CLIMATE SHOCKS AND VIOLENT CONFLICT INCENTIVES: EVIDENCE FROM THE INDIAN SUB-CONTINENT

by

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A thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Arts in Political Science

Boise State University

May 2022

BOISE STATE UNIVERSITY GRADUATE COLLEGE

DEFENSE COMMITTEE AND FINAL READING APPROVALS

of the thesis submitted by

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Thesis Title: Climate Shocks and Violent Conflict Incentives: Evidence from the Indian Sub-Continent

Date of Final Oral Examination: 25 January 2022

The following individuals read and discussed the thesis submitted by student Thomas Campbell and they evaluated the student's presentation and response to questions during the final oral examination. They found that the student passed the final oral examination.

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DEDICATION

To the innocent victims and their families of violent conflict, to future peace, and to the innumerable nameless and faceless individuals our governments and societies ignore.

ACKNOWLEDGMENTS

I would like to thank all of the teachers and professors in my life that have educated me both inside and outside of the classroom. I could not be who I am today without any of you. I would specifically like to thank Dr. Isaac Castellano for mentoring me over the past four years ofmy college education. You have helped me grow as a person, student, and scholar. Your advice, feedback, and sincerity are greatly appreciated, and my future work is indebted to your time and input into my life. I would also like to thank Dr. Nisha Bellinger for her time and feedback. Yourclasses, opportunities, and feedback have helped structure my interests and will guide me in my future research. To Dr. Michael Allen, thank you for all your kindness and innumerable opportunities that will help me in my future endeavors. And Dr. Mark Plew who put the fear of God into me and made me really work for my grade in your classes and for the conversations between our back-to-back classes.

I would also like to thank some of the women who have played an outsized role in my life. To Mrs. Terri Van Vleck who, despite our different tastes in music, played an invaluable role in shaping my work ethic and instilled in my importance of small diligent steps will take mefurther towards my goals. To Dr. Jody Peterson who helped me find my interest in Political Science and for all the lovely conversations in your office and halls of Centralia College. To Mrs. Jill Smith who, through your investment, got me to graduate high-school and gave a lost boy a home. Without you, or anyone mentioned, I would not be here today. Thank you.

ABSTRACT

How much do climate shocks impact different societal actors' incentives to commit directacts of violence? This thesis argues that different climate shocks and their effects introduce incentives for different societal actors to increase and reduce their likelihood of committing direct acts of violence, which is in line with Brzoska's (2018) claim. The results of this thesis' analysis support that different climate shocks can lead different societal actors to commit acts of violence.

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LIST OF ABBREVIATIONS

VNSA	Violent Non-State Actor
ROCS	Rapid Onset Climate Shock
CCCM	Climate-Conflict-Contract Model
IWI	International Wealth Index
GDL	Global Data Labs
HDI	Human Development Index
SATP	South Asia Terrorism Portal
NB	Negative Binomial
QP	Quasi-Poisson

INTRODUCTION

In the Jammu and Kashmir region of India in February 2005 during a climate-related avalanche, the Indian security forces recorded zero terrorist incidents and even provided aid to insurgent groups stuck in the avalanche (SATP, 2021). Opposite to this, in Jammu and Kashmiron September 3rd, 2006, while Indian security forces were conducting a search and rescue mission after a flood three insurgents hid in a nearby village and ambushed said security forces (SATP, 2021). Which begs the question, how much do climate shocks impact different societal actors' incentives to commit direct acts of violence?

Some authors claim that there is a growing consensus that climate change has a minor, but important, effect on the onset of conflict (Buhaug and von Uexkull, 2021), while others would claim that there is still too much mixed evidence to claim a consensus of any kind (Sharifiet al., 2021). Authors have cited multiple concerns within the literature that hamper any scientificconsensus. These concerns include issues about sampling biases (Adams et al., 2018), modeling choices and data aggregation problems (Schweizer, 2019), confusing climate uncertainty with climate shocks (Meierding, 2013), looking at only either the magnitude or frequency of climate shocks but rarely, if ever, both (Yu and Gagne, 2019), and competing results (Koubi, 2019). Despite this, some authors argue that research should not focus on how climate change influences different societal actors toward committing direct violence. Instead, scholars should take the climate-conflict connection as a given and move on towards predictive analysis (Buhaug and von Uexkull, 2021). However, the connections underlying climate-conflict are still undertheorized,often ignoring other prevalent factors (Meierding, 2013).

To help advance the literature, this thesis can make theoretical and empirical advancements. The theoretical advancements made are understanding that there are separate effects that a Rapid Onset Climate Shock (ROCS), weather shocks, and the effects of the interaction between ROCSs and weather shocks have on societal actors in militarized conflict (Brzoska, 2018). This thesis also frames the dynamics of society within the framework of a social contract between the state and non-combatant civilians and between non-combatant civilians andviolent non-state actors (VNSAs) as both the state and VNSAs require legitimacy from civilians to sustain themselves (Wood, 2010). As such, it allows for an expansion on understanding the possible incentives at play when considering why state and VNSAs participate in violence. This framing using the social contract does several important things.

The first advancement this framing allows for is that it deepens the shallow theoretical basis of the current literature (Meierding, 2013). By placing the conflict over the support of the non-combatant civilians grants greater agency to individuals who the literature has denoted as objects to be acted on rather than agents who can act. Doing so, reduces the deterministic nature present within the literature. By framing it as an incentive structure does not necessarily precludethe idea that actors will still commit acts of direct violence. Lastly, theoretically framing conflictin Galtung's (1969) notion that violence comes in many forms with a specific focus on direct violence. Using Galtung's (1969) theory of violence opens the literature to explore how actors may or may not be incentivized to commit acts of indirect, structural, or cultural violence.

The empirical advancements made in this thesis also help the literature in several ways. As there is an issue of endogeneity between countries that are climate threatened, conflict-prone, and impoverished (Buhaug and von Uexkull, 2021), it is important to move on from the binary ofwhether a conflict is present or not. Instead, this thesis looks at how climate shocks shape conflict frequency and intensity, which will reduce the endogeneity present in the relationship between climate shocks and conflict. Secondly, this thesis uses subnational data, allowing for regional variation and better evidence of climate change influencing incentives. The effects on climate change and conflict are local, and the over-aggregation of data may lead to problems, specifically where a shock occurs in one part of the country and conflict happens in other. In a national level aggregation, the two become indistinguishable from each other, leading to confusion of cause and effect (Schweizer, 2019). Thirdly, this thesis focuses on types of climate shocks (ROCSs and weather shocks) and the interaction of these shocks.[1]

Lastly, this thesis looks at pooled-time series data from sub-national regions in India andPakistan which have active rebel groups. Using Pakistan and India addresses some of the case selection concerns raised by Buhaug (2016) and Adams et al. (2018) such as some of the countries most at risk are left out of study, and the region of South Asia is one of the most climate impacted regions (Eckstein, Kunzel, and Schafer, 2021). South Asia is highly understudied in the climate-conflict literature, with some notable exceptions (Wischnath and Buhaug, 2014; Sarbahi and Koren, 2021), and thus harms the

[1] This thesis focuses on climate shocks rather than climate change which is the product of the change rather than the change itself. Also, both ROCS and weather shocks are types of climate shocks. ROCS focus on much more immediate shocks whereas weather shocks focus on more mid- to long term shocks. Even though the term climate shocks are used liberally, the context of the writing delineates between which is being discussed.

generalizability of previous findings (Nordqvist and Krampe, 2018). India and Pakistan also have large populations with a tremendous amount of diversity in both populations as well as state and VNSA dynamics, whichprovide an arena to see good preliminary evidence for the theoretical contributions of this thesis.When accounting for all of these concerns, the evidence from this thesis' analysis supports someof the theoretical foundations laid out below.

