The Pitfalls and Potholes of Reconstruction: Understanding the Role of Infrastructure in Post-Conflict Reconstruction

by

Emily Molfino

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Graduate Supervisory Committee:

Clark Miller, Chair
Reed Wood
Erik Fisher

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ABSTRACT

National infrastructure form the bedrock for economic growth and social security, both of which lowers conflict risks. This encourages states and international organizations to invest heavily in post-conflict infrastructure reconstruction efforts, believing that infrastructure provision will reduce future political instability. This belief is based largely on the perceived successes of reconstruction efforts in prior eras, especially after World War II. Today, post-conflict reconstruction efforts are much less successful in this regard and, overall, are not reducing political instability—Iraq being the quintessential example of such policy failure. In the face of both ongoing conflict and persistent needs for infrastructure reconstruction after conflicts, therefore, there is a critical need to understand two questions: *Why are current reconstruction efforts failing to reduce political instability or even, in some cases, increasing it?* And, *how can reconstruction efforts be organized to do better?* To address these questions, this dissertation examines infrastructure reconstruction across a wide range of national contexts. In doing this, an updated viewpoint is provided on the role of infrastructure in conflict-prone areas to include a long-term perspective on infrastructure system's role in society, technological integration, and relationship between the state and conflicting groups. This dissertation finds that though provision of different types of infrastructure might increase conflict risks in the short term, such provision can reduce conflict in the long run depending on how and where infrastructure is provided vis-á-vis excluded populations. These results provide crucial input towards the redesign of reconstruction policies to limit future political instability risks through infrastructure.

DEDICATION

I dedicate this dissertation to two sources of strength:

My dad, who has provided unwavering support, inspiration, and encouragement to set high goals no matter the hurdles to achieve them.

My husband, John, who has endured reading drafts upon drafts of this project and all the craziness, randomness, and everything in-between writing a dissertation entails.

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My time in AZ was made enjoyable in large part due to the many friends and colleagues who became a part of my life. I cannot acknowledge and thank enough my friends and colleagues at in Arizona. Your guidance and friendship made these years filed with laughter and great memories. You helped make this place home.

One of the best pieces of advice I was given before starting on this journey was to maintain a hobby. Thus, I must also briefly acknowledge to the San Fransisco Giants. Each spring training and Arizona away game, you gave me both diversion and fond family memories.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

SURVEYING THE LAND FOR FUTURE RECONSTRUCTION OPERATIONS

Infrastructure networks form the bedrock for economic and social security (ASCE Critical Infrastructure Guidance Task Committee 2009). This prevalent claim understates the impact of society's dependency on national infrastructure—a dependency that results in society being deeply embedded and structured around infrastructure's technical configurations. Failure in these technical configurations results in political crises and social upheaval. One must not look far to see the vulnerabilities such infrastructure failures can create. In the aftermath of Hurricane Katrina, the failure of the levy networks resulted in massive flooding and chaos on the streets of New Orleans. A software bug in 2003 ignited the second largest blackout and life in the Northeast, Midwest, and Ontario province was essentially suspended for days. The terrorist attack on 9/11 targeted and destroyed a portion of Manhattan's buildings and transportation infrastructure, which shut the city down for weeks and a decade-long rebuilding process is just being completed. In fact, the mere threat of failure with the infamous Y2K bug ignited paranoia as people prepared for the shut-down of electronic infrastructure in the developed world.

These events lead to consequences far beyond the infrastructure networks themselves. The United States Army Corps of Engineers, Federal Emergency Management Agency, and President George W. Bush faced extreme accusations and political consequences in their failed preparation for and response to Katrina. Following 9/11, the United States' (US) federal government sent the military to airports to symbolically and physically protect airport infrastructure, restructured the Transportation Security Agency, and created the Department of Homeland Security. In response

to the Y2K scare, billions of dollars were spent worldwide by governments and the private sector to reprogram information technology systems and prevent future potential data and digital shutdowns (especially in the form of hacking). These political and social responses occurred as policymakers and the general public recognized that infrastructure networks and surrounding systems are in fact "too big to fail" before the concept was popularized.

Even with this risk of failure and upheaval, citizens expect to have access to infrastructure for public use at some basic level (see: Mody 1996; Abadie 2006; Salehyan and Gleditsch 2006; Rotberg and West 2004; Gompert et al. 2009; Sen 1999). At the national level though, infrastructure has often proven itself as a public good—its intrinsic characteristics of communal consumption, non-excludability, and invisible payoffs garner little incentive for private actors to provide such goods (Olson 2009; Mody 1996; ASCE Critical Infrastructure Guidance Task Committee 2009). Thus, states have had to step in themselves or through subsidies if their populations are to have full access to critical national infrastructure.[1] As populations have come to rely on and demand of their political leaders to provide these public goods, national infrastructure have come to embody a modern social contract between a population's expectations and the obligations of their government (Brown 2001; Rhoads 1985). But, what of situations where the state is incapable of neither providing the necessary public goods let alone responding to an extreme infrastructure failure and resulting social upheaval—especially when that failure was caused by conflict? In the resulting post-conflict reconstruction policies, infrastructure must by rebuilt due to being destroyed or damaged during a conflict or newly provided as a conflict prevented its provision.

[1]Critical infrastructure are those infrastructures deemed necessary for a functioning state by policymakers and business leaders.

The Success and Failures of Reconstruction Policies

Foreign policymakers have not always recognized post-conflict reconstruction policy as an available strategic option to achieve international goals. For most of history, states did not feel strategically obligated nor were they morally pressured to help restore their enemies after a conflict's end—case in point being Article 231 of the Treaty of Versailles, also known as the "Guilt Clause." Then came the unparalleled aftermath and destruction of World War II (WWII). With much of their infrastructure destroyed, Western European countries were financially incapable and too politically anemic to rebuild on their own. Seeing the potential consequences to American power and position in the international system, Secretary of State George Marshall stood at Harvard University on June 5, 1947 and ignited the official beginning of post-conflict reconstruction by proposing that the US would provide direct and indirect assistance to Western European counties for economic and physical reconstruction—on the condition that they create their own reconstruction plans. The resulting Marshall Plan and infrastructure laid the groundwork for Western European unification and helped point the region away from Soviet communist influence and towards America's economic market and democratic ideals (Dobbins 2003; Agnew and Entrikin 2004).

On the other side of the globe, a similar process was taking place in Japan. Throughout WWII, Japan's infrastructure took hits from extensive air raids and the dropping of two atomic bombs. Ultimately, over 40% of Japan's urban infrastructure had some level of damage by the war's end (Azimi, Fuller, and Nakayama 2003). In contrast to the multilateral efforts taking place in Western Europe, the US conducted a majority of Japanese reconstruction efforts under the unilateral direction of General Douglas MacArthur. Nonetheless, Japanese reconstruction was similarly successful in helping guide the country towards economic prosperity under America's

umbrella of influence (Dobbins 2003; Agnew and Entrikin 2004).

The successes of both European and Japanese reconstruction remained prominent within the mindset of foreign policymakers. In due course, these programs became metaphorical guiding lights for modern post-conflict reconstruction operations (Agnew and Entrikin 2004). With these exemplars in mind, the US has invested heavily in post-conflict infrastructure reconstruction in the developing world under the belief that similar results would be produced. Yet, this belief assumes that post-WWII and post-Cold War eras of reconstruction are similar—an assumption that ultimately contributed to the failure to create stable environments on which growth can occur.

Such failure is epitomized in the second largest foreign assistance program since the Marshall Plan: Iraqi stabilization and reconstruction operations following the Iraqi War in 2003 (Office of the Special Inspector General for Iraq Reconstruction 2009).[2] Shortly after the removal of Saddam Hussain, Iraq quickly plummeted into political, social, and economic chaos: looters ran rampant, sectarian violence grew, and the economy halted. Moreover, what was left of the Iraqi government was nearing failure and unable to to provide basic services, let alone infrastructure reconstruction (Office of the Special Inspector General for Iraq Reconstruction 2009). Once recognized, the US deemed the inability of the Iraqi government to provide public goods as politically unacceptable and that any new government or occupying force could not legitimately control Iraq without providing basic public goods, like security and infrastructure. Thus, reconstruction intervention was necessary if the US was to maintain Iraq until indigenous leadership could take over its allocation (Majeski and Sylvan 2009). Nevertheless, more then a decade into post-conflict reconstruction, Iraq is still experiencing recurrent economic breakdown and continued political

[2]Iraq initially held the top position until stabilization and reconstruction operations in Afghanistan took over in 2013 (Office of the Special Inspector General for Iraq Reconstruction 2013).

crises, sectarian violence is an everyday threat throughout the country, and national infrastructure systems persistently fail. As of 2013, Iraqi households are averaging only about 7.6 hours of electricity and 2 hours of potable drinking water access a day (Londoño 2013; Office of the Special Inspector General for Iraq Reconstruction 2009).

This potential failure was recognized shortly after the start of Iraqi reconstruction. Congress reacted to this risk by establishing an independent agency to provide objective leadership and coordination in Iraq—the Office of Special Inspector General for Iraq Reconstruction (SIGIR) (United States 2004). During it's tenure, SIGIR conducted 200 audits and 170 inspections on various reconstruction projects. Budgetary benefits from these actions included over $1.61 billion from audits and $191 million from investigations (Office of the Special Inspector General for Iraq Reconstruction 2013). Ultimately, stories of mis-spending, waste, and inadequate resources during Iraq's reconstruction are abundant. According to Special Inspector General Stuart Bowen, over $8 billion was wasted throughout Iraqi reconstruction out of $60 billion spent, while the Coalition Provisional Authority (CPA) did not have the power nor organizational structure to accomplish it's large reconstruction goals (Office of the Special Inspector General for Iraq Reconstruction 2009). Based on its experiences on the ground and seeing how Iraqi infrastructure projects often suffered from inadequate design, poor government oversight, and lack of sustainability, SIGIR provided some lessons learned to help better plan and execute future reconstruction projects (Office of the Special Inspector General for Iraq Reconstruction 2013). Many of these recommendations focused on reforming reconstruction provision—how to manage contractors, how to plan unified reconstruction efforts, and how to prevent waste and fraud (see: Office of the Special Inspector General for Iraq Reconstruction 2006*ab* 2007 2009 2011 2013; Dobbins 2003; Orr 2004).

Though these are needed areas of inquiry, they converge on changing the *means*

of reconstruction while failing to address the reasons behind *why* current reconstruction policies tend to lead to political instability. SIGIR does attempt to address the greater goals and assumptions of reconstruction by recommending larger policy adjustments that shifts the yardstick of reconstruction success away from mere project numbers, such as: not viewing the defeated state as an enemy, recognizing the need to have soft programs to develop the capacity of people and systems through the local population, and having policies that address local needs and priorities to avoid a crisis of sustainability. Yet, resulting policy recommendations do not go beyond a focus on the means of reconstruction. Even the argument for designing reconstruction projects based on local needs and input is placed in terms of waste prevention by ensuring that unneeded or unnecessary projects are not conducted (Office of the Special Inspector General for Iraq Reconstruction 2012*c*).[3]

Yet, the most poignant recommendation by SIGIR is left unattended. Reconstruction operations are complimentary components of how foreign policy helps fragile states, which is to keep them from failing. In these cases, reconstruction policies can obviate those fragile states in becoming nests of threats (Bowen 2014). Bowen recognized this and argued for fact that reconstruction is "an extension of political strategy" (Office of the Special Inspector General for Iraq Reconstruction 2009, p. 333). Yet, following reports, recommendations, and policy changes never elaborated on how or if this can be done. Turning to German and Japanese reconstruction for an answer would provide little insight, as at the center of the Iraqi reconstruction failure is a theoretical gap created by a fundamentally changed environment surrounding reconstruction in the 21st Century. Unlike the post-WWII era, the pressing issue for most states confronting political instability today is no longer the dynamics of

[3]See Chapters 2 and 6 for more on Iraqi reconstruction failures, successes, and resulting policy recommendations.

global power. Rather, reconstruction efforts take place in states where conflict is commonplace, internal strife looms, governments are corrupt and weak, and public goods are increasingly limited. Additionally, these are places that can catch fire and then require continued military engagement and assertion of US power (Bowen 2014).

