*)-(1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial v_G}\big)^2+Y_L^R\big(2(1-v_R)\frac{\partial \lambda^*}{\partial v_R}-(1-v_G)(1-v_R)\frac{\partial^2 \lambda^*}{\partial v_G^2}\big)\Big)}.
\end{aligned} \tag{C.4}$$

In equilibrium, $\frac{\partial \lambda^*}{\partial v_R} = \frac{\lambda^*}{(1-v_R)}$ and $\frac{\partial \lambda^*}{\partial v_G} = \frac{-(1-\lambda^*)}{(1-v_G)}$. Therefore, Equation (C.4) simplifies to

$$\frac{\partial v_G^*}{\partial v_R^*} = -\frac{Y_L^R\big(\lambda - (1-v_G)(1-v_R)\frac{\partial^2 \lambda^*}{\partial v_G \partial v_R}\big) - (1-v_G)Y_{LL}^R}{Y_L^R\big(2(1-v_R)\frac{-(1-\lambda^*)}{(1-v_G)} - (1-v_G)(1-v_R)\frac{\partial^2 \lambda^*}{\partial v_G^2}\big)}.$$

The sign of $\frac{\partial v_G^*}{\partial v_R^*}$ is determined by the concavity/convexity of λ^* with respect to v_G and the sign of $\frac{\partial^2 \lambda^*}{\partial v_G \partial v_R}$, which is determined by its numerator, below.

$$
\begin{aligned}
&b(v_G,v_R)\Big[\big((1-v_G)(1-v_R)\big)^2\big(u'(c_G)(1-t_G)Y_{LL}^G + u'(c_R)(1-t_R)Y_{LL}^R\big) - b(v_G,v_R)\Big] \times \\
&\Bigg\{\frac{-(1-v_G)\Big(b(v_G,v_R)\big[u'(c_R)(1-t_R)Y_{LL}^R(1-\lambda^*) - u'(c_G)(1-t_G)Y_{LL}^G(\lambda^*) - \big(u(c_G)-u(c_R)\big)\big] - \big(u(c_G)-u(c_R)\big)b_G(v_G,v_R)\Big)}{\Big(b(v_G,v_R)\Big)^2} + \\
&\frac{(1-v_G)(1-v_R)\Big((1-v_G)(1-v_R)(\lambda^*)^2\big[u''(c_G)\big((1-t_G)Y_{LL}^G\big)^2 + u'(c_G)(1-t_G)Y_{LLL}^G\big] + u'(c_G)(1-t_G)Y_{LL}^G(\lambda^*)\Big)}{b(v_G,v_R)} + \\
&\frac{(1-v_G)(1-v_R)\Big(-(1-v_G)(1-v_R)(1-\lambda^*)^2\big[u''(c_R)\big((1-t_R)Y_{LL}^R\big)^2 + u'(c_R)(1-t_R)Y_{LLL}^R\big] - u'(c_R)(1-t_R)Y_{LL}^R(1-\lambda^*)\Big)}{b(v_G,v_R)} - \\
&\frac{(1-v_R)\Big(-u'(c_G)(1-t_G)Y_{LL}^G(1-v_G)(\lambda^*) + u'(c_R)(1-t_R)Y_{LL}^R(1-v_G)(1-\lambda^*)\Big)}{b(v_G,v_R)} - \\
&\frac{(1-v_G)(1-v_R)\Big(-u'(c_G)(1-t_G)Y_{LL}^G(1-v_G)(\lambda^*) + u'(c_R)(1-t_R)Y_{LL}^R(1-v_G)(1-\lambda^*)\Big)b_R(v_G,v_R)}{b(v_G,v_R)^2} - \\
&\frac{(1-v_G)(1-v_R)\Big(b(v_G,v_R)[u'(c_R)(1-t_R)Y_{LL}^R(1-\lambda^*) - u'(c_G)(1-t_G)Y_{LL}^G(\lambda^*)]\Big)(2b_R(v_G,v_R))}{\Big(b(v_G,v_R)\Big)^3} - \\
&\frac{(1-v_G)(1-v_R)\Big(\big(u(c_G)-u(c_R)\big)\big(b(v_G,v_R)+b_G(v_G,v_R)\big)\Big)(2b_R(v_G,v_R))}{\Big(b(v_G,v_R)\Big)^3}\Bigg\} - \\
&\frac{(1-v_G)(1-v_R)^2 b(v_G,v_R)\Big(u'(c_R)(1-t_R)Y_{LL}^R(1-\lambda^*) - u'(c_G)(1-t_G)Y_{LL}^G(\lambda^*)\Big)\Big)}{b(v_G,v_R)^2} - \\
&\frac{(1-v_G)(1-v_R)^2 b(v_G,v_R)\Big((1-v_R)\big(u(c_G)-u(c_R)\big)\Big(b(v_G,v_R)+(1-v_G)b_G(v_G,v_R)\Big)}{b(v_G,v_R)^2} \\
&\times\Big\{b_R(v_G,v_R)\Big(\big((1-v_G)(1-v_R)\big)^2\big(u'(c_G)(1-t_G)Y_{LL}^G + u'(c_R)(1-t_R)Y_{LL}^R\big)\Big) - \\
&b(v_G,v_R)\Big(2(1-v_G)^2(1-v_R)\big(u'(c_G)(1-t_G)Y_{LL}^G + u'(c_R)(1-t_R)Y_{LL}^R\big)\Big) - 2b(v_G,v_R)b_R(v_G,v_R)\Big\}
\end{aligned}
$$