The following sections are organized as follows. Section 2 covers the dominant approachto the literature, the threat multiplier approach, and its theoretical underpinnings. Section 3 lays out the theoretical foundations of this thesis' argument. Section 4 details the methods and data used for this thesis. Section 5 covers the results of the regressions laid on in section 4. Section 6 discusses the implications of the results from section 5. Section 7 concludes this thesis.

LITERATURE REVIEW

This section reviews the relevant literature examining the climate change-conflict nexusas it currently stands and a critique of the current dominant theory, the threat multiplier approach. But understanding the threat multiplier approach requires first understanding the theoretical underpinning of the climate-conflict literature, Malthusianism and Neo- Malthusianism. This literature review is first grounded in the scientific consensus on climate change. Climate change is human-made and is driven by human processes, particularly how humans use the environment and its natural resources (IPCC, 2021). The effects of climate change will be increased temperatures, increased variation in precipitation patterns, and more frequent and intense natural disasters (climate shocks) (IPCC, 2021).

Climate-related disasters (climate shocks), as defined here, are events that are political bynature (De Waal, 1997). These shocks unearth underlying community risks, or, in other words, shocks are risks that have become a reality (Sinha and Lipton, 1999). According to Sinha and Lipton (1999), what determines a shock is that shocks are unexpected events, of some magnitude, vulnerable populations are hit the hardest, the shock must not be endogenous, and there must be physical or psychological duress. More simply put, shocks surpass a society's ability to cope with the shock's effects (Anderson, 2000). Some have measured shocks on an events basis and not discriminated based on the size of the shock (Brancati, 2007; Slettebak, 2012), some have used climate-related and non-climate related disasters interchangeably (de la Fuente, 2007; Nel and Righarts, 2008), and some have used more complex methods of proportional effects of shocks (Bergholt and Lujala, 2012). But since there is a lack of clarity indefining and measuring shocks, the findings related to climate-related disasters are mixed (Busby, 2018).

Thomas Robert Malthus is most well-known for his work, *An Essay on the Principles of Population*. The main premise behind Malthus' work is how population pressures affect food production and food allocation to people. Malthus argued that food production grew arithmetically, and the human population grew exponentially, meaning that the human population would grow to such a state that food production could not sustain the population creating a condition of total human immiseration (Malthus, 1826). But Malthus failed to account for technological progress, which allowed food production to overcome population pressures andthe political dynamics that influence food production and allocation and population pressures (Devereux, 2007).

The Neo-Malthusians, who draw upon Malthusian preconceptions about population concerns, improve on traditional Malthusian theory by accounting for the limits of technology (Buhaug, Gleditsch, and Theisen, 2008). Thomas Homer-Dixon and his work helped jump-start the environmental security literature (Gleditsch and Urdel, 2002). In Homer-Dixon's (1994) view, there is a complex relationship between climate change, environmental security, and conflict. In Homer-Dixon's (1999) explanation, he attributes issues of climate change into three categories which are connected to resource scarcity. The first is an instance of environmental degradation where resources become depleted, or the quality of resources degrades; the second isan increase in population that outpaces supply; and the third is poor distribution of resources.

These three can have interacting effects. The first interacting effect is *resource capture,* whereinelites understand there is a valuable resource, so they shift institutions and rules to better themselves to the detriment of society. The second effect is *ecological marginalization,* whereininstitutional imbalances drive out portions of society from resource-rich areas and therefore are in an area with poor resource distribution (Homer-Dixon, 2000). In scenarios of resource scarcity, it can lead to migration or decreased economic output, which can lead to migration. These can lead to weak states and can induce multiple types of conflict (ethnic conflict, coups, and scarcity conflicts) (Homer-Dixon, 1999). This is the foundation of resource scarcity-inducedconflict and the Neo-Malthusian argument.

This approach is not free from critique. When analyzing Homer-Dixon's scarcity-conflictconnection, Gleditsch and Urdal (2002) find that there is a disconnect between the quantitative and qualitative findings, and this trend has continued (Shariffi et al., 2021). Even though the authors acknowledge the importance of Homer-Dixon, his work, they argue, underplays the role of the social, political, and economic factors that are more important to inducing conflict rather than scarcity (Gleditsch and Urdal, 2002). Conflict come less from population growth or density, but the socio-political and socio-economic conditions of society contrary to Neo-Malthusian thinking (Urdal, 2005).

In the face of the insubstantial evidence for Malthusian and Neo-Malthusian evidence, the threat multiplier approach has become the dominant approach in the climate-conflict literature (Koubi, 2019, von Uexkull and Buhaug, 2021; Shariffi et al, 2021). The threat multiplier approach is simply that the underlying societal factors such as poverty, inequality, political exclusion, and weak states are the primary drivers which induce conflict, but also argue that environmental degradation due to climate change increases these conflict inducing conditions (Margolese-Malin, 2011; Devlin and Hendrix, 2014; Schleussner, Donges, Donner, and Schellnhuber, 2016; Buhaug and von Uexkull, 2021). The threat multiplier approach, by stating the issue as such, tries to bridge the Malthusian and Neo-Malthusian theory with non-Malthusianconceptions of human conflict.

The earliest mention of the threat multiplier comes from the CNA Corporation report in 2007 wherein eleven retired high-ranking US military officials and five researchers outline the threat of climate change to both the United States' domestic security, international security, and the security of the US's international interests (Catarious Jr. et al., 2007). Within the report, they find that long-term climatechange acts as a threat multiplier. Meaning that in places that are already economically and ecologically vulnerable with failing governments, various factors of human life will degrade (for example: food and water availability), and the state being unable to do anything and the society desperate, conflict will ensue. The Quadrennial Defense Review (Dale, 2014) sums up the argument for how threat multiplier is understood in both the practical policy side and the academic research side. They state that:

> "The pressures caused by climate change will influence resource competition while placing additional burdens on economies, societies, and governance institutions around the world. These effects are threat multipliers that will aggravate stressors abroad such as poverty, environmental degradation, political instability, and social tensions – conditions that can enableterrorist activity and other forms of violence" (Dale, 2014).

The threat multiplier bled out from the US military into the broader academic sphere. However, the research on this approach is not conclusive, with some studies presenting positive results, some no results, and some negative results (Theisen, Gleditsch, and Buhaug, 2013; Ide and Scheffran, 2013; Buhaug, Gleditsch, and Theisen, 2008; Koubi, 2019; Koubi, 2017; Theisen,2017; Bernauer, Bohmelt, and Koubi, 2012; Saleyhan, 2008; Sakaguchi, Varughese, and Auld, 2017; Hsiang, Burke, and Miguel , 2013; Abrahams and Carr, 2017). But there is a small growing consensus that climate change positively affects conflict, but the effect is small (Buhaugand von Uexkull, 2021). Part of this lack of consensus might be due to methodological concerns of results being sensitive to models, over aggregation of data, and lack of real understanding of testing (Meierding, 2013; Schwiezer, 2019). There is also a sampling bias within the literature where the countries most studied are already conflict prone and not at substantial risk to climate change (Buhaug, 2016; Adams et al., 2018). Part of the bias might also be due to a lack of under-theorization which undermines the interpretations of findings (Suh, Chapman, and Lickel, 2021; Buhaug and von Uexkull, 2021).