In the face of both ongoing conflict and persistent needs for infrastructure reconstruction, therefore, there is a critical need for reconstruction policymakers to understand two questions: *Why are current reconstruction efforts failing to reduce political instability or even, in some cases, increasing it? And, how can reconstruction efforts be organized to do better?* To accomplish this, clear connections between reconstruction policies, infrastructure, and political instability must be made.[4]

Limitations in Exiting Literature

Statecraft and substantive fixes in response to policy failures must be complemented with appropriate theoretical insight.[5] Yet, behind recent reconstruction policy failures is a theoretical limitation regarding infrastructure as a public good. In existing conflict literature, infrastructure is either overlooked, viewed with deterministic qualities, or assumed to be a neutral tool to be employed. The researcher might discuss the poor quality of roads or include infrastructure as a control or proxy variable (for example, mega watts used per capita is a widely accepted as a proxy for development along side of GDP). Yet, rarely is infrastructure the central independent variable of interest. Briefly, there are three broad shortcomings in the literature when it comes to connecting infrastructure and reconstruction to political instability.

[4]See Chapter 2 for an in-depth definition and discussion on political instability.

[5]I do not desire nor have the room to discuss the policy versus academia debate. For more detail on this divide, see: Fearon (1998), Walt (2005), and Hill and Beshoff (1994). I am taking the position here and throughout this dissertation that academic and policy debates are inherently interconnected and one cannot fully grasp failure or provide policies that work by addressing one without the other.

The first is explanatory. Current theories addressing the relationship between infrastructure and political instability conceptualize infrastructure as a resource for political elites to allocate. The provision or withholding of infrastructure and other types of public goods is viewed as a type of short-term accommodation (towards a selectorate or dissident group to limit the risk of future conflict) or repression (against perceived dissident groups or a divergent selectorate as a form of punishment by not meeting infrastructure expectations). Dissidents then react to such political strategies in ways that can increase resentment and demands against the state (Lichbach 1987; Roniger 2004; Cunnhingham and Weidmann 2007). Yet, these strategic decisions by the political elite are not as straightforward as described and come with their own set of influences (mainly private interests and incentives) and reaction to infrastructure provision or non-provision is not bound by time or place.

On top of this, many types of infrastructure are also strategic coordination goods, whose key purpose is to connect people and ideas—for example, roads allow for travel between places while broadband networks allow for communication between people. While these connections offer immense economic benefits, previous literature describes how such connections created by infrastructure can also be detrimental to political instability in conflict-prone areas. "For dissidents in coercive states, power lies in numbers" (DeNardo 1985, p. 270). Infrastructure allows dissidents a way to assemble resources, recruit supporters, and increase their power by acting in concert via these connections (Francisco 1995; DeNardo 1985; Arendt 1970; Lichbach 1987; Gates 2002; Moore 1998). Additionally, new connections created by infrastructure can also lead to political instability by way of intermingling or the connecting or mixing together groups who were previously geographically separated—the effects of such intermingling is especially great if those connected have a history of conflict (Van Evera 2001).

Current literature claims that the political elite, especially in authoritative regimes, will balance the risks behind strategic coordination and the benefits of economic growth by limiting such goods at large, like national infrastructure, while still providing goods that promote economic growth at some some level to the selectorate (Bueno de Mesquita and Down 2005). In short, this literature foresees a high chance that post-conflict regimes might opt not to provide infrastructure at the national level because the perceived costs (e.g. dissident mobilization) are high and often outweigh the perceived benefits (e.g. support and potential economic growth). Yet, the mere lack of infrastructure poses a long-term threat to the political elite by increases conflict risks.

Because they focus on whether goods are provided (or not) by the state and the immediate, short-term reaction to this action or non-action, existing literature is not in a position to explain whether infrastructure provision might have long-term value for reducing political instability. Put differently, the underlying assumption in existing literature on infrastructure is that the public good is merely consumed or not consumed. There is no reciprocal role for good provision to shape an actor's long-term decisions, goals, or behaviors. Moreover, the only agency allowed is linear, adaptive reaction—there is no time for learning over time. A new theoretical framework is necessary to explore how and under what conditions reconstruction in the altered post-Cold War dynamics contribute to long-term political instability. As will be discussed in following chapters, the long-term availability or unavailability of infrastructure can be accompanied by social re-organization, thus leading to different political and conflict dynamics between the state and society (e.g. Bronner (2008)).

A second shortcoming relates to an errant accusation on the causes of negative infrastructure consequences, which ultimately limits potential fixes. Any political system exhibits some level of clientelism or corruption—defined both normatively

and legally as those actions where public power is abused for private ends. Yet, states experiencing or recovering from conflict tend to have higher rates of endemic corruption (Roniger 2004; Waterbury 1973, p. 533). Owing to the financial and political expense of infrastructure projects, the incentive structure of corrupt political elites leads to misappropriation of infrastructure funds for personal gain, not for the general public good.

A significant source of such corrupt public good misallocation, as described in exiting literature, comes from the structural relationship between the political elite's winning coalition and size of the selectorate or the slice of society from which the winning coalition is drawn—a political elite within a small selectorate system is best sustained by directing private goods to its members (Bueno de Mesquita et al. 2005). Such privately incentivized elites are also shown to increase political instability risks by being proximate causes of internally driven conflict (Brown 2001, p. 16). Recognizing corruption's risk to political instability, existing literature focuses on preventing political instability surrounding infrastructure by fixing the the structural causes of corruption and misallocation of public goods generally and infrastructure specifically.

Yet, this policy prescription assumes that fixing the structural causes of corruption will automatically lead to less conflict and lower levels of political instability. This is not always the case, as the consequences of corruption are contested within the same system. In fact, structural causes of corruption might not be as dire a situation that requires immediate action (Johnston 1986; Nye 1967). If the ultimate goal of the political elite following a war is to reduce political instability risks (a common goal for state regimes in general), it is possible that the same structure that promotes corruption might also have the political capacity to reduce political instability vis-á-vis infrastructure and reconstruction. Moreover, when the blame for negative consequences of infrastructure is placed solely on structural incentives, no valid nor-

mative claims may be raised—to include political stability. A political structure is automatically viewed as 'bad' and in need of immediate fixing (to include intervention) once corruption is perceived as endemic. When normative disputes and claims are included into the discussion surrounding the relationship between reconstruction and political instability, infrastructure solutions can be formed that go beyond a focus on entrenched structural inefficiencies to a focus on decreasing political instability. Rather than trying to change government structure, which can take years and is often unsuccessful, attention can be placed on finding ways to allocate public funds and/or infrastructure to create a stable social and political order.

The third shortcoming of existing literature relates to its value for policymakers. Current theories largely predict that infrastructure provision will fail to reduce instability in the short term. They thus suggest to rational actors that they not invest in infrastructure, especially if not your own. Yet, state decisions not to provide public goods like infrastructure can also provoke dissident groups to fight against the state (Cunnhingham and Weidmann 2007; Gompert et al. 2009). Thus, current theories are unable to provide meaningful guidance on infrastructure investment in the short term. Equally importantly, they also do not provide guidance on how to structure infrastructure investments so that long-term dynamics will reduce political instability. Such misguidance is seen within the aforementioned discussion on current reconstruction policy fixes to prevent future Iraqi-type failures that focus on structural misallocation, bureaucratic competition, and efficiency. These solutions underestimate how or why long-term consequences occur around infrastructure provision and fail to appreciate infrastructure's intrinsic long-term qualities.

In summary, existing literature has failed to see the unique complexities behind infrastructure as a public good: they view infrastructure as an capability rather than part of an ever-changing system that shapes political stability and instability; agency

is limited to be linear and in the short term while learning (direct and indirect) is outside their scope; and current solutions revolve around preventing structural misallocation of public goods rather than incorporating normative ideals such as political stability. A new theory is needed that incorporates infrastructure's long-term qualities and role in shaping society along side the normative goal of political stability.

Call for a New Theory

To avoid the same problems as past research, I propose a new theory. This theory represents a middle ground approach as it "deterministic and constructivist argument while adding a time-sensitive perspective" within a technical systems focus (Hughes 1969; Fritsch 2011, pg. 33). In Chapter 2, I develop such a theoretical framework, Infrastructure Stability Theory (IST), that aims to explain why some kinds of infrastructure reconstruction policies reduce political instability while others do not. With IST, I argue that there are two types of infrastructure politics present: first and second order politics. In first order politics, infrastructure is a material capability, where actors and politics are concerned with immediate intents and adaptation to conflict that are driven by *short-term* goals and retaliation. In second order politics, the focus shifts to a *long-term* perspective on the politics surrounding socio-technical system where the interaction of infrastructure, power structures, and the public over time leads to conflict being driven by long-standing grievances and group identity. In short, agency is given to society (and thus politics) while acknowledging technology's push in specific directions (Fritsch 2011). From IST, hypotheses are presented in Chapter 2 that pertain to both the observed effect of infrastructure provision and non-provision on conflict over time and the specific second order causal mechanisms connecting national infrastructure systems to political instability.

As explained in Chapter 2, IST is a new framework through to understand the role of and effect of infrastructure in conflict-prone countries. Though built upon past research and knowledge on both conflict and technology, IST's conceptualization of second-order and different long-term consequences of infrastructure is novel. As such, before past theories can be updated or new theories created based on IST insight, I must illustrate the existence of long-term consequences (second order politics) and acquire an understanding of just how and why infrastructure shapes political instability over-time. Such a task requires data that capture both infrastructure and conflict across time and the long-term social/political effects of reconstruction policy decisions. Such data are case-specific, does not exist, and/or is often inadequate, which limits direct analysis. To overcome this, a triangulation approach helps point to the complexities of infrastructure consequences and answer the what, how, and why behind post-conflict reconstruction induced political instability (Schock 1999).

This dissertation uses, to the best of my knowledge, a unique combination of methods: a geospatial longitudinal study on a population of thirty-two cases, a fuzzy-set qualitative comparative analysis (fsQCA), and process tracing on a case study: Ethiopia. These methods complement one another and each provides a piece to the larger IST framework: a geospatial longitudinal study provides both visual evidence of infrastructure and conflict over time and hypothesis testing; fsQCA provides an evaluation of the hypothesized causal mechanisms to past cases and data both independently and in conjunction with each other; while, process tracing allows for an understanding of the narrative behind infrastructure and reconstruction induced political instability in addition to seeing the unique benefits of an IST framework.

The first step required in this dissertation is to demonstrate that IST is actually needed in that there are different long-term effects of infrastructure, which previous theories cannot adequately capture. Chapter 3 presents a geospatial-temporal study

on 32 post conflict cases where reconstruction was needed.[6] The resulting longitudinal analysis uses infrastructure data across time, created using geographic information system (GIS) software. This model accomplishes three things: 1) it allows me to connect place, time, and attributes (Paul et al. 2005), 2) it models how levels of different types of infrastructure influences political stability, and 3) it tests the existence of IST's novel second order politics. Supporting the the longitudinal analysis are two vignettes. The results demonstrate how conflict surrounding infrastructure morphs as time passes after infrastructure provision and how the lack of infrastructure in the peripheries increase conflict risks over time.