For some range of parameters, $\frac{\partial v_G^*}{\partial v_R^*} < 0$. ■

Proof of Proposition 4.5: The sign of $\frac{\partial^2 \lambda^*}{\partial v_G \partial v_R}$ depends on the sign of $\frac{\partial b(v_G,v_R)}{\partial v_G \partial v_R}$. Recall I have made no assumptions about $\frac{\partial b(v_G,v_R)}{\partial v_G \partial v_R}$. If $\frac{\partial b(v_G,v_R)}{\partial v_G \partial v_R} > 0$ then it is more likely $\frac{\partial^2 \lambda^*}{\partial v_G \partial v_R}$ is negative. If $\frac{\partial b(v_G,v_R)}{\partial v_G \partial v_R} < 0$, it is more likely $\frac{\partial^2 \lambda^*}{\partial v_G \partial v_R}$ is positive. ■

C.2 Supplementary Appendix: Exogenous Change in Capital

Consider an exogenous shift in the initial capital stock K_R in the economy affiliated with the insurgent group, which may indicate financial or material support by a third-party or some other

windfall. Of interest is how this shock affects citizens' labor force participation decision and the levels of violence against citizens and destruction of capital chosen by both combatants. Starting with the citizens' choice, the effect of the change in K_R on citizens is captured by its effect on labor force participation λ^*. Implicitly differentiating λ^* with respect to K_R,

$$\frac{\partial \lambda^*}{\partial K_R} = -\frac{\frac{(1-v_G)(1-v_R)\Big(u\big((1-t_G)Y_L^G\big)-u'\big((1-t_R)Y_L^R\big)(1-t_R)Y_{LK}^R\big(e^{-\delta d_G}\big)\Big)}{b(v_G,v_R)}}{b(v_G,v_R)\Big[\big((1-v_G)(1-v_R)\big)^2\Big(u'\big(c_G\big)(1-t_G)Y_{LL}^G - u'\big(c_R\big)(1-t_R)Y_{LL}^R\Big) - b(v_G,v_R)\Big]}$$

If the marginal increase in real wages offered in the insurgent-affiliated economy that results from the change in capital is sufficiently large, then support for the government is decreasing in the size of the insurgent capital stock.

Of interest is the effect a change in the insurgents' capital stock has on the levels of government violence. Implicitly differentiating the first order conditions for the government yields

$$\frac{\partial d_G^*}{\partial K_R} = -1\times \frac{t_R\Big(-\delta K_R\big(e^{-\delta d_G}\big)^2 Y_{KK}^R - Y_K^R\big(\delta e^{\delta d_G}\big) - Y_{LK}^R\big((1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial d_G}(e^{-\delta d_G})\big) + Y_L^R\big((1-v_G)(1-v_R)\frac{\partial^2 \lambda^*}{\partial d_G K_R}\big)\Big)}{t_R\Big(\big(-\delta K_R e^{-\delta d_G}\big)^2 Y_{KK}^R + Y_K^R\big(\delta^2 K_R e^{\delta d_G}\big) + Y_{LK}^R\big((1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial d_G}(\delta K_R e^{-\delta d_G})\big) - Y_L^R\big((1-v_G)(1-v_R)\frac{\partial^2 \lambda^*}{\partial d_G^2}\Big) + z''(d_G)}$$

for destruction of capital and

$$\frac{\partial v_G^*}{\partial K_R} = -\frac{t_R\Big(Y_{LK}^R\big(e^{\delta d_G}\big)\big(-(1-v_R)(1-\lambda^*) - (1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial v_G}\big) + Y_L^R\big((1-v_R)\frac{\partial \lambda^*}{\partial K_R} - (1-v_G)(1-v_R)\frac{\partial^2 \lambda^*}{\partial v_G \partial K_R}\big)\Big)}{t_R\Big(Y_{LL}^R\big(-(1-v_R)(1-\lambda^*) - (1-v_G)(1-v_R)\frac{\partial \lambda^*}{\partial v_G}\big)^2 + Y_L^R\big((1-v_R)\frac{\partial \lambda^*}{\partial v_G} + (1-v_R)\frac{\partial \lambda^*}{\partial v_G} - (1-v_G)(1-v_R)\frac{\partial^2 \lambda^*}{\partial v_G^2}\big)\Big)},$$

which simplifies to

$$\frac{\partial v_G^*}{\partial K_R} = -\frac{\frac{\partial \lambda^*}{\partial v_R} - (1-v_G)\frac{\partial^2 \lambda^*}{\partial v_G \partial K_R}}{2\frac{\partial \lambda^*}{\partial v_G} - (1-v_G)\frac{\partial^2 \lambda^*}{\partial v_G^2}},$$

for violence against citizens. Both of these effects may be positive or negative. Shifts in optimal levels of violence and capital destruction are determined the effects of increasing the insurgents' capital stock on citizens' labor force participation decision λ^*. These comparative statics highlight that the wage mechanism explicated throughout the main analysis also determines any affect foreign aid may have on violence.

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