Another one of the problems in the climate-conflict nexus literature that causes confusionand partly contributes to the disparate findings is the operationalization of the terms, as different authors use different terms when talking about climate change and climate shocks (Salehyan, 2014). Within the literature, two types of shocks are considered, which may have separate effectson the conflict process (Brzoska, 2018). The first relates to climate-induced disasters (Nel and Righarts, 2008; Slettebak, 2012), and the second relates to temperature and precipitation shocks which are measured in various ways (Miguel, Satyanath, Sergenti, 2004; Devlin and Hendrix, 2014). The first shock has been defined with several different characteristics and measured differently (Sinha and Lipton, 1999; Anderson, 2000; Nel and Righarts, 2008; Bergholt and Lujala, 2012). The second one has been measured either by deviations from the average temperature/precipitation (Hendrix and Salehyan, 2012; Devlin and Hendrix, 2014) or as a proportional change (Miguel et al., 2004). While there are two separate operationalizations of shocks, both measures ignore that weather shocks and ROCS can happen simultaneously as theyboth do not exist in a vacuum.

The climate-conflict literature has a long theoretical history while being a recent realm ofstudy within academia. Beginning in 1798 and continuing into today, the literature is still dominated by the Malthusian notion that the human societal structure will either eventually or currently outpace humanity's ability to cope with itself and its environment. But this approach fails to recognize the interdependency of climate change and human ability to cope with climate change and environmental stressors. The next section develops a theory that helps explain the possible connections between climate change and armed, violent, and organized conflict.

THE CLIMATE-CONFLICT-CONTRACT MODEL

What are the connections between social contracts, climate change, and intrastate militarized conflict? And how does an understanding of a social contract impact current understandings of the threat multiplier approach? These research questions are linked together through one empirical analysis, testing the 'Climate-Conflict-Contract Model' (CCCM) developed here, which argues that the linkages between climate change and conflict are mediatedand mitigated by the social contract established within a country, but that this contract is also affected by the dynamics of the climatic change and conflict within the same country. A broad swath of literature in the interdisciplinary environmental security literature has empirically examined a range of mechanisms and evaluated the evidence for how conflict may or may not beimpacted by climate change and non-climatic elements, including the greed-grievance explanations in the International Relations literature (Sharifi et al., 2021). However, the current literature still remains relatively theoretically underdeveloped which may hurt a results interpretation (Meierding, 2013). This research advances a new model that seeks to explain conflict outcomes within the climate-conflict nexus, test that proposition, and through the analysis additionally provides the policy prescription that states incorporate a response to climate change into their social contract.

The central framework of the CCCM rests on the idea of a social contract. The underlying foundation of the social contract is that individuals choose to voluntary consent to agreements between each other to avoid conflict and reap the benefits of cooperation (Keeley, 1995). This contract can come in various forms and may be literal, analogous, or metaphorical (Davis, 2009) and can exist in both formal and informal systems (Seabright, Stieglitz, and Van der Straeten, 2021). These contracts tend to be grown naturally from bottom-up self-organizing rather than top-down enforcement, but this is not always the case (Gaus, 2018). To take this intoaccount and for the purposes of this thesis, the social contract is defined as the formal and informal commitments of different societal actors to one another to maintain societal cooperation, and this contract can change over both the long term and short term.

The maintenance of this contract then requires trust and legitimacy. Trust in the sense that neither party will break the contract by upholding their commitments. This helps foster an environment where cooperation between individuals can survive. Out of this, actors and institutions require legitimacy to survive, the trust and cooperation fostered through the upkeep of the social contract provides legitimacy to actors who maintain the contract. If individuals know that the other actor is credible in upholding agreements, then that actor's actions will be perceived as more legitimate. For example, to a certain extent, the state offers security to the populace, and in return, the populace rewards the state by not rising up against thestate. The state that does not go past what the populace is willing to give up, then the populace provides the state with their trust, making the state a more legitimate institution that provides thestate more power to operate and achieve its goals.

The creation of a social contract by design precipitates, at the very least, a negative peace.By extension, civil conflict ensues when the social contract degrades or breaks down by differentactors within the state (Murshed, 2009; Murshed and

Tadjoeddin, 2009). Civil conflict defined here, to be precise, are violent, organized, armed actions from members in society against the broader society in opposition to the state. But this is simply an increase in the *direct* violence, which means a decrease in negative peace (Galtung, 1969). This does not mean that indirect or cultural violence (positive peace) are affected (Galtung, 1969).

The social contract is not only affected by human interactions but also by the environment in which humans exist. The interconnection between climate change, conflict, andthe social contract is that the social contract can be both constructed, deconstructed, and reconstructed (Blackburn and Pelling, 2018). What happens post-climate shock or natural disaster opens up avenues for social contracts to remade between the state and society (Pelling and Dill, 2010; Siddiqi, 2013). Climate change and the environment play a crucial role inconstructing social contracts.

The interaction between the social contract, civil conflict, and climate change is the focusof this thesis. The damage of a climate shock can be a threat to the state's legitimacy (the social contract) as they cannot meet the expectations of society, thereby making it easier for VNSA to attract more recruits (Nel and Righarts, 2008) and/or provide more opportunities to attack the state as the state's capacity has been weakened (Raleigh and Kniveton, 2012). However, short- term informal ceasefires can occur after shocks, meaning that conflict is not the only option between rebels and the state after a major shock (Kreutz, 2012). Rebels need the support of localgroups (Wood, 2010). Even the bare minimum of response from the state can entrench the social contract between the state and society, decreasing the recruiting potential of rebels (Siddiqi, 2013). Rebel groups can, like the state, provide public goods to maintain legitimacy with the local populace (Enia, 2008). In a post-shock situation, rebel groups can provide public goods, like disaster relief, to affected groups to entrench the rebel group's legitimacy and possibly stoke anti-state sentiment (Walch, 2014). Meaning that climate shocks provide interesting incentives to both rebels and the state to respond meaningfully to the shocks.

Weather Shocks and Violent Conflict

Weather shocks are shocks that deal less with an immediate need but with future needs. If there are times when there is more rain, it could lead to a more bountiful harvest or, in extreme cases, flooding which ruins the harvest. Something similar occurs in the opposite direction: too little rain ruins harvest, and no rain means no harvest. A lack of harvest could mean economic problems for individuals who depend on agriculture for their livelihood, but a boon in harvest could mean those same individuals' economic prospects are better. The same could be applied totemperature changes as well (Wischnath and Buhaug, 2016). This is why Meierding (2013) claims these are uncertainty shocks, as they may not be immediate problems but future problems.Weather changes for various reasons, making both the shocks uncertain and entirely dependent on the weather at any given moment.

Uncertainty provides a lack of knowable incentives for either the state or rebel actors to change any meaningful behaviors. While there has been some evidence suggesting these weather shocks lead to an increase in violent conflict (Salehyan and Hendrix, 2012; Devlinand Hendrix, 2014), after using updated data and applying numerous different measures pertaining to rain shocks could not reproduce results (Liang and Sim, 2019). More plausible is that what studies are capturing is how temperature and precipitation changes can make environmental conditions favorable for conflicting parties to take combative action (Selby, 2014). Understanding when environmental conditions are favorable for combat as a basis of understanding conflict goes back to Sun Tzu and is still being used in militaries worldwide (Selby, 2014). Being unable to distinguish between when something is a shock[2] and when it is simply an opportune moment for a group to engage in conflict are different questions that lead tothis thesis's first hypothesis.

H1: *There should be no effect of all-weather shocks on the likelihood of conflict frequency*.

When weather shocks are disaggregated there are contradictory results. Looking at SouthAsia, rain shocks tend to be a decreasing factor on violent conflict in South Asia (Blakeslee and Fishman, 2018; Gangopadhyay and Nilakantan, 2018). This could be partially attributed to basicirrigation systems which make farmers more resilient to adverse rain (Sarsons, 2015; Mary, 2022). The psychology factors that have been identified in the climate-conflict link where increased temperatures lead to more conflict (Breckner and Sunde, 2019; van Weezel, 2020) are also present in South Asia (Blakeslee and Fishman, 2018; Gangopadhyay and Nilakantan, 2018).Which to leads to this thesis' alternative hypotheses concerning weather shocks.