It is not enough to merely show the existence of different long-term consequences of infrastructure and second order politics. I must also demonstrate how these varying effects are occurring. To do this, Chapter 4 examines IST's necessary and sufficient properties by way of a fuzzy set qualitative comparative analysis (fsQCA) (Schneider and Wagemann 2012; Rihoux 2008; Ragin 2008). By employing fsQCA, I am able to directly address the hurdles involved in examining post-conflict reconstruction and political instability (such as endogeneity, asymmetry, and limited case diversity). Following this, I describe in detail how four reconstruction conditions (cut off peripheries, reconstruction aid discrepancies, high unemployment during reconstruction, and poor infrastructure quality) explain past cases of political instability. Ultimately, this fsQCA will evaluate whether the hypothesized causal mechanisms are supported by case knowledge and data by examining between- and within-cases (Schneider and Wagemann 2012, p. 304). The findings presented in this chapter provide support for my hypotheses in regards to how reconstruction conditions can play into both relative and absolute deprivation theories and can hinder national unity.

Projecting policy outcomes requires information about why things (infrastructure,

[6]This set of cases is used both for Chapter 3's geo-spatial study and Chapter 4's fsQCA.

politics, conflict, society, etc.) look and work the way they do in an actual case. This calls for a case study approach favoring thick and in-depth description (Fritsch 2011). As such, Chapter 5 includes a qualitative case study into IST's causal mechanisms via process tracing (Bennett 2008; Mahoney and Rueschemeyer 2003; George and Bennett 2005). The case examined in this chapter, Ethiopia, was chosen based on the results of the previous two chapters. As Ethiopia had two consecutive periods of reconstruction, this case provided a unique opportunity to trace policy changes and varying consequences in a most-similar situation. In describing why IST's causal mechanisms have led to political instability, this narrative engages with elements previously left out in the geo-spatial and fsQCA studies: political grievances, history, learning, power, and infrastructure design. In the end, this chapter depicts how Ethiopia's political elite could not foresee the long-term consequences of the reconstruction decisions and thus bolstered feelings of relative deprivation and psychological separation.

The ultimate goal of this dissertation is to provide policy recommendations for future reconstruction projects. As s new theory on the relationship between infrastructure and political instability, IST will provide useful input into the redesign of reconstruction policies that unintentionally increase the probability of instability. The final chapter of this dissertation (Chapter 6) brings together the results from the previously described three approaches to form such policy recommendations and projections. An expert interview with the Special Inspector for Iraqi Reconstruction, Stuart Bowen, on US reconstruction policies plays a large role in these recommendations as a way to maintain policy feasibility and placed within current policy debates. The five policy recommendations presented in Chapter 6 can help the US and others avoid the failures seen in Iraqi reconstruction in future operations.

Conclusion

Populations around the world are dependent on infrastructure networks and systems. When these collapse or are destroyed, like they were in Iraq, the consequences spread beyond the infrastructure and into all corners of society. As such, policymakers must be prepared to both prevent such collapse and have a political strategy ready when collapse does occur. The failures of Iraqi reconstruction, where neither was present, ring the alarm for policymakers and researchers alike to pay attention to the influence of national infrastructure and make such plans. These plans can then be incorporated into political strategies to help the state achieve long-term goals such as lower political instability risks. No longer can we depend on successes seen last century in today's changed environment. Before this can be done though, theoretical perspectives must mirror this shift and incorporate contemporary knowledge on the long-term qualities of infrastructure as a component of a larger complex system shaping political instability risks. This new perspective will then act as a foundation to understand past failures and build successful reconstruction politics.

By doing this, this dissertation, as a whole, strengthens academic and policy ties between political science and science and technology studies (STS). An interdisciplinary approach between these fields provides a broader understanding of how technology and politics interact, which then opens a door for new research on public good provision and the use of technology by state and non-state actors (Fritsch 2011; Kolodziej 1992). This dissertation takes takes such an approach by conditioning political science's theories about conflict and public goods with STS' insight on technological systems and complexity to understand the dynamics behind infrastructure decisions and consequences. this dynamic is both political and economic and driven by actions and choices both within and outside of these systems (Skolnikoff 1994).

Chapter 2

DECONSTRUCTING RECONSTRUCTION: INFRASTRUCTURE STABILITY THOERY

Whether a state is in post-conflict situation or not, political elites desire political stability over political instability. Yet, political stability and instability are not merely characteristics of states. They are dynamic outcomes of a complex system. Where political instability is "a long-term degenerate disease," political stability is a continual course of action that fluctuates across time (Zartman 1995, p. 8). Conceptually, political stability and instability form the ends of a spectrum. Yet, there is a qualitative asymmetry between the negative and positive poles of this political stability/instability spectrum (i.e. peace is not the absence of war). This means that any explanation of political instability non-occurrence is not a complete explanation of political stability occurrence (Goertz 2006). For instance, if one were to demonstrate that poor quality infrastructure increases political instability risks, this does not mean that having good quality infrastructure will necessarily directly ensure political stability. Though the factors that explain political instability do help explain the existence of political stability at some level, there are separate conditions that better explain increased political stability—e.g. debt ratio, education equality, and rights protection.

Knowing this, political stability and political instability should be examined on their own terms. With the recent Iraqi reconstruction failure discussed in Chapter 1, this dissertation focuses on explaining post-conflict political *instability*—defined as the threat (both perceived and actual) that the central government's legitimacy and/or control will be undermined or overthrown. The same post-conflict reconstruc-

tion theory examined in this dissertation cannot fully explain post-conflict political *stability*. Nevertheless, understanding how to promote political stability requires knowledge on why failure and political instability have occurred in the past. A state may enact many policies to promote political stability (i.e. liberalization of the economy and increasing the general living standard of the population). However, if conditions still exist in the state that promote political instability (i.e. mass corruption and economic inequalities), then the threat of conflict and political instability will remain and potentially fracture any political stability achieved with little warning—see the Arab Spring protests in Egypt that ousted then President Hosni Mubarak. Such ignorance of political instability conditions can be seen in a contemporary 'success story.' China's political elites have been greatly successful in creating a prospering economy, increasing the population's living standards, and raising the country's position in the international system. However, this growth came at a cost by ignoring immense economic inequalities and failing to comprehensively invest in infrastructure to the entire population[1] —conditions that reinforced an underlining risk of political instability.

Nevertheless, how to capture political instability, let alone the conditions that influence it, is highly debated. There has been some convergence in existing literature and political instability measures on borders, centralized control over state agents, security, physical power, legitimacy, and regime measures that include type, length, or durability (Marshall and Cole 2010; Foltz 1995; Zartman 1995; Brown 2001). However, the literature has generally given short shrift to the extremely important role of non-security based public good provision in the modern state. These goods range

[1]When one thinks of China's infrastructure, they often conjure images of Beijing Airport, one of the most expensive airports in the world, or the high-speed rail that connects the eastern cities. Though these are spectacular infrastructure project, this is not the norm in China. The widespread and deadly distraction of recent earthquakes in the Yunnan, Guizhou, and Sichuan provinces demonstrated the poor quality of rural infrastructure in the west and southwest.

from health services, education, social security, financial infrastructure, and physical infrastructure (Weaver and Rockman 1993). Such goods do not directly help increase individual or national security as traditionally understood by policymakers and realist frameworks, but they provide crucial social nets, structures, or capabilities to the population at large. This oversight in existing political instability conceptualization leads to a limited understanding of the impact of certain types of public good provision—including infrastructure provision—to observed political instability. In response, I argue that the ability to effectively allocate public goods beyond security must be emphasized in political instability conceptualizations.[2]

Though infrastructure is just one type of such non-security based public good, I argue that these technologies are, in fact, major components in the success and failure of post-conflict policy and cannot be overlooked—when there is failure in infrastructure's technical configurations, political crises and social upheaval become pervasive throughout a country. Thus, it is through this re-conceptualization of political instability where infrastructure provision is a key component that it becomes possible to provide a new perspective on why previous post-conflict reconstruction efforts have led states into continued political instability. Incorporating this will allows for a better understanding of just how reconstruction can become a part of political strategy in post-conflict operations.

Doing this requires addressing four relevant policy variables related to infrastructure and infrastructure networks as part of a complex system: when, who, where, and how. The "when" element must consider both short and long-term components. The "whom" that receives or does not receive infrastructure matters because individuals are rational entities with agency to both adapt and learn. "Where" infrastructure

[2]This does open the door to endogeneity problems, but the ability to allocate infrastructure and other public goods is an integral part of political stability/instability and cannot be ignored. As will be discussed in Chapter 4, this endogeneity does not preclude an analytical study from occurring.

is built requires a comprehensive view of the state's geography and infrastructure network. And, the "how" infrastructure is constructed captures who receives reconstruction benefits and the strength and longevity of these benefits. By combining elements from both conflict literature and STS, this chapter develops a theory that provides insight into how each variable influences political instability in post-conflict reconstruction areas: Infrastructure-Stability Theory (IST). IST is not intended to be a standalone theory; IST is a framework on how to view the effects of infrastructure and reconstruction policies. By using this new framework, existing literature can be reframed and updated while new theories are formed that building on IST's insights.

In developing IST, this chapter proceeds as follows. First, I reframe exiting literature's short term perspective on infrastructure as a capability (first order politics), and argue for the need to have a long-term perspective of infrastructure (second order politics) in order to fully understand infrastructure's role in shaping to political instability. I then present hypotheses concerning both the observed effect of infrastructure on conflict over time and the second order causal mechanisms connecting national infrastructure networks and reconstruction to political instability. IST is not solely an academic theory of political instability; IST is a framework to help plan future post-conflict reconstruction projects. As such, the concluding portion of this chapter covers the policy implications of IST on reconstruction planning and infrastructure construction. Lastly, I reframe Iraqi reconstruction failures within IST to demonstrate its potential utility to policymakers.

Infrastructure Networks Across Time

As defined in this dissertation, infrastructures are the material technologies (both structures and facilities) that are essential for economic endeavors and quality of

life.[3] Examples of such infrastructure include: roads, railroad lines, power plants, water/sewage pipes, and broadband towers. Connecting separate infrastructure together so that they work together to achieve a single purpose creates infrastructure networks (i.e. connecting multiple power lines and a power station creates a power network whose purpose is to provide a reliable source of electricity). I acknowledge that this definition precludes vital organizational infrastructure (e.g. governance, law, and banking infrastructure), which are the systems that control power and assign individual/group responsibilities (American Society of Civil Engineers 2013). Yet, where material infrastructure technology is physical, organizational infrastructure is social and adds an human element to an already complex causal story. Adding such a social element would make it more difficult to pinpoint the source of policy failure and political instability (Perrow 2011). For this reason, I exclude bureaucratic infrastructure from this dissertation's central independent variable.[4]

National infrastructure is necessary for a well-functioning state.[5] Yet, the provision of infrastructure specifically and public goods generally requires financial and political capital. As a state transitions from a conflict to post-conflict environment, political elites are faced with decisions on where to allocate these limited resources, and rarely do these states have enough of both physical and political capital to rebuild and perform other necessary post-conflict responsibilities. States do have the option

[3]In lieu of material, policy papers often use the descriptor "hard" to define the same category of infrastructure. Though the two labels are interchangeable, the word hard invokes certain characteristics that, I argue, are not always present in post-conflict reconstruction. Hard technologies and hard infrastructure implies immobile, unchanging, and inanimate. As I explain in this chapter, these qualities are not always accurate over time: infrastructure technologies shape society; infrastructure changes as it erodes due to lack of maintenance; and, infrastructure's benefits move well beyond the technology itself.

[4]Although I leave the application of IST on organizational infrastructure to future research, I postulate IST will also provide key insights, as organizational and material infrastructure are often if not always interrelated.

[5]See Chapter 1 for further details on why infrastructure in necessary for a functioning, stable state.

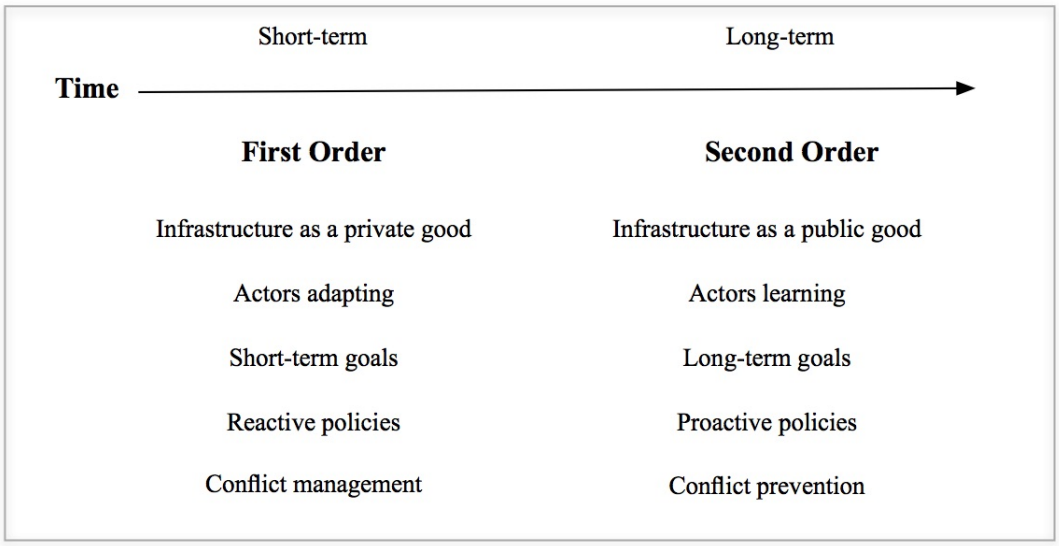
on whether to accept foreign aid and/or have international actors provide the infrastructure they cannot provide, but this comes with it obligations and/or concessions that the political elite or society may find unpalatable.

Nevertheless, it must also be noted that infrastructure and reconstruction decisions are not the only decisions occurring in post-conflict situations. After a conflict, the political elite face decisions on security (where to station military troops and deciding whether to restructure the military), the economy (how to transition into the global market and whether to enact liberalization policies), and political arena (is there a need to create a new political coalition or begin democratization of the political system). Such decisions affect how infrastructure is provided—the selectorate of a new coalition might expect to be rewarded or transitioning to a democracy might slow public good allocation as policymakers create and learn a new decision-making structure. At the same time, these decisions are not independent from each other. a military requires infrastructure to transport people and supplies, thus the places where the military is sent either needs to have infrastructure or infrastructure needs to be built at the expense of building infrastructure in different areas; economic growth requires national infrastructure to transport goods, services, and workers, yet economic cost-benefit analysis hinders potential invest went investment (Alesina, Baqir, and Easterly 1999; Miguel, Satyanath, and Sergenti 2004; Habyarimana et al. 2007). This interdependence of post-conflict decisions across many realms makes it more essential to understand the role of infrastructure in post-conflict political instability so that infrastructure decisions fortify the decisions made in the security, economic, and political arenas (Office of the Special Inspector General for Iraq Reconstruction 2009; Roland 2002; Cohen 2009).

Any infrastructure decisions made though must contend with the fact that *although infrastructure tends to remain stationary, its consequences are anything but*

fixed.[6] These moving consequences come as a result of the unfolding relationship between infrastructure and political instability across time, moving from what I term first order politics to second order politics—see Figure 2.1.

Figure 2.1: Infrastructure Across Time



In first order politics, technology is politicized; infrastructure is a private good and tool in power plays during its construction and use (Brown 2009; Herrera 2003). As will be discussed in further detail below, first order politics revolve around the immediate goals of political elites and dissidents with infrastructure viewed as a capability in either conflict management (e.g. accommodation and repression) or dissident strategies. In second order politics though, infrastructure becomes un-politicized, becomes a public good, and is no longer an *active* tool for conflict management or strategies. This does not mean though that politics are absent. Contrary to first order politics, second order politics revolve around the socio-technical system at large

[6]Relocating a road or communication network is financially impractical and at most physically impossible. This does not mean that networks are unchangeable. Additional roads or power lines can be added, which does change that infrastructure network. Moreover, infrastructure can be completely destroyed—as shown by the initial need for reconstruction. This distinction is important. It demonstrates the need to consider the long-term consequences of infrastructure early in the planning process. But, as these infrastructure networks are changeable, current and future policy makers have the opportunity to change directions.

where the public, power structures, and infrastructure continuously shape each other *across time* (Jasanoff 2003). This long-term conceptualization and system model of infrastructure's role in political instability has been missing from previous theories, which focuses on the short term and, I argue, first order politics.

The shift from first to second order politics is a shift in focus from the decisions of political elites and dissidents to a focus on the long-term effect of infrastructure systems on the greater public. It might seem that the main driver of this shift between first to second politics is time, and time does play an important role here, but time does not explain everything behind this shift. The shift between first order to second order politics involves a shift in the focal points and perspective. Actors within first-order politics essentially act with blinders; they only see what is immediately in front of them. These blinders are the result of various structural incentives to merely focus on the short term. Once the blinders are removed, one's perspective expands and shifts into the long term and second order politics. In other words, shifting to second order from first order politics involves allowing more information/data/input to enter one's evaluation and decision making. This requires a cognitive choice to remove one's first-order blinders and look at the larger, long-term picture. This is not easy, as there is often information overload once the blinders are removed. Yet, IST and the causal mechanisms between infrastructure and reconstruction to political instability described below provide guiding posts to help order, comprehend, and act on this new information.

Nevertheless, first and second order politics are intrinsically connected. Political elites acting solely with a short-term perspective in first order politics cannot adequately anticipate second order politics in the long term. Yet, changes in the second order require adaptation in the first order. It is then of increased imperative to be able to differentiate between first and second order politics and their subsequent short

and long-term consequences to political instability.[7] If they are connected, why are the politics surrounding infrastructure and reconstruction different in the initial years as compared to many years out? The answer lies in the focus. A couple of years out from infrastructure provision, it is still hard to see plausible long-term outcomes or consequences, which is why the focus remains on the short term and immediate reactions. Yet, actions and decisions in the first-order build on top of each other and eventually add up to form second-order politics and consequences. Many years after provision, it becomes more possible to see how a policy is or is not achieving long-term goals and changes can be made accordingly.[8]

First Order Politics

In first order politics, decisions by the political elite regarding infrastructure provision are based on private good logic with the goal to immediately increase loyalty, punish dissidents, or fulfill international agreements (Lichbach 1987; Bueno de Mesquita and Down 2005; Bueno de Mesquita et al. 2005). The populous (to include infrastructure users and non-users, dissident groups, selectorate, and non-committed) react to this infrastructure provision or non-provision. This reaction comes in many

[7] A similar perspective is used within emerging technology discourse in regards to the "upstream" and "downstream" policies. Technological development's downstream includes regulations and market mechanisms and its upstream includes research policies and technology assessment (Fisher, Mahajan, and Mitcham 2006). Though there are many similarities between the upstream/downstream and first/second order, I am hesitant to bring this metaphor over to this discussion on infrastructure technology primarily due to the diffuse effects of infrastructure over time. Where downstream development policies are seemingly most common by the political elite and revolve around regulation and market mechanisms, second order policies are commonly ignored and revolve around forecasting and sustainability.

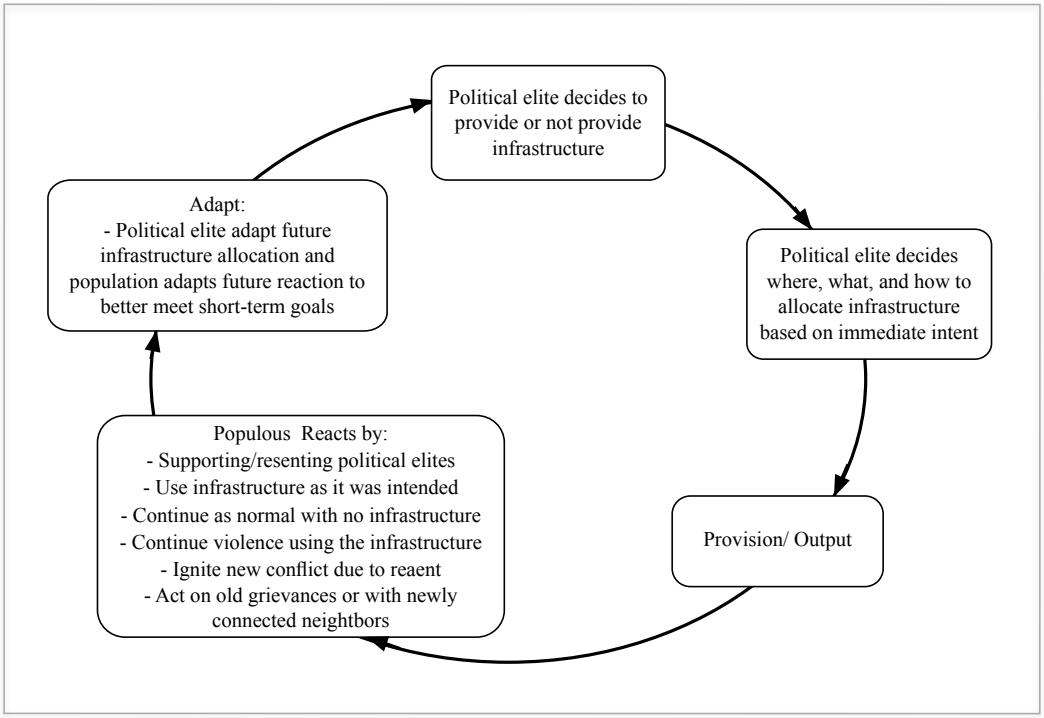
[8] This is a common problem in regards to evaluating policy. Looking at the Affordable Care Act (ACA), this becomes apparent. The ultimate long-term goal of the ACA was to increase the health of the nation. Yet, in the initial years of its implementation, successes had to be measured using short-term metrics (numbers of newly insured or changes in costs and benefits) that do not really capture changes in the nation's long-term health, because there was little other available data and these were the numbers the policymakers wanted to help make their claim. At the same time, it does not become possible to fully measure this until many years later after the initial changes start taking hold and shaping health outcomes. It is then that different policies can be made to help better align the ACA towards improving the long-term health of the nation.

forms, such as: supporting or resenting the political elites, employing new infrastructure in their strategies, igniting new conflict due to 'bad' infrastructure provision, or fighting neighbors as a result of new connections and intermingling (Francisco 1995; DeNardo 1985; Arendt 1970; Lichbach 1987; Gates 2002; Moore 1998; Van Evera 2001; Gompert et al. 2009). After seeing how others react to their decisions, the political elite adapt future infrastructure provision decisions(Lichbach 1987; Roniger 2004; Cunnhingham and Weidmann 2007)—Figure 2.2 depicts this cycle.