H1A: *As rain shocks increase, conflict frequency and intensity should decrease.*

H1B: *As temperature shocks increase, conflict frequency and intensity should increase.*

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[2] How shocks are measured for this thesis are contained within the methods and data section.

Rapid Onset Climate Shocks

There are two ways of discussing ROCSs and their impact on conflict. The first is associated with the climate-conflict literature and argues that either ROCSs increase conflict as itweakens state apparatus's thereby creating opportunities for rebel groups to attack more successfully (Nel and Righarts, 2008), or decrease conflict ROCSs create windows of opportunities for peace between conflicting groups (Kreutz, 2012). The second comes from Disaster Sociology which argues that conflict becomes less likely as greater social cohesion happens after disasters (Slettebak, 2012). If those effects are present, non-combatant civilians may be less likely to join rebel groups, but that does not preclude rebel groups from committing violent actions. The former addresses the ability for rebel groups to coordinate and enact violence after ROCSs. Those are two separate questions, and this thesis focuses on the former.

ROCSs, which reduce human security, provide states and VNSAs opportunities to garnerlegitimacy from society. Meaning, that if the support the state needs from the society is the same for the VNSAs (Wood, 2010); and, if these VNSAs will and can provide public goods to parts of society within their territory (Keister and Slantchev, 2014; Stewart, 2016; Stewart, 2018); then, there should be some sort of reciprocal social contract being established between thesociety and the VNSA. What can be shown is that increased support for VNSAs from the societyincreases the level of public goods provisions from the VNSA to the society and vice versa (Adeel, 2018). And, just the implicit threat of violence by VNSAs within society can spur the state to become more generous with their public goods provisions to gather more legitimacy from society (Abrahams and Merrell, 2021). Meaning that as climate shocks become more frequent and damaging, it provides opportunities and incentives for both state and VNSAs to gather legitimacy from the society, thereby restructuring the different social contracts and making conflict *less likely* rather than more likely. Because both states and VNSAs' capacities will be constrained post-shock and in regions where shocks are more frequent and intense turn the choice to do *both* commit acts of violence *and* provide public goods into a situation where both actors must choose *either* to commit acts of violence *or* provide public goods. In the contextof extreme climate shocks, conflict will come less from violence and transfer to an arena of vying for the support of society through less violent means.

Even further, the difference between a climate hazard and a disaster is a political event, and that conflict can worsen the disaster (Buhaug and von Uexkull, 2021). Since states and VNSAs require non-combatant civilian support/legitimacy to survive, increasing levels of conflict within shock-affected regions may worsen conditions for non-combatant civilians, which

lessens the necessary legitimacy for either the state or VNSAs. Therefore, both the state and VNSAs may come to either formal or informal compromises, not wanting to make situations worse and/or due to limited capacities. Compromises in the sense that the conflicting parties, notwanting to create a worse situation, may come to either an implicit or explicit agreement on the rules of engagement to avoid the situation (Campbell and Nitzan, 1986). Even tacit compromisesare created on mutual understanding and some level of mutual trust and reciprocity, which can evolve into long-term agreements if the compromises are kept (Roumeas, 2021). A compromise between the state and VNSAs, whether formal or informal, to not attack each other creates further incentives due to, in part, the effects of climate change to commit less direct violence.

This compromise can be thought of using Pelling and Dill's (2010) explanation of how climate shocks provide new avenues for social contracts to be constructed and Fearon's (1995) bargaining framework. In the aftermath of a ROCS, a bargaining space opens up for states and VNSAs to create a potential compromise. This can be seen in the first Jammu and Kashmir example from the opening of this thesis, which shows that compromises post-shock can and do occur in conflict situations. Both states and VNSAs have incentives to provide the public good ofless conflict to build trust (deepen the social contracts), but in the face of a lack of more extremeclimate shocks, there will be fewer opportunities and therefore fewer incentives to provide the public good of less conflict than in extreme climate shock conditions.

H2: *As Rapid Onset Climate Shocks increase in both intensity and frequency; conflictfrequency and conflict intensity will decrease.*

However, this can lead to competing incentives as well. As both states and VNSAs want to increase their legitimacy within regions and in certain groups, the other side wishes to decrease the other's ability to grow their legitimacy. This can lead to states and VNSAs actually increasing the frequency of conflict (Wood and Sullivan, 2015; Wood and Molfino, 2016). Sinceconflict frequency increases, the likelihood that conflict intensifies increases. Meaning that even though ROCSs provide opportunities for states and VNSAs to grow their legitimacy within specific regions, as they are both competing forces neither wants the other to grow their legitimacy as it weakens their own position, which increases the level of conflict. This can be seen in the second Jammu and Kashmir example in the opening of this thesis, which leads to thisthesis' alternative hypotheses.

H2A: *As Rapid Onset Climate Shocks increase in both intensity and frequency; conflictfrequency and conflict intensity will increase.*

Climate shocks do not happen in a vacuum. Not only do climate shocks interact withhuman society, but the different types of climate shocks interact with each other as well.

Temperature changes and precipitation changes occur simultaneously, and these interactions mayoccur in tandem with ROCSs. This accounts for changes in weather conditions and climate- induced disasters. Doing so provides for the most complete version of a climate shock in the literature to date. But since H1 and H2 have competing claims, the actors' incentives will not be affected, leading to the next hypothesis.

H3: *As climate shocks increase in magnitude, intensity, and frequency, conflict frequencyand conflict intensity will not be affected.*

METHODS AND DATA

This next section covers the methods and data used in this thesis. This thesis considers the methodological criticisms made by Schweizer (2019), who criticized the literature for using over aggregated data. To account for this, this thesis uses region-month data from 2005-2014[3] from 15 states and regions[4] that had the most complete data from India and Pakistan[5] which had active rebel groups during this period, creating an *N*=1800. The regions in this study cover multiple different climatic and geographical zones, contain multiple different cultures and languages, over two dozen rebel groups (SATP, 2021), variety of institutional makeups, regions that are under severe climatic duress (Eckstein, Kunzel, and Schafer, 2021), and as of 2014 and using the Global Data Labs population data contained roughly a little more than 6% of the globalpopulation. Only focusing on states and regions with active rebel groups allows this thesis to focus on the possible social contract implications; whereas, if all regions were implemented, the theory posited here could not be tested but the strategic implications that climate change has on conflicting groups. Lastly, focusing on these large South Asian states partially addresses the country/region sampling in the climate-conflict literature (Buhaug, 2016; Adams et al., 2018). This means that even though a small number of regions are covered

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[3] This is because the Jammu and Kashmir Insurgents were funded by Pakistan until the end of 2004 (SATP, 2021) which can skew the data as the insurgent rebel group were not completely/mostly autonomous.
[4] India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jammu and Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Odisha/Orissa, Punjab, Tripura.Pakistan: Baluchistan, Punjab, Sindh.
[5] Bangladesh would have been included, but the lack of data for this thesis' control variables caused the removal. Future research should include Bangladesh into the analysis.

in a short time span, somelevel of generalizability can be made from this analysis, at least for the broader literature.

To test for this, this thesis uses both a quasi-Poisson (QP) regression and negative binomial (NB) regression. The data used for this thesis has a high level of dispersion which bothQP and NB regressions help account for this dispersion (Wedderburn, 1974; Joe and Zhu, 2005;Ver Hoef and Boveng, 2007). The dependent variables used for this thesis use count data, so it would be more appropriate to use count models than OLS based models. As the QP regression uses a linear variance of the mean regression and the NB uses a quadratic variance of the meanregression. Meaning that the NB weights the importance of smaller numbers more than the QP regression (Ver Hoef and Boveng, 2007). In addition, using both QP and NB regressions help facilitate more robust findings for the results of this analysis Especially for findings that appearin both tests across different models which can help future research in understanding which variables are more important in the climate-conflict nexus.