Such first order politics is seen in the West Bank where Israeli leaders decided to build an additional road in 2004 between Jerusalem to Maaleh Adumim—an already well-connected settlement with a population of over 31,000 Israeli settlers—in order to gain support from local lawmakers upset with Prime Minister Ariel Sharon's plan to withdraw from the Gaza Strip. Though successful in that regard, this decision was perceived as a road misallocation. Palestinians in the West Bank wondered why an area, which already had the needed infrastructure, was getting new infrastructure when they did not have access to all-weather roads or only very poor quality roads. This fed into local anger and frustration (P-I News Services 2004). First order politics are also seen in how infrastructure reduce barriers to collection action, increase the ability to mobilize insurgents, and increase the likelihood of insurgency within a given area. Pierskalla and Hollenbach (2013), for example, show how spatial variation in access to communication technologies help explain the location of insurgent violence, which occurs as a result of the positive influence communication and information sharing has on rebel mobilization. In both cases, infrastructure was viewed as a tool or capability. This led to a near-sighted perception of infrastructure's consequences and costs/benefits. Long-term effects to political instability were not addressed.

By viewing infrastructure as a capability and private good, actors' limited agency to enact change while acting in first order politics becomes evident—the political

Figure 2.2: First Order Politics



elite and the populous can only adapt to infrastructure and *react* to failing or new strategies by changing their *behavior* (Haas 1990; Hall 1993; Sabatier 1988; Levy 1994). Within IST, adaptation is observed in infrastructure provision policies or in dissident tactics. Political elites can adapt future infrastructure projects in first order politics to mitigate conflict risk or to punish dissident actions. Dissident groups adapt to infrastructure provision and use infrastructure in their mobilization strategies. As shown in Figure 2.2, first order politics is a continuous and vicious cycle of reaction and adaptation to an other's action. By continuously adapting policies, the political elite and dissident groups primarily execute reactive strategies in hopes to prevent the other side from gaining great leads. Yet, such reactive strategies that are concerned about protecting ones position from an other can only regulate violence rather than preventing it all together (Bar-Siman-Tov 1994; Mitchell 1981).

In terms of the observable effects on conflict type, first order politics triggers

reactionary and counteraction violence where the political elite or dissident groups employ quick, tit-for-tat strategies using infrastructure as a tool. Such conflict is based on short-term goals or those goals that achieve immediate results (i.e. ending a protest, destroying military capabilities, eliminating government officials, or gaining control of a town). Tough policymakers and dissidents do have long-term goals (i.e. secession, democracy, regime security, and economic growth), their focus remains on immediate goals that have built-in tools for implementation (Majeski and Sylvan 2009). In short, dissidents and the political elite in first order politics are opportunistic in their conflict tactics to gain immediate benefits—resulting success is quick to see and greatly rewarded. With a focus on immediate benefits, there is no incentive to either act or recognize potential long-term consequences of their infrastructure and reconstruction policies to political instability (Weinstein 2007).

With first order politics' short-term perspective, there is no time to understand how actors can learn from or be shaped by infrastructure or socio-technical systems as actors are focused on the material technology and short-term reactions to these technologies. This does not mean that learning is not occurring, just that neither side recognizes that learning is occurring and having real consequences to political instability. In short, the consequences of learning are larger and are more severe than first order politics can appreciate. This adaptation versus learning distinction is important in regards to post-conflict reconstruction as it is through learning that conflict prevention and decreased political instability is allowed.

When comparing this description of first order politics to exiting literature's treatment of infrastructure in conflict areas (described in Chapter 1), it becomes clear that there is very little difference between the two beyond technical terms—this was deliberate. IST does not replace previous theories, but adds an additional layer that was missing as existing literature cuts the relationship between infrastructure and polit-

ical instability short and discounts infrastructure's long-term qualities. By adding this long-term perspective via my conceptualization of second order politics, existing literature could be reframed so that it better captures how infrastructure as a capability influences conflict on the ground. It then becomes possible to appreciate infrastructure's long-term influence and role in society.

Second Order Politics

Infrastructure has an intrinsic long-term quality in that its consequences both remain and change long after the initial investment. Beginning at an infrastructure's construction and as time passes, an increasing-returns yet path-dependent situation forms where the relative benefits of staying with that infrastructure and the costs of switching paths to new or different infrastructure increase over time (Pierson 2000; Hughes 1994; Kennedy 2008).[9] One aspect of such change across time is how infrastructure shifts from being a private benefit into a public good where the consequences (both good and bad) are felt by the public (users and non-users; selectorate) at large. As first order politics focuses on the short term and immediate consequences, a perspective is needed that accounts for this long-term quality and infrastructure as a public good in order to fully understand how infrastructure shapes political instability over time—a perspective provided in IST's second order politics.

Second order politics takes a system-level approach towards infrastructure. Where infrastructure is a tool/capability in first order politics, infrastructure becomes its

[9]An example: a well is built and the builders leave; the community grows surrounding the well; the community becomes dependent on that source of water; the builders remain far away while their product continues to benefit the community; the community now could not exist without that well and switching to a different water infrastructure network (i.e. piped in from a local reservoir) becomes costly as residents invest in other technologies dependent on the well; the well provides security in the community to invest in its growth.

own component within a larger socio-technical system (Jasanoff 2003).[10] These socio-technical systems are comprised of not only the various infrastructure and infrastructure networks, but also power structures (social structures that reinforce inequalities between groups of people, to include: social orders, economic arrangements, and political constituencies) and the actions occurring within the system (i.e. the interactions created by transportation networks and patterns of social activity)—see Figure 2.3.[11] In such systems, these elements continuously interact and influence each other—in other words, society, technology, and power structure become dependent on each other. This interaction ultimately effects how the public (individuals and groups) both act and feel—note that this does not always occur as the original 'planner' intended (Kennedy 2008). Infrastructure shapes individual daily actions and ultimately their identity. Separating these elements, which a short-term perspective does, causes one to miss power dynamics and important lines of inquiry (Winner 1986).[12]

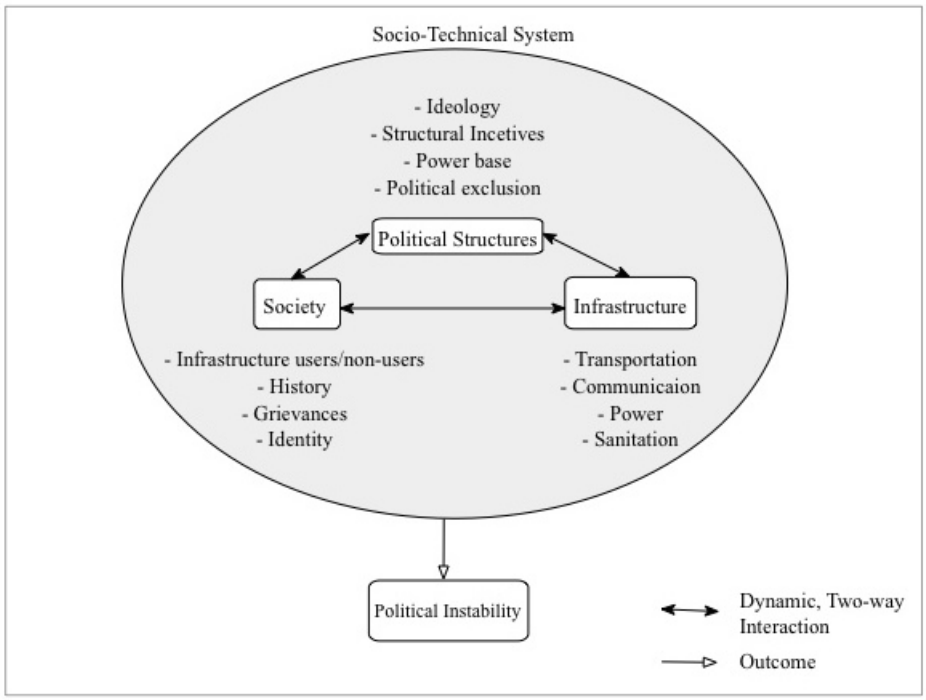
The dynamic nature of socio-technical system makes it susceptible to manipulation and allows actors to push the system towards their own goals and ideology. Ideology is *symbolically* important in second order politics by envisioning and framing a desired future 'public'. This is not say that ideology is not absent in first order politics; ideology tells the political elite and dissidents who their supporters are that need

[10]Note, socio-technical systems are not 'soft technology'. As traditionally used, soft infrastructure technologies are bureaucratic, immaterial structures. For more discussion on the difference between material and bureaucratic infrastructure and why the latter is not included in this discussion, see Chapter 1.

[11]An individual or society can be affected by multiple socio-technical systems at one time. These systems might even pull in opposite directions. As described in this dissertation, I am looking at socio-technical systems incorporating *national* infrastructure in its entirety. Excluded is the effect of international socio-technical systems (i.e. roads crossing borders and international satellites). Though these systems are impotent in shaping society, I am currently focusing on the national level.

[12]For instance, a focus on infrastructure as a capability may capture the various ways dissidents use that technology but not see how the power structures reinforced by infrastructure may ignite long-held, simmering grievances or even create new, deep grievances.

Figure 2.3: Second Order Politics



private goods, why retaliation is needed, and what any other short-term goals are.[13]

Such manipulation is seen within governmentality where technologies (here infrastructure) discipline citizens by guiding their daily lives towards or against the goals of the state and ideology (Keeley 1990). If the political elite wishes to maintain power, a continual process of governmentality is needed, which a maintained infrastructure network can do over a long period of time (Jasanoff 2003; Ferguson 1990; Nye 1994). Please note that I am not taking a deterministic stance in regards to infrastructure. A deterministic stance (X technology directly leads to Y consequence with little agency given to society) would not allow for the type of change IST foresees in second order politics (Winner 1986). In second order politics, agency is given to actors (the political elite and public) within and around a socio-technical system (and thus politics) while acknowledging technology's continual push (Fritsch 2011).

[13]As an illustration of this dual role of ideology, Chinese ideology envisions a future with a *Chinese* people under communist rule and part of a capitalist superpower. This then requires a socio-technical system that promotes communist norms, economic growth, and unified identity.

Figure 2.3 illustrates how the socio-technical system *shapes* political instability as an outcome. Yet, this outcome is the result of a complex system *over time*. Because of this long-term quality, infrastructure viewed with a short-term perspective are perceived as stable, as only the physical infrastructure and immediate consequences are seen. Yet, these systems are anything by stable over time. What is not seen with a short-term perspective is how these socio-technical systems are in constant reformation and any change is gradual and cumulative in nature. For instance, UNHCR refugee camp designers, using first order logic, failed to understand how the camp's infrastructure would be operated by the inhabitants over time—the original builders assumed these camps were temporary, when, in fact, they became a long-term homes for many. This meant that UNHCR was unable to foresee how their camp structure and technology would actually obstruct community values and provide shielding for illicit activity later on (Kennedy 2008).

By extending the time frame, it becomes possible to see how infrastructure is more than just a technology. It is a component of a dynamic, larger, socio-technical system. Infrastructure shapes individual daily actions, which cumulate together to ultimately shape their identity. Infrastructure also gives power or takes power away from certain individuals or groups. Yet, none of this exists independently from societal and political influences. Human actors have power in shaping infrastructure design and use. This dynamic complexity represents a potentially destabilizing force by reinforcing previous outcomes or allowing these systems to be quickly overturned through endogenous and exogenous forces (Perrow 2011). A case in point being when lines of conflict occur as non-users see themselves as separate from the central state or when actors within the population learn to 'misuse the system' against the state (Skolnikoff 1994).

In contrast to the adaptation seen in first order politics, learning around and

within the socio-technical system in second order politics is the deliberate or unintentional attempt to adjust policy *goals and values* in response to a combination of failures, feedback loops, perception changes, and increased information (Hall 1993; Sabatier 1988; Malici 2011). Such learning in regards to infrastructure takes time as changes are incremental and must be continuously reinforced. When viewed in first order politics, these incremental changes appear as individual acts. Yet, when amalgamated together these compounding acts, these changes appear as learning.