Dependent Variables

This thesis uses two different dependent variables, and both come from the South Asian Terrorism Portal (SATP, 2021). The first variable is conflict frequency, measured as the total number of violent actions that occur in a given month in a given year. The second variable is conflict intensity, measured as the total number of individuals killed due to violent actions in a given month in a given year. Both of these credibly address the hypotheses laid out above as thevariables conflict frequency and conflict intensity are directly related to those hypotheses.

Independent Variables

Climate Variables

This thesis uses EM-DAT database (CRED, 2021) on natural hazards to measure ROCS. The hazards used are used to determine climate risk by the CRI. This climate shock variable is not just concerned with the number of people affected by the shocks within a given region but also the frequency of shocks within a given region in a given year. Most of the scholarly attention has focused on the size of the shock (change in rainfall, change in temperature, or amount of people affected by disasters) while very little scholarly attention is onthe frequency of climate shocks (Yu and Gagne, 2019). Since ROCSs are going to be more prevalent in the future, magnitude and frequency must both be looked at. The climate shock variable used here is the percentage of the population within a region affected multiplied by the number of shocks that occurred within that region in a given year (equation 1). The total numberaffected is divided by a thousand because the regional population variable is measured by the population per thousand, and dividing the total number affected by a thousand then gives the accurate percentage of the population. The variable is then lagged a month to ensure that way only post-shock rates are analyzed.

Equation 1: ((*Total Number Affected*/*1000*)/*Regional Population*) *x Climate ShockFrequency = ROCS*

The second set of climate variables come from the University of Michigan's XSub database (Donnay et al., 2019). To measure weather shocks (temperature and precipitation), this thesis uses a similar method employed by Salehyan and Hendrix (2008) and Devlin and Hendrix (2014), which is the deviation from the average, which is shown in equation 2 using rainfall as an example (the same calculation applies to temperature). Since the time frameis small, this thesis uses a rolling average on a monthly basis of the 10-year period of data. This thesis deviates from previous quantification by considering the distance the rain or temperature deviation is from the monthly standard deviation. By doing this, this model accounts for when the weather falls outside of the climate norm for the region. By using the absolute value of both the difference and the shock, it considers how far exactly the measurement is outside or inside of the climate norms which should measure both uncertainty and strategic environmental conditions. Since neither temperature nor precipitation occur in a vacuum, the multiplicative interaction of the two is made, creating this thesis variable for weather shocks.

Equation 2: *Monthly Rain - Regional Monthly Average = Rain Difference*

Equation 2A: *Abs (Rain Difference)-Standard Deviation of Monthly Rain = Rain Shock*

Equation 2B: *Abs (Rain Shock)*

Equation 2C: *Temperature Shock x Rain Shock = Weather Shock*

Control Variables

From this point forward, all variables will be based around Mach et al.'s (2017) expert opinion survey on drivers of conflict. Economic and social development is measured by using Global Data Lab's (GDL) subnational HDI variable (*HDI*), which holds accurate numbers at aggregated national levels to those held by the United Nations. HDI has been a long-standing indicator for understanding the well-being of people and, to a lesser extent, the capabilities of people. The subnational HDI shows the diversity of well-being outcomes within countries (Smitsand Permanyer, 2019).

Another variable that is controlled for is relative deprivation which has been an aspect of grievance-based conflict explanation since its inception (Gurr, 1968). Relativity deprivation is the difference between where people are at materially and where they expect themselves to be. Meaning that if individuals who exist in absolute poverty are being left out of development will feel slighted, increasing grievances that might influence the likelihood of conflict. This data comes from comes from the GDL's International Wealth Index (IWI). The IWI measures well- being as baseline sufficing of needs and materials that make life easier. Using surveys of over 2.1million households in 97 low- and middle-income countries uses data mainly from Demographic and Health Surveys and the UNICEF MICS surveys. From this, the index looks at three broad categories of materials that a household might have: consumer durables, household characteristics, and public utilities. Items that fall underneath consumer durables are whether or not a household owns a television, a refrigerator, a phone, a car, bicycle, and whether or not a household has cheap or expensive utensils. Household characteristic items are the quality of floormaterials in the house, the type, and quality of toilet facility available if at all, and the number of rooms the house has. The final category of public utilities is whether or not a household has electricity and the quality of water the household has access to. These are then put on a scale of 0-100. A household would be scored a 100 if they had all of the consumer durables, the highest quality of household characteristics, and the largest house, and if the household has electricity plus high-quality water access. A household would be scored a 0 if a household had none or only the lowest category possible. The IWI has been found to be highly correlated with HDI, life expectancy, and GNI per capita, making it another useful measure to look at economic and socialdevelopment as well as governance (Smits and Steendijk, 2015).

An advantage of the IWI over the measures used in this thesis is that the IWI has measures for understanding the proportions of regional populations under different levels of material well-being. The two variables used to construct the measure for relative deprivation is the difference between the proportion of the regional population under an IWI score of 35 or more simply the proportion who are the lowest levels of material well-being (those individuals who are between scores 0 and 35) and the proportion of the regional population under an IWI score of 70 (those who have a level of material well-being beyond merely meetingthe baseline subsistence needs which includes the people in between the scores of 51 and 70). The measure for relative deprivation here does not correlate too highly with the subnational HDIvariable, so there should not be an issue of multi-collinearity.[6]

The last development variable seeks to look at three separate facets of development. Overall infrastructure, individual's economic well-being, and regional economic output which allcome from XSub's database. Specifically, the linearly interpolated variables relate to lights, regional GDP, and regional per capita. Measuring lights and electricity are good measures of overall infrastructure development within regions, as shown in Equation 3 (Stern, Burke, and Bruns, 2019; Best and Burke, 2018). This provides a more inclusive measure of development. None of the development-

[6] IWI 70, also does not have a high correlation with either HDI or Relative Deprivation so it is included in the analysis as well as a separate measure of development.

related variables are too highly correlated with one another, meaningthat there should be no problems using all three together.

Equation 3: *Lights + Regional GDP Per Capita + Regional GDP = Development*

The remaining variables that Mach et al.'s (2017) expert opinion survey include population density,which comes from Global Data Labs data on populations and region size comes from XSub's conflict database. This variable captures the Neo-Malthusian assumptions between population and conflict. The other variable used is the conflict spillover effect, measured as the number of neighboring states that have conflict in the previous month.

RESULTS

This section goes over the results from the NB and QP regressions used for the data mentioned above. What Fig 1 shows the results from NB regression for the effects of climateshocks have on conflict frequency. The results support Brzoska's (2018) claim that different climate shocks have different effects. There are inconsistent results for ROCS variable which does support either H2 or H2A. But there are consistent positive significant results for temperature shocks on conflict frequency supporting H1B, and consistent negative significant results for rain shocks on conflict frequency supporting H1A. In isolation, there are no significant results for when the variables are interacted with one another. When rain and temperature is interacted (weather shocks variable), there is no significant relationship which finds support for H1. When rain, temperature, and ROCS variables interact with each other, thereis no significant relationship finding support H3. Meaning that there are interesting interactions that are occurring that make variables in isolation significant and insignificant. All control variables are negative significant on conflict frequency.

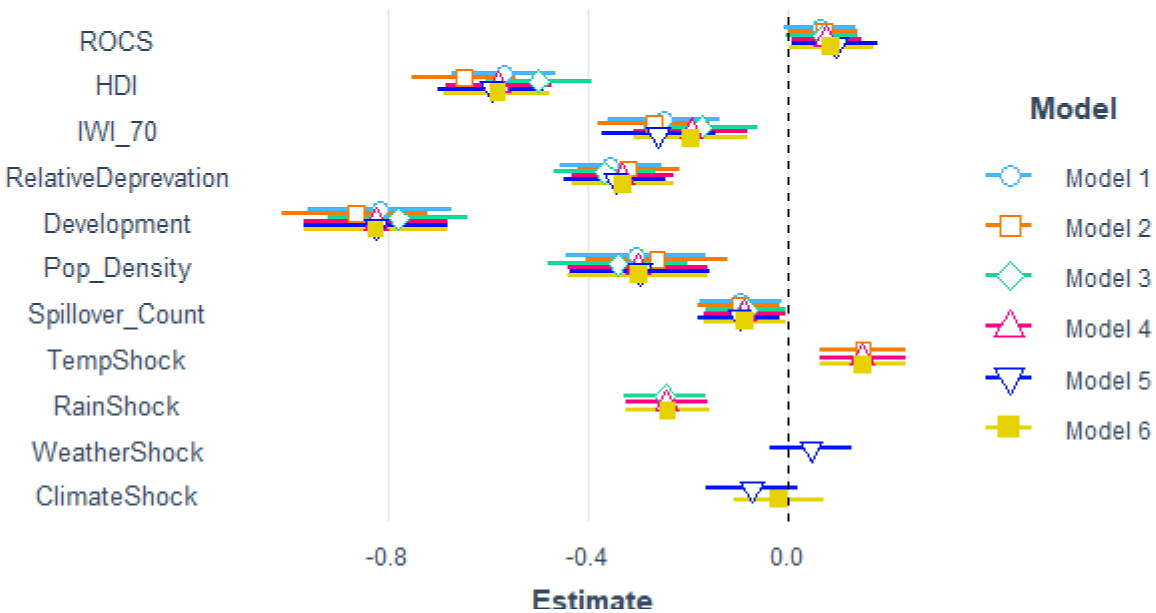

Figure 1. **Climate shocks on conflict frequency - NB**

Fig. 2 shows the results of the QP regressions on conflict frequency. The results whilesimilar do have certain differences. The ROCS variable has a positive and significant relationship with conflict frequency across all models which is in contrast to the inconsistent

results in Fig. 1 finding support for H2A. All other climate shock variables retain the same relationship across tests. Part of the different results might be due to the larger confidence intervals in Fig. 2 as compared to Fig. 1 so the results of the ROCS variables should be takenwith some suspicion.

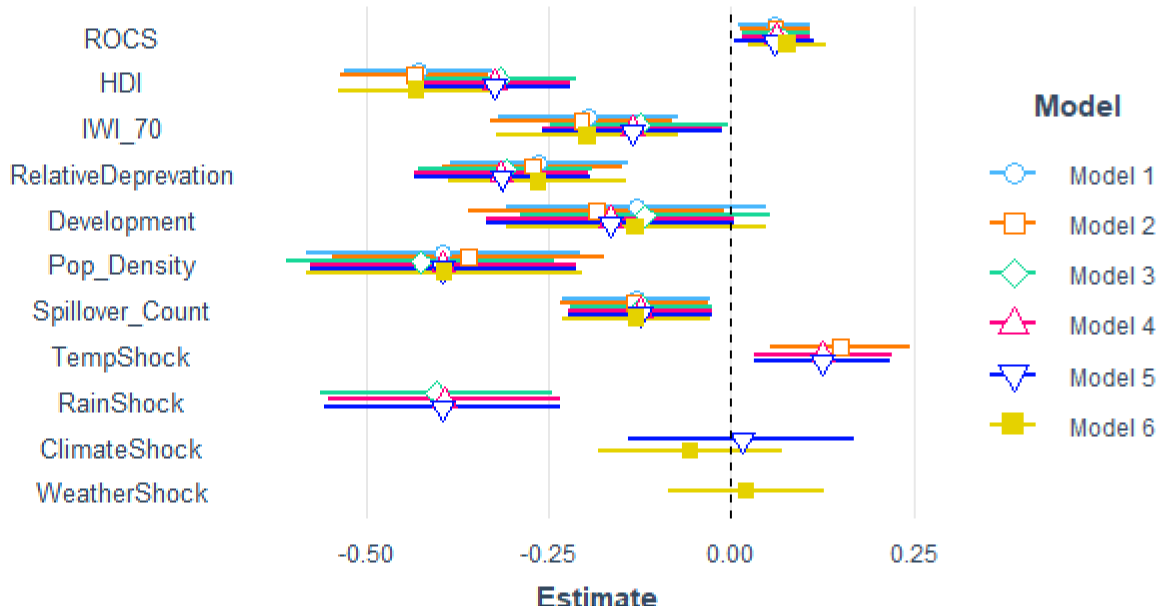

Figure 2. **Climate shocks on conflict frequency - QP**

Fig. 3 shows the NB regression results for the effect of climate shocks on conflict intensity. The ROCS variable shows inconsistent results on the effect on conflict intensity whichfails to support either H2 or H2A. Temperature shocks have a consistently positive and significant relationship with conflict intensity supporting H1B. Rain shocks have a consistent significant and negative relationship with conflict intensity supporting H1A. The interaction variables for both rain and temperature shocks and for rain, temperature, and ROCS variables have no discernable effect on conflict intensity finding support for both H1 and H3. Only the development control variables have significant results.

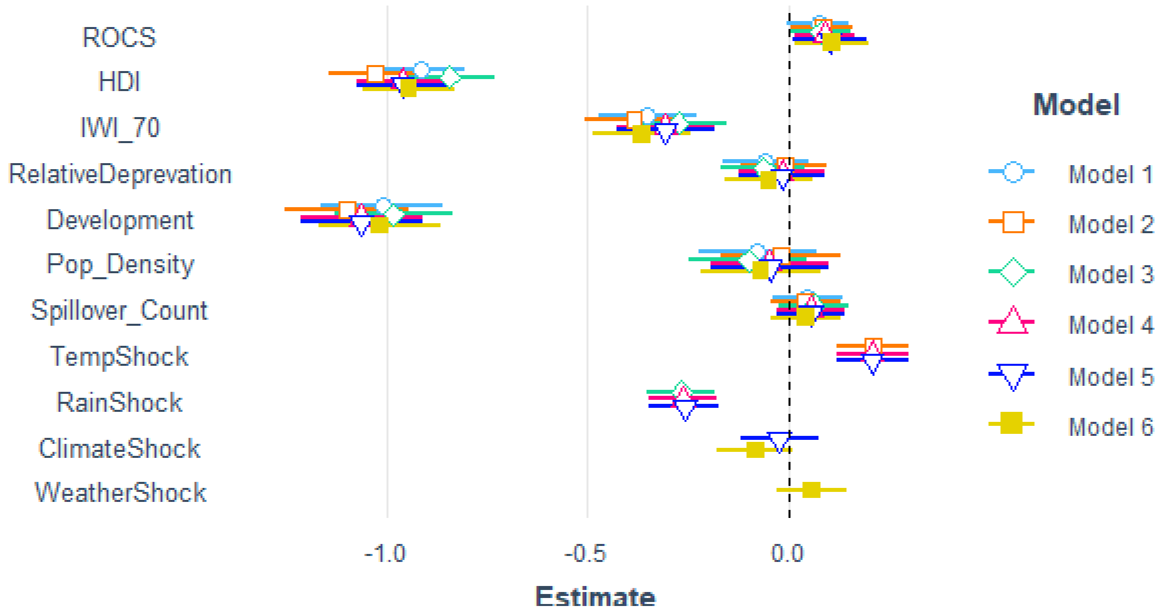

Figure 3. Climate shocks on conflict intensity - NB

Fig. 4 shows the results from the QP regressions of climate shocks on conflict intensity. The ROCS variable shows a mostly consistent positive relationship with conflict intensity finding support for H2A, but this runs contrary to the findings in Fig. 3 meaning that the results should be seen as suspicious as the results are not truly replicable across different tests. The otherclimate variables are robust between tests. More controls in the QP tests are significant factors compared to the NB tests, but as before, the only ones that should be considered relevant have similar relationships across models.