Such learning appears in many forms across post-conflict reconstruction. In dissident strategies, infrastructure can reinforce long running grievances or create new grievances that leads to that group changing their goals and values (i.e shifting from attacking political elites themselves to attacking those sites that symbolize the regime's attempt to quell their movement and identity). Moreover, dissident groups can find ways to undermine the state by manipulating the socio-technical system towards their goals and away from state goals often leading to infrastructure destruction (Habyarimana et al. 2007). Alternatively, the lack of infrastructure can cause groups to learn new ideational grievances by promoting physical and psychological ethnic separations (Van Evera 2001). Learning can also be seen in the political elite's policies that manipulate the system to purposively push segments of the population away. In other words, resentment and grievances are baked into the socio-technical system, which the populous then learns from as it's being shaped by the system. Is it through this learning in second order politics that the intentional sabotage of infrastructure and/or denial of a state provided good by ideological forces becomes comprehensible. This type of learned "misuse" of infrastructure is recognition that: infrastructure is important and long-term political instability is connected to infrastructure—a second order focus.

Though learning can take different forms, what they have in common is that

they invoke proactive conflict strategies based on long-term goals—long-term goals are those objects that have no immediate solution and it takes a chain of different actions to achieve an outcome (Majeski and Sylvan 2009). Proactive strategies are not concerned with finding ways to eliminate the enemy quickly. Instead, they involve diminishing the capabilities and resources of dissidents or the political elite slowly to a point where they can be absorbed into society and the political structure or until compensation must be made before a complete takeover (Posen 2001/02). As such, conflict driven by second order politics comes as a result of deeper, simmering grievances where the goals of the state clash with the goals of a group—often seen as a build up of *prolonged* conflict (Fearon and Laitin 2003). This learning must be understood as it has substantially different conflict effects compared to first oder politics.[14]

Israel offers an illuming example of the socio-technical system and first and second order politics. Israel has been adopting policies to gain legitimacy and sustain a particular identity they believe and desire Israelis to have (Ezrahi 1997). This is done by building Israeli settlements in the West Bank to force that area in the Israeli national identity while pushing out, via infrastructure, those not belonging to this perceived identity. For instance, a stoplight exists separating Beit Hanina (a Palestinian neighborhood) and Pisgaat Zeev (a Jewish settlement). Local Palestinians tell the story of how the light remains green for settlers for five minutes and only briefly for those in Beit Hanina. After hearing this, an international news investigation found that stoplights stay green in Jewish settlements for an average of a minute and a half while stoplights did in fact stay green for an average of 20 seconds in Palestinian areas (Guarnieri 2010). Little if any objective justification for such a dichotomy ex-

[14]More will be discussed on different second order politics' learned strategies/tactics and grievances in the rest of this chapter's discussion on second order causal mechanisms and policy implications.

ists. Looking at other types of infrastructure, the high contention behind water rights and infrastructure can be traced back to Israeli state formation and failed Oslo peace accords, which was supposed to be a temporary solution to water rights by freezing quantities. Yet, such levels cannot adequately nourish the West Bank's growing population in the arid region. As Palestinians continuously adapt to blatant infrastructure discrepancies and water shortages, resentment builds that reinforces a separate Palestinian identity in the West Bank—an identity Israeli political elites are attempting to lessen within the national Israeli identity (Sel 2003; Alatout 2009). "It's a feeling of frustration and of not belonging...that the government and state is excluding you and you are not counted as an equal," a local Palestinian resident explained of the effect of this socio-technical manipulation (Guarnieri 2010).

Where there is second order politics, there are first order politics. By framing infrastructure policy in a security framework, Israel has politicized infrastructure in hopes to gain legitimacy internally and internationally using first order politics. After the second intifada in September 2000, the Israeli Defense Forces closed many of West Bank's major roads for non-Jewish settlers claiming safety concerns both on the road and in regards to combatants traveling between sites—ten of these major roads were still closed nine years later. This separate infrastructure policy (essentially making infrastructure a private good for Israeli citizens) was further upheld in March 2008 when the Israeli Supreme Court made an interim decision allowing for additional separated roads to be built in the West Bank for Palestinians. Having gained the label of 'Apartheid Roads' by Palestinians, these were not separate-but-equal roads, as neither their utility nor quality measured up to the original road (Carey 2001; Bronner 2008). Access to water follows a similar track as water infrastructure is used a private good tool to support the Israeli selectorate at the cost of providing inadequate water access to Palestinians. Though Israel's water comes from its own

aquifers, the West Bank and Israelis share groundwater basins (Alatout 2006; Sel 2003; Allan and Allan 2002). In both cases, the resentment ignited by the initial decision to punish dissidents and non-selectorate by limiting infrastructure has morphed into second order consequences. As they are being routinely pushed out these first order decisions and the socio-technical system, Palestinians's separate identity and long-term grievances are also being continuously re-enforced.

Conflict Surrounding Infrastructure

In summary, first order politics and existing literature largely predict that conflict risks will spike shortly after infrastructure provision and the initial phases of reconstruction. Yet, not all infrastructure provision will illicit conflict. Such conflict occurs in subnational/local areas where there was already a history of conflict between groups, there was high political distrust in the central government, and/or there was a latent dissident group. When infrastructure is newly provided in these areas, new conflict can be sparked based on: the intermingling of groups with a violent history, dissidents reacting defensively to perceived repression, and groups taking advantage of their increased capacity to mobilize support and resources. If these conditions did not exist, then there is a low risk that newly provided infrastructure will spark a spike in conflict and new infrastructure provision would likely reduce grievances and be accepted. Nevertheless, the conditions that lead to conflict are common in many areas of post-conflict states, which is one reason why helps explain why current literature has focused on such first-order consequences.

Nonetheless, I also argue that second order politics offers the potential for a drop in conflict because of these socio-technical systems. Infrastructure can connect areas physically to the political core, national economy, and national identity. This follows Tobler's first law of geography where "everything is related to everything else, but

near things are more related than distant things" (Tobler 1970, p. 236). If national infrastructure is dispersed throughout the country, distant areas from the political core are no longer distant and the influence of the political core will not decay across large territories.[15]

If second order politics are accounted for in reconstruction policies, the risk of future conflict will drop—creating an inverted-U shape of conflict risks. With this inverted-U conflict risk, conflict is inevitable. However, if policymakers acknowledge and plan for the initial outburst and forecasts are accounted for during the planning process, conflict risks will fall. This brings me to my first hypothesis about the observable/geographic effects of this shift from infrastructure's short-term consequences (first-order) to long-term consequences (second order).

> *H1: Conflict risks after infrastructure provision follows an inverted pattern where conflict risks spike after provision and then drops as time passes.*

In testing H1, I am specifically looking at the consequences (conflict events) of the surrounding infrastructure networks. Confirming this hypothesis will provide evidence for the existence of second order politics. If I cannot show the distinction between first order and second order consequences, IST is in jeopardy as its novelty comes from the theorized existence of second order politics.

Second Order Causal Mechanisms

Nevertheless, it is not enough to show the existence of second order politics; also needed is an understanding how second order politics leads to political instability.

[15]The political core is the central geographic location of the political elites—in most all cases, this is also the country's capital (Campante and Do 2009).

The hypothesized causal mechanisms discussed in this section revolve around reconstruction conditions that lead to higher political instability risks over time in regards to integration, power, and system security. In other words, the presence of these conditions means that the hypothesized inverted-U relationship will not occur and there will not be an eventual drop in conflict after reconstruction.

National Unity

Socio-technical systems were pivotal in the creation of the modern state. As described Anderson (2006), these systems created a vital "we" that connected people who might never meet, have little in common, and yet live within the same invisible borders.[16] In his narrative of the "unfolding of national destiny," Nye (1994) illustrates how the US came to be in part due to technology's ability to unify and create a single 'American Identity.' The US federal government needed to create a national bond as the country expanded westward—republicanism, as a creed, meant that politics itself could not be the unifying element needed as its politics were focused more on debate (Nye 1994, p. 76). Jackson's manifest philosophy intertwined with the Industrial Revolution's mechanical philosophy and sparked the creation of the first Transcontinental Railway connecting San Francisco, California to the East Coast, which cemented the American identity to both coasts. The creation of such nationalistic feelings required and still calls for central leadership.

Just as fledging states needed to create a unified we, the need for a unified state after a major conflict is also paramount in order to create national trust and concord after turbulent times. Yet, the modern state is still "a compulsory association with a territorial bases" where national identity and nationalism more closely linked with

[16]For more on how technologies has shaped national identities, see: Lansing (2006) and Scott (1998).

the territory and people and not necessarily with the state or regime at large (Weber 2009; Coakley 2003; Gourevitch 1979; Wright 1991, p 156). Given that states recovering from conflict are also commonly composed of a diverse set of people (ethnically and religiously) across a large land area, the risk of potential separatist feelings and increased political instability remain high if left unattended (Fearon and Laitin 2003). Once this diversity is politically, economically, and ideationally marginalized along territorial lines, the risk of conflict is high (see Tir and Vasquez (2010) and Hensel (2012) for how territory affects conflict onset and escalation; see: Vasquez (1993) and Senese and Vasquez (2008) for how territory can be the underlying cause of conflict). In these situations, the risk of successful separatist mobilization based on peripheral nationalism increases based on the degree of such marginalization (Buhaug 2006; Olzak 1983; Wright 1991; Gourevitch 1979).[17]

Existing literature highlights two available options for the state to curb such risks: changing territory boundaries or relocating the group in question (Coakley 2003). Both of these options, however, fail in two areas. First, both risk sparking new conflicts. Secondly, post-conflict governments are often too weak to implement such ambitious policies. IST offers a third option for states to overcome diverse and/or fractionalized populations: having a national infrastructure system that connects periphery to the political center.

Infrastructure is dependent on the ground its sits upon. Where first order politics only sees the technology and immediate land it sits upon, second order politics' systems approach broadens the scope to include the surrounding territory at large.

[17]Buhaug (2006) argues though that such peripheral secessionist conflict primarily occurs within a large country. Dissidents in small states primarily want to take over the government rather than seceded due to limited land area to be 'separate from the core'. This structuralist argument though ignores the actions of the political elite to both incorporate or push away certain populations. Moreover, what constitutes small or large state is purely subjective and that a group can still desire a separate state on a relatively small area—see Sri Lanka.

Just as all parts of human body must be connected to the heart via the vascular system, the socio-technical system can limit political instability only if the system runs through the entire country, thus creating a single and unified "we". By doing this, peripherality is formed with "the subordination of a group to the authority of a geographical center or core over its fate and possessing minimal reduces for the defiance of its distinctiveness against outside pressures" (Rokkan and Urwin 1983, p. 299). A system that connects territories decreases the costs of the continued governmentality needed to combat political instability.

If peripheries are cut off from this political core, the control and influence of the political elite will decay in these areas. Cut off peripheries created by the lack of infrastructure are prone generate feelings of psychological separations, which increase grievances, resentment, and mobilization against the political core (Olzak 1983). Moreover, areas with little or no infrastructure offers rebel groups sanctuary from the governments control and military (Fearon and Laitin 2003).[18] Thus, misappropriation of infrastructure creates socio-technical systems that enforce "lines of conflict" between how individuals view themselves and how actors in power force them to behave. This type of 'a rule by nobody' leads to political instability, as those without power have a tendency to push back (Arendt 1970; Barnett and Duvall 2005; Scott 1998). As such, the aforementioned inverted U relationship where conflict risks eventually drops, will not occur.[19] Preventing such a situation requires the political elite to recognize infrastructure's long-term, technical qualities and second order politics—this recognition is not easy as the peripheries are commonly not part of the

[18]Nonetheless, I argue that this effect of distance decay can be altered and diminished (seen as spatial autocorrelation) with a unified socio-technical system where those areas that are also far away will still be tied to the political core—as argued in H1.

[19]I am not making an assumption here though that the population will be resentful of non-provision. A group might be content that they are being separated as it matches their long-term goals.

political elite's selectorate and there is minimal incentive to provide them goods over their selectorate.

> *H2: If peripheries are cut off from the political core by a lack of infrastructure, there will be an increased probability of political instability.*

Individual Capabilities

Existing measures to capture these infrastructure benefits concentrate on use and availability. I argue that such statistics, though, only capture first order, short-term benefits. In second order politics, power is delivered to society at large via capability-building benefits—benefits that increase those individual capabilities that allowing individuals to better themselves and their families and thus boost real, sustainable freedom (Sen 1999). Take the capability building benefit of basic eduction for example. Increasing literacy rates opens the door to more employment and higher education opportunities, which then allows an individual to economically better themselves well into the future.

In post-conflict reconstruction, such capability-building benefits are offered from the skills learned by both building and maintaining the infrastructure networks and from the job opportunities at large. The construction, engineering, and management skills acquired on reconstruction projects provides many benefits: gives individuals the power to improve their lives long after that project ends, allows infrastructure networks to be self-sustainable overtime, individuals are able to improve their lives after a project ends, and ultimately promotes a sustainable socio-technical system. Moreover, employment on reconstruction projects allows an individual to economically provide for their families, which in turn provides a multitude of indirect benefits—for instance, a steady family income increases the probability of the children attending school and improve health of the household in general (Sen 1999).

Reconstruction's capability-building benefits is seen historically within Western Germany's reconstruction. German industries partaking in Technical Assistance Programs as part of the Marshall Plan gained knowledge about productivity and related statistical measurement from worker-exchange programs—American economists, statisticians, and engineers visited German industries as they rebuilt and German workers traveled to America to visit operating American industries so that they can rebuild their own industries in a similar fashion (Agnew and Entrikin 2004; Sorel and Padoan 2008). The learned knowledge and skills allowed Western Germany to sustainably rebuild, which allowed industry and economic growth long after the initial aid period.

Conditions that remove these opportunities mitigate society's power to help themselves and leads to an increase risk of political instability, as resentment and tensions rise. In post-conflict reconstruction, a major risk to locals not receiving these capability building benefits (besides complete non-provision) is the diverse array of reconstruction actors, many of whom are foreign.[20] This foreign involvement often comes in the form of contractors charged with doing the actual construction and management. By itself, foreign involvement does not necessarily increase or decrease political instability. However, when paired with conditions like high unemployment, foreign involvement will begin to increase political instability—a contingent relationship. As an individual or group sees that others are receiving benefits they feel entitled to, feelings of being deprived increases (Walker and Smith 2002; Bayertz 1999; Olson, Herman, and Zanna 1986).

The use of local/national workers is a long-term, second order investment. Despite an abundance of local workers, claims of efficiency (the perception of one's own

[20]I focus here on international foreign actors taking away national, which I term local, reconstruction benefits. Nonetheless, a similar argument can be made for national actors taking away local reconstruction benefits. These actors are also considered to be an 'other' whether because of being from a different tribe, ethnicity, region, or religion.

workers having a comparative advance compared to local resources) or contractual claims (international contracts requiring foreign workers in order to minimize political attacks on spending their own money to support another country) lead foreign entities or governments to utilize foreign labor. Such decisions reflect a focus on short-term, first order politics. Seeing foreign entities benefit from local resources increases resentment and feelings of impotency by the local population willing and able to hold these jobs. This feeling of deprivation may lead individuals to be recruited into social movements and political violence against the political regime as they fight for what they view as rightfully theirs (Gurr 1970). Moreover, where economic opportunities are few, individuals are increasingly likely to engage in criminal behaviors or engage in armed challenges to the state (Fearon and Laitin 2003; Collier and Hoeffler 2004).

H3: When the local population is not receiving the capability building benefits of reconstruction, the risk of political instability increases.

Sustainability

As previously described, socio-technical systems are constant flux. This opens the door to a seemingly stable system rupturing to produce political instability at any point. As a result, if infrastructure is to reduce long-term political instability, the system surrounding infrastructure must both limit political instability risks and be secure overtime itself. Such, sustainability in socio-technical systems require infrastructure and infrastructure networks that pass the test of time by being well built and continuously, domestically maintained. If the system is at risk of failing due to erosion or lack of aid when external revenue sources dry up, those who depend on the system will be unsure about its future and the risks of political instability increase as grievances grow and any stability created via the socio-technical system crumbles away. Poor quality infrastructure—infrastructure deteriorated enough to

prevent maximum use—is just one characteristic of an unsustained infrastructure brought about by the lack of investment and maintenance that puts a system at risk of failing. In the long-term, poor quality infrastructure increases system uncertainty, which makes it more prone to political instability.

The need for a sustained socio-technical system is imperative as infrastructure is not independent from other public goods provided by the state and visa versa. Where service public goods (i.e. education and health services) increase life spans and social capital, infrastructure goods promotes national economic growth and group capabilities. Yet, successful provision of these public goods are dependent on each other. Health care provision is not independent from the hospitals and clinics that house those services; roads, railroads, and airports are not independent from transportation and security services that allow for safe and reliable use of the infrastructure. Thus, investment into sustaining infrastructure goes not only to the physical technology, but also to the state's public good system at large.

Yet, sustainability within socio-technical systems is difficult for a state economically and politically recovering from a recent conflict. Moreover, infrastructure's benefits are not self-reinforcing and the initial investment must be continuously re-provided in order to maintain infrastructure benefits (Sen 1999). This requires both the capital (political and financial) and technical knowledge to plan and invest in infrastructure sustainability over a long period of time. Both of which might not be possible in reconstruction areas due to limited resources and government effectiveness (Brinkerhoff 2005; Russett and Oneal 2001). Complicating this investment further is the fact that the potential benefits of infrastructure tend to be indiscernible at the time of investment, which makes infrastructure's high sunk costs risky for political elites who are conceded about their own selectorate and maintaining power (Olson 2009).

H4: If infrastructure is unsustained, the probability of instability increases.

Policy Implications for Future Reconstruction

Decisions on where and how to reconstruct a state after a conflict have real consequences beyond infrastructure, which makes understanding the relationship between infrastructure and political instability necessary for the success of future reconstruction projects. Just as their politics are different, first order and second order politics imply different types of post-conflict reconstruction policies.

Planning infrastructure within first order politics means constructing infrastructure in places that support one's selectorate, withholding infrastructure provision to repress dissidents or out of fear of dissident mobilization, or planning reconstruction projects based on aggregate numbers and aid requirements. These different design choices are visible—one can see where infrastructure has or has not been built. Yet, such policies increase political instability risks, as the political elites, in a reactive position, are merely designing infrastructure projects based on immediate objectives. Long-term goals, such as political stability, remain secondary in the planning and implementation of infrastructure provision behind more proximate, conflict-driven, and patronage goals such as the management of violence levels, rewarding loyalty from their selectorate, or to appeasing international donors.

International reconstruction policymakers are not immune to first order politics. Viewing infrastructure as a capability, those actors providing post-conflict reconstruction aid focus on infrastructure projects rather than the entire socio-technical system. Thus, success is ultimately measured by the presence of infrastructure and not the long-term social and political consequences of that infrastructure coming as a result of its socio-technical system. They assume economic benefits will occur and that this will lead to less conflict. Yet, such measures are insufficient in regards to capturing

infrastructure's role in creating political stability or instability. *Merely having infrastructure is not enough to eliminate political instability risks.* Such overstatements on the power of technology via technological fixes and jumps are common. Yet, they are not the only determinants of an outcome. Moreover, when conflict occurs either as a result of or around an infrastructure project, infrastructure providers have a tendency retreat (physically or financially) and halt reconstruction in that area without regards to potential long-term losses to their long-term goals.

Nevertheless, reducing political instability more than just the reactive policies seen in first order politics—it requires an effective proactive strategy. Proactive policies utilize reactive strategies' positive returns and secure large gains towards long-term goals, such as lower political instability risks (Posen 2001/02; Van Evera 1984).[21] Such strategies and second order policies entail a cognizant political elite and policies that break the logic of first order politics to create a stable socio-technical system that limits political instability. This requires foreseeing how potential infrastructure consequences might affect their ideology and view of the public as a whole and planing accordingly (Kennedy 2008; Winner 1986). Such design choices require answering system questions about sustainability (how can infrastructure be built so that initial investments continue to bring benefits while being cost-effectively maintained), benefits (how can infrastructure be built so that positive externalities spread beyond the technology to create a stable, competent society around the political elite), and integration (how can infrastructure be built to support a central, cohesive state around the political state).

Reconstructing infrastructure needs then to be based on forecasting "what so-

[21]This is not to say that the state should focus all their resources on proactive strategies and second-order politics. Focusing solely on proactive strategies creates vicious cycle of escalation and having the necessary reactive strategies limits the need of a continued proactive actions (Van Evera 1984).

ciety ought to be." Society must "imagine and seek" specific technologies that fit with certain political ends (Winner 1986, p. 53). Yet, forecasting is not a simple task; the ability for actors to plan and construct reconstruction projects towards specific goals decreases as time passes after implementation of that technology. In other words, likely infrastructure outcomes are indistinguishable from plausible or possible outcomes before implementation and only become more apparent after the infrastructure is built and in use—termed the Collingridge Dilemma (Collingridge 1980). As such, reconstruction policies to remain flexible and been seen as a cycle of "assessment and intervention, using [a] palette of localized tools, in response to the previous adaptions [and learning]" (Kennedy 2008, p.221). At the same time, forecasters must avoid the temptation to hold deterministic viewpoints of infrastructure or recommend non-provision. As stated throughout this dissertation, providing infrastructure does not solve all development or political instability problems. At the same time, I argue against Winner (1986) who argues that if a technology is incompatible to the desired future, then the technology must be excluded. Besides the fact that infrastructure is a development necessity, non-provision comes with it its own risks or political instability—such a viewpoint is deterministic, but in the opposite direction.

The goal then of such forecasting involves reducing the risk of political instability and conflict, setting the game up to favor both the state's perceived desired future and political stability, and remain flexible. There might still be unintended consequences and policy changes must still be made to combat these—I do not wish to make the claim that IST 'solves' the Collingridge Dilemma. Yet, by preparing for passable long-term consequences, the political elite will be better equipped to adapt to and learn from,these unforeseen consequences.

With the inverted-U conflict risk described in the H1, conflict is inevitable. How-

ever, if policymakers acknowledge and plan for this initial outburst and forecasts are accounted for during the planning process, political instability will fall. Ultimately, this requires policymakers to convince constituents and funding agencies to continue investing in infrastructure throughout turbulent times.

IST Insights into Iraqi Reconstruction

IST addresses a theoretical limitation concerning the relationship of infrastructure to political instability across time. From this, the successes and/or failures of past and current infrastructure and post-conflict reconstruction policies can be reframed and thus better understood. The Iraqi reconstruction failure described in Chapter 1 offers a concrete illustration to understand reconstruction policy failures. Specifically, this section attempts to address policy concerns over why IST matters and potential policy implications when shifting to a second-order perspective of infrastructure and reconstruction (Shapin 1994).[22]

Technological Fixes

Reconstructing infrastructure requires financial capital to do everything from buying the needed materials to paying workers themselves. Yet, Iraqi reconstruction faced financial limitations that neither the Marshal Plan nor Japanese reconstruction had to face. The successes of both of these reconstruction projects were dependent on large levels of financial investment—the Marshall Plan itself was a set of policies totaling $120 billion while Japanese post-war reconstruction totaled around $15.2 billion (Serafino, Tarnoff, and Nanto 2006; Dobbins 2003).[23] Conversely, policymakers were hesitant to set aside similar levels of financial investment for post-conflict Iraqi recon-

[22]See Chapter 6 for a more in-depth discussion of Iraq reconstruction's successes and failures and IST-informed policy recommendations.