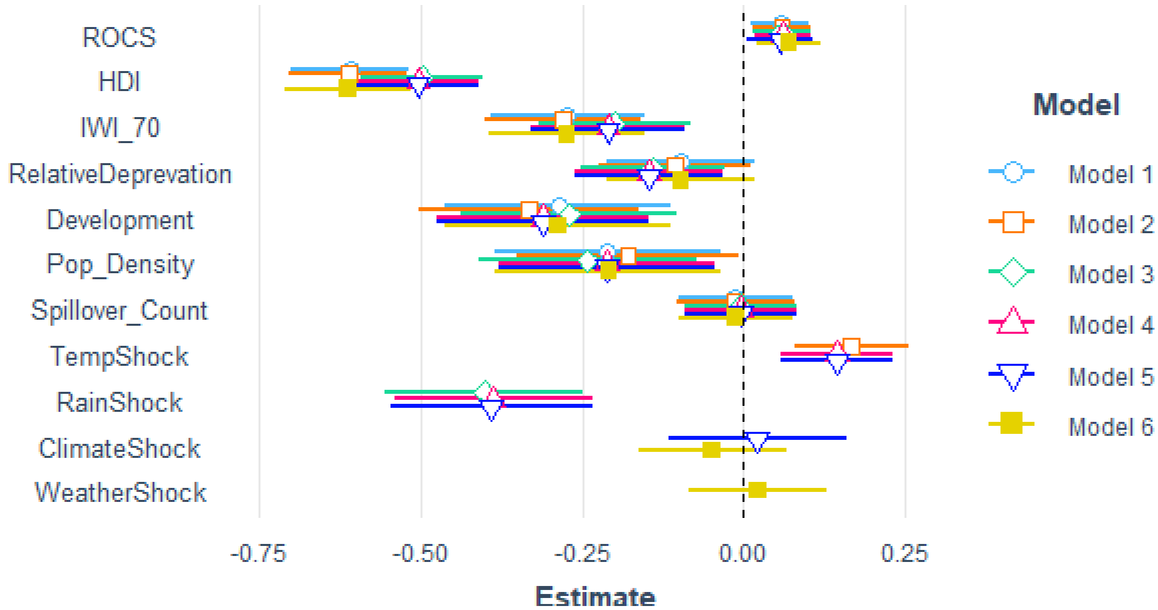

Figure 4. Climate shocks on conflict intensity – QP

DISCUSSION

The results of the analyses above show support for Brzoska's (2018) claim that differentclimate shocks have different effects. The different effects for rain and temperature shocks can help explain why the weather shocks variable was insignificant across all models and tests. Interestingly, the ROCS variable, while consistently positively related with conflict frequencyand intensity showed inconsistent significance in the relationship. Meaning that there is an association, but more evidence needs to be provided before definitive claims can be made. Meaning that H2 and H2A should not be outright rejected but should not be accepted either. Partof the reason for the inconsistency is that certain ROCS may have different effects compared to another (flood vs. fire). This could also be explained with the deviating cases in Jammu and Kashmir where there are also competing incentives. More research should be focused on this.

What can be discerned from the weather shocks variables is that the greater extremes inprecipitation can lead to greater negative peace, supporting H1A. This could be possible in that severe droughts or floods could make competing groups become more reliant on each other for survival, reducing conflict frequency and intensity. Temperature extremes can lead to increases in conflict frequency and conflict intensity, supporting H1B. But the analysis here shows that theinteraction between rain and temperature shocks has no discernable effect on conflict outcomes meaning that the interaction has a negating effect on both temperature and rain. But this could also be due to how the variable is constructed which could lead to outcome biases. If a more traditional measure of rain and temperature shocks were used, the results could be different. Overall, though, H1 should be rejected as the disaggregation of weather shocks reject thehypothesis.

The impact of climate shock variable on conflict outcomes shows no significant impact on conflict outcomes. This could be explained either as the variable makes the ROCS variable outcome insignificant and is not meaningfully picking up on the effects of the different weather shocks or that ROCS and weather shocks should be studied separately as the completely differenteffects lead to a negation of the other. Another way of interpreting this is the importance of institutions, resilience measures, and more nuanced analysis. At its most pure interpretation is that Brzoska (2018) is right that different climate shocks create different incentives and so the interaction of all three create no significant results. From the results, there is support for hypothesis 3.

Importantly from the results is the importance of development. Across all models, development is a significant factor in determining conflict frequency and intensity. One interpretation could be that in more developed areas where rebel groups exist, both the state andthe VNSAs are incentivized to tone down their violence as the more economically developed an area the more that individuals can be hurt from conflict which could threaten the legitimacy ofboth the state and VNSAs. Thinking about the relationship like this, opens the door to explorehow other forms of violence might be substituted for direct violence in these situations.

CONCLUSION

This thesis set out to test how much do climate shocks incentivize violent conflict. The answer that this thesis' analysis shows is that different shocks have separate effects. While mostof the hypotheses laid out above have failed to find support for, interesting findings can still be found. Extreme temperatures can increase conflict while extreme precipitation can decrease conflict, but the two's interaction has no effect on conflict. ROCSs have a positive yet mixed significance on conflict dynamics, but the interaction between ROCSs and weather shocks haveno meaningful impact. The findings are robust, which help provide a base for future studies.

There are limitations to this study, though. The first being that the analysis does draw from a small number of regions and in a short period, but it tries to mitigate this by using region-month data, which helps increase the number of observations in the study. A similar study using a similar approach but with more countries or regions and a longer time-span are needed before any definitive claims can be made. A second limitation of this study is that the control variables are heavily based around development, which ignores possible connections to ethnic grievances (Denny and Walter, 2014; Mach et al., 2017), geography (Fearon and Laitin, 2003; Cederman and Vogt, 2017; Hammond, 2018), environmental degradation (Homer-Dixon, 1999), and institutions/governance (Ide, Kristensen, and Bartusevisius, 2021a; Ide, Lopez, Frohlich, and Scheffran, 2021b). This is mainly due to data limitations at the sub-national level, so the study could be improved when more data on these topics becomes available for the sub-national.

While there may be some limitations to the analysis of this study, there are two key findings that come directly from this analysis that future research should focus on. First, by establishing a clear distinction between climate shocks related to weather and climate shocks related to climate-disasters, each has different incentives on conflict dynamics. The second is thetheoretical improvements of the social contract allow for a greater understanding of the incentivestructures for the climate-conflict literature.

Future research should focus on how climate change influence conflict behaviors. Whilethis thesis opens theoretical doors, much is still left unanswered. Specifically in terms of the temporal effect of ROCS, the role of institutions, development/resilience, and psychological andbehavior examination of these occurrences. A more divers set of case studies, deep ethnographies, historical analysis, and more rigorous quantitative research is needed (Peters andKelman, 2020). More evidence from multiple approaches is required to make more definitive claims and address these issues properly.

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APPENDIX A

Appendix A Models A1-A4

Tables in this appendix are the statistical results of the analysis in the main body of this thesis.

Table A1. Effect of Climate Shocks on Conflict Frequency - NB

Dependent variable:						
Conflict Frequency						
	(1)	(2)	(3)	(4)	(5)	(6)
ROCS	1.214*	1.354*	1.309*	1.463**	1.519**	1.252*
	(0.707)	(0.704)	(0.704)	(0.700)	(0.699)	(0.707)
Temperature Shock		0.274***		0.273***	0.016	
		(0.080)		(0.080)	(0.105)	
Rain Shock			-0.061***	-0.060***	-0.094***	
			(0.010)	(0.010)	(0.014)	
Weather Shock						0.018
						(0.018)
Climate Shock					0.094***	
					(0.027)	
HDI	-7.696***	-8.773***	-6.769***	-7.861***	-8.136***	-8.042***
	(0.717)	(0.719)	(0.728)	(0.732)	(0.733)	(0.743)
IWI 70	-0.014***	-0.015***	-0.010***	-0.011***	-0.011***	-0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Relative Deprivation	-0.029***	-0.026***	-0.030***	-0.027***	-0.027***	-0.028***

	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Development	-0.529***	-0.560***	-0.504***	-0.533***	-0.520***	-0.534***
	(0.047)	(0.048)	(0.046)	(0.047)	(0.047)	(0.048)
Population Density	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Spillover Count	-0.099**	-0.101**	-0.087**	-0.090**	-0.095**	-0.102**
	(0.043)	(0.043)	(0.043)	(0.042)	(0.042)	(0.043)
Constant	9.737***	10.201***	9.038***	9.510***	9.733***	9.938***
	(0.535)	(0.533)	(0.537)	(0.535)	(0.539)	(0.548)
Observations	1,800	1,800	1,800	1,800	1,800	1,800
Log Likelihood	-4,791.490	-4,785.645	-4,775.515	-4,769.586	-4,762.842	-4,790.865
theta	0.432*** (0.016)	0.436*** (0.017)	0.442*** (0.017)	0.447*** (0.017)	0.451*** (0.017)	0.432*** (0.016)
Akaike Inf. Crit.	9,598.979	9,589.289	9,569.030	9,559.171	9,547.683	9,599.729
Note:						*p**p***p<0.01

Table A2. Effect of Climate Shocks on Conflict Frequency - QP

Dependent variable:						
Conflict Frequency						
	(1)	(2)	(3)	(4)	(5)	(6)
ROCS	1.151**	1.172**	1.217***	1.207***	1.110**	1.150**
	(0.479)	(0.471)	(0.462)	(0.453)	(0.458)	(0.479)
Temperature Shock		0.276***		0.232***	-0.029	
		(0.090)		(0.088)	(0.114)	
Rain Shock			-0.100***	-0.097***	-0.164***	
			(0.020)	(0.020)	(0.028)	
Weather Shock						0.007
						(0.023)
Climate Shock					0.129***	
					(0.030)	
HDI	-5.797***	-5.875***	-4.279***	-4.393***	-4.559***	-5.858***
	(0.699)	(0.695)	(0.720)	(0.719)	(0.720)	(0.733)
IWI 70	-0.011***	-0.012***	-0.007**	-0.008**	-0.008**	-0.011***
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Relative Deprivation	-0.021***	-0.022***	-0.025***	-0.026***	-0.026***	-0.021***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Development	-0.083	-0.119**	-0.076	-0.106*	-0.115**	-0.086
	(0.058)	(0.058)	(0.056)	(0.056)	(0.056)	(0.059)

Population Density	-0.002***	-0.001***	-0.002***	-0.002***	-0.001***	-0.001***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Spillover Count	-0.133**	-0.136**	-0.125**	-0.127**	-0.124**	-0.134**
	(0.053)	(0.053)	(0.051)	(0.052)	(0.051)	(0.053)
Constant	7.626***	7.625***	6.817***	6.842***	7.109***	7.665***
	(0.525)	(0.523)	(0.525)	(0.523)	(0.526)	(0.544)
Observations	1,800	1,800	1,800	1,800	1,800	1,800
Note:						*p**p***p<0.01

Table A3. Effect of Climate Shocks on Conflict Intensity - NB

Dependent variable:						
Conflict Intensity						
	(1)	(2)	(3)	(4)	(5)	(6)
ROCS	1.434*	1.629**	1.532**	1.749**	1.776**	1.478*
	(0.765)	(0.760)	(0.761)	(0.755)	(0.754)	(0.765)
Temperature Shock		0.382***		0.380***	0.177	
		(0.085)		(0.084)	(0.109)	
Rain Shock			-0.066***	-0.065***	-0.092***	
			(0.011)	(0.011)	(0.015)	
Weather Shock						0.022
						(0.019)
Climate Shock					0.077***	
					(0.028)	
HDI	-12.371***	-13.944***	-11.404***	-13.006***	-13.174***	-12.777***
	(0.764)	(0.767)	(0.776)	(0.781)	(0.782)	(0.792)
IWI 70	-0.020***	-0.022***	-0.015***	-0.017***	-0.017***	-0.021***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Relative Deprivation	-0.005	-0.001	-0.005	-0.001	-0.001	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Development	-0.653***	-0.709***	-0.635***	-0.687***	-0.669***	-0.659***
	(0.049)	(0.051)	(0.049)	(0.050)	(0.050)	(0.050)

Population Density	-0.0003	-0.0001	-0.0004	-0.0002	-0.0002	-0.0003
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Spillover Count	0.048	0.042	0.064	0.056	0.048	0.042
	(0.046)	(0.046)	(0.045)	(0.045)	(0.045)	(0.046)
Constant	12.267***	13.001***	11.515***	12.265***	12.403***	12.511***
	(0.572)	(0.570)	(0.574)	(0.572)	(0.576)	(0.586)
Observations	1,800	1,800	1,800	1,800	1,800	1,800
Log Likelihood	-5,618.585	-5,607.812	-5,602.231	-5,591.352	-5,586.883	-5,617.715
theta	0.364*** (0.013)	0.369*** (0.013)	0.372*** (0.014)	0.377*** (0.014)	0.380*** (0.014)	0.365*** (0.013)
Akaike Inf. Crit.	11,253.170	11,233.620	11,222.460	11,202.700	11,195.760	11,253.430
Note:						*p**p***p<0.01

Table A4. Effect of Climate Shocks on Conflict Intensity - NB

	Dependent variable:					
	Conflict Intensity					
	(1)	(2)	(3)	(4)	(5)	(6)
ROCS	1.097**	1.140**	1.153***	1.164***	1.063**	1.097**
	(0.453)	(0.445)	(0.436)	(0.428)	(0.431)	(0.453)
Temperature Shock		0.306***		0.266***	0.042	
		(0.083)		(0.081)	(0.104)	
Rain Shock			-0.099***	-0.095***	-0.155***	
			(0.019)	(0.019)	(0.027)	
Weather Shock						0.007
						(0.023)
Climate Shock					0.119***	
					(0.030)	
HDI	-8.234***	-8.258***	-6.729***	-6.810***	-6.993***	-8.299***
	(0.633)	(0.629)	(0.656)	(0.654)	(0.656)	(0.667)
IWI 70	-0.015***	-0.016***	-0.011***	-0.012***	-0.012***	-0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Relative Deprivation	-0.008	-0.009*	-0.011**	-0.012**	-0.012***	-0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Development	-0.186***	-0.214***	-0.174***	-0.201***	-0.208***	-0.187***
	(0.058)	(0.056)	(0.055)	(0.054)	(0.054)	(0.058)
Population Density	-0.001**	-0.001**	-0.001***	-0.001**	-0.001**	-0.001**
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)

Spillover Count	-0.013	-0.013	-0.005	-0.005	-0.002	-0.013
	(0.047)	(0.047)	(0.045)	(0.046)	(0.046)	(0.047)
Constant	9.230^{***}	9.165^{***}	8.415^{***}	8.392^{***}	8.643^{***}	9.270^{***}
	(0.477)	(0.476)	(0.478)	(0.477)	(0.480)	(0.494)
Observations	1,800	1,800	1,800	1,800	1,800	1,800
Note:						*p**p***p<0.01