[23]Both totals listed in in 2005 dollars.

struction (Office of the Special Inspector General for Iraq Reconstruction 2009). This hesitancy is more troubling considering the large difference in expectations, which came about from the initial disparities between the US and the country needing reconstruction. Compared to the development levels of pre-war Germany and Japan, Iraq was much less developed at the start of US intervention. As such, while a majority of aid in Japan and Europe was humanitarian and went towards infrastructure rebuilding, the US faced higher expectations in Iraq to both democratize and build Iraq's physical reconstruction from scratch (Serafino, Tarnoff, and Nanto 2006).

A disastrous contradiction fed into this inadequate investment: though the worst-case humanitarian situation was prepared for in Iraq, the best-case reconstruction situation was expected.[24] To combat the grim infrastructure situation they faced once on the ground, reconstruction agencies focused on increasing the number of infrastructure projects and viewed technology as a financially-efficient fix for Iraq's problems.

In viewing infrastructure as a technological fix, Iraq reconstruction policymakers essentially viewed reconstruction as a technical task and infrastructure as a neutral tool with deterministic outcomes instead of appreciating infrastructure and socio-technical system's long-term influence and role . As such, spending rates became a way to measure success in Iraq (Londoño 2013; Office of the Special Inspector General for Iraq Reconstruction 2009). This focus on technological fixes is a first order perspective. For instance, US officials decided to reconstruct a destroyed oil and gas pipe line under the Tigris River rather than replacing the original line above under the assumption that more and newer technologies are always better. This occurred even

[24]This is all the more puzzling as the causes of poor humanitarian situations were the same that lead to the need of reconstruction (i.e. insurgencies), but they were either ignored or incorrectly assumed. Data about every import into Iraq did exist due to international sanctions before the war that could have been used to understand the humanitarian and infrastructure conditions in Iraq, but it was not used (Office of the Special Inspector General for Iraq Reconstruction 2009).

with reports and the local population warning about sandy soil. Over $100 million was spent before the project was stopped and the original bridge and pipe were fixed (Londoño 2013; Office of the Special Inspector General for Iraq Reconstruction 2009).

In light of technological advances in infrastructure construction, there has also been a growing argument that private actors provide infrastructure services more efficiently, both after a conflict and in general (Mody 1996)—such a private-actor focus is evident in the sheer numbers of foreign contracting companies brought into Iraq. This assumes though that private actors would be willing to accept the risks (financial and personal) involved with infrastructure investment, which is frequently not the case. Private actors in post-conflict situations are more concerned with their own profit, whether in the form of future revenue from sales or a large initial contract. Yet, rarely do profit-generating infrastructure in these areas make substantial profit (if any), and the areas such projects take place are often insecure which makes them a high liability. Missing from this is the added value to long-term goals and second-order norms like political stability, which private actors have no incentive to truly consider.

Ultimately, Iraqi post-conflict reconstruction investment projects have not reduced political instability as promised. SIGIR recently recognized measuring success based on the amount spent was counterproductive (Office of the Special Inspector General for Iraq Reconstruction 2012*c* 2013). This is essentially an indirect measure of activity, which can be easily disordered based on infrastructure type. Yet, no alternative metric to measure reconstruction success is offered. IST offers such an alternative measure for infrastructure and reconstruction outcomes: decreasing the risk of political instability via how and where infrastructure is provided.

Goal of Reconstruction

As with any policy, the absolute goal of post-conflict reconstruction policy is important as it shapes the types of tools and mechanisms available for policymakers (Majeski and Sylvan 2009). Reconstruction managers did not define specific goals, objectives, measures, and metrics until very late in the planning process (Office of the Special Inspector General for Iraq Reconstruction 2013). Beginning from pre-war planning, the State Department, USAID, and Department of Defense (DOD) officials held different pre-war evaluations and post-conflict goals shaped by "historically rooted conceptions of defense, diplomacy, and development" (United States Department of State 2003; Ginty 2003; Office of the Special Inspector General for Iraq Reconstruction 2009, pg. 325). The Pentagon believed they could follow a liberation model and get in and out of Iraq within months. Consequently, they did not make or feel the need to consider alternative, long-term plans. USAID, on the other hand, saw reconstruction as a long-term, nation-building endeavor. The State Department underscored the need to make an humanitarian argument for removing Saddam Hussain via military intervention. Though both the State Department and USAID were heavily involved in post-war Iraq, President George W. Bush ultimately gave postwar planning responsibility to agencies within the DOD. As a result, the blueprint for post-conflict Iraq was established on DOD evaluations, principles, and goals.

Following this, the initial goal of reconstruction was to (quickly) rebuild infrastructure damaged during the invasion, which was to act as a foundation of Iraq-led growth after American forces left. However, as the reality of the situation hit and the US shifted from a liberation model to nation-building, post-war Iraq policy went from repairing war damage to full scale nation-building (Office of the Special Inspector

General for Iraq Reconstruction 2009). This change in goals though did not appear in Iraqi reconstruction policy until much later and the goal of reconstruction remained on rebuilding infrastructure networks, albeit on a grander scale. In other words, the goal of reconstruction shifted from micro-level rehabilitation to large-scale rebuilding often from scratch (Office of the Special Inspector General for Iraq Reconstruction 2009). To aid in this, the CPA created the Program Management Office (PMO), whose purpose was large scale infrastructure projects. Yet, the PMO did not have the power nor organizational structure to accomplish it's large reconstruction goals. If the number of large scale infrastructure projects was the goal and the agency in charge had inadequate power, the use of local contractors makes logical sense. It is also unsurprising that the infrastructure projects suffered from inadequate design and government oversight (Office of the Special Inspector General for Iraq Reconstruction 2009).

Having goals merely focused on infrastructure projects (a first order focus) means that long-term, second order consequences could not be adequately planned for.[25] Sustainability was rarely considered and projects handed over to Iraqi hands often failed (Office of the Special Inspector General for Iraq Reconstruction 2009 2013). Additionally, there was little connection between infrastructure construction to the political stabilization and democratization occurring in the political core, Baghdad.

As stated in Chapter 1, SIGIR states that reconstruction must be an extension of political strategy. What then was the goal of political strategy in Iraq? Different departments might give different answers. But they converge on some basic elements: political stability and lower conflict risks both in the short term and after the US would ultimately leave. Adequately addressing such a goal, which is needed for the

[25]The consequences of short-term goals were seen throughout post-Iraq policies. For instance, the de-Ba'athification in the first weeks of reconstruction where the military, a potential source of reconstruction resources was dissolved.

success of future reconstruction efforts, requires recognizing infrastructure's long-term consequences and second order politics. The US could use its resources and sheer brut force to bring about some basically level of stability. However, such political stability would not be guaranteed once the US left. By incorporating a long-term perspective into their planning, the US and interim Iraq government could have set the foundation for political stability and reduced conflict risks in preparation.

Case Specificity

As described in Chapter 1, West German and Japanese reconstruction acted as the foundation and guiding-light for Iraqi reconstruction to a point that it was assumed Iraq's reconstruction would parallel Germany's reconstruction. The harmful consequences of this misguided assumption becomes apparent when comparing reconstruction preparations for both eras.

Beginning in Europe, much of the Marshall Plan's aid was transferred directly over to the receiving country, which was then spent to purchase American goods to rebuild infrastructure under the advice of U.S. Economic Cooperation Administration (ECA) officials. The ECA also provided direct training from American businessmen and industrial workers while the US Bureau of Labor Statistics produced labor statistics and productivity research for countries receiving Marshall Plan aid. This was done to increase industrial efficiency as industries rebuilt both physical and workforce assets. Such politics were done in recognition of Germany's industrial past. Policymakers were able to use case-specific knowledge to understand how to use the country's own resources (human and material) to effectively and efficiently reconstruct after WWII.

In Japan, US policymakers and the Office of War Information commissioned social scientist Ruth Benedict to conduct a report on Japan with the objective to bridge intercultural understanding and help plan Japanese reconstruction. In her final re-

port, Benedict stressed the importance of understanding the roots of a culture before one (read: the United States) could truly understand (read: shape) the politics and political decisions of that country. By understanding the Emperor's role in Japanese society and culture, Benedict was able to recommend some key policies that aided future reconstruction success: the continuation of Japanese institutions (the same institutions that helped conduct the war against the US.), not abolishing the emperor and incorporating his public support, gaining the private sector support, and recognizing the importance of continuing egalitarian land and wealth policies (Benedict 1967; Rosenblatt 2004; Azimi, Fuller, and Nakayama 2003). By doing this, the U.S. was able to earn the active support and participation of the Japanese people in the reconstruction process with little resistance.

A comparable report to Benedict's,"Future of Iraq Project," was created for Iraqi reconstruction to help develop plans for post-war Iraq—over seventeen working groups were involved in this project that included more than two hundred exiled Iraqi opposition figureheads and professionals. Compiled in secret and at a cost of $5 million, the "Future of Iraq Project" came about in the midst of intense bureaucratic infighting. In the end, President Bush gave post-war responsibilities to the DOD, whose liberation model ignored the "Future of Iraq Project." Instead, West German and Japanese reconstruction reports were distributed to the CPA and other reconstruction actors to help guide reconstruction policy decisions (Caldwell 2011; Office of the Special Inspector General for Iraq Reconstruction 2009, pg. 119-120). In other words, the DoD decided "whose knowledge counts," and Iraqi's knowledge did not (Jasanoff and Martello 2004, pg. 19). When US forces did go into Iraq, there was a general misunderstanding of what three major wars and a decade of sanctions would do to a country's infrastructure and psyche (Office of the Special Inspector General for Iraq Reconstruction 2013).

Though IST argues that political stability and reduced political instability are normative goals across cases, it recognizes that there are many paths to political instability.[26] Although similar patterns of casual mechanisms can be found connecting infrastructure and reconstruction to political instability, addressing how to to fix and prevent them depends on that case's history, social structure, and national and local politics—case specificity. I argue that it is okay to use past success as examples, but policymakers must also know their host country and plan reconstruction policies that are fitted for that country. As recommended by SIGIR, this requires strengthening host country relationships (Office of the Special Inspector General for Iraq Reconstruction 2009, 2013). IST offers a way to see how history and circumstances on the ground might feed into conditions that would increase long-term reconstruction-induced political instability.[27]

Policy Discussions

As Iraqi reconstruction progressed, a deteriorating security situation meant that almost every post-conflict Iraq decision was made based on security—even in regards to infrastructure reconstruction. After a new US Embassy inherited Iraqi reconstruction projects from the CPA and the security situation worsened in 2005, there was a major shift of resources into the security and economic sectors. Following this, reconstruction goals shifted again from long-term goals to short-term goals where success was based on how that project helped counterinsurgency efforts (Office of the Special Inspector General for Iraq Reconstruction 2009 2013). Yet, security directly affected rebuilding with high rates of of worker absenteeism, disrupted logistics, delayed countless projects, escalated security and project costs, and forced projects to

[26]See Chapter 4 for more discussion on and direct analysis of this equifinality.

[27]See Chapter 5 for an illustrative case-study into these connections.

shut down. In short, it was impossible to meet completion dates on time, which led to the scaling down of projects and contributed to the complaints from Iraqis about the transfer of semi-completed projects (Office of the Special Inspector General for Iraq Reconstruction 2013)

Between May 1, 2003, and August 31, 2010, an estimated 719 people were killed while engaged in reconstruction or stabilization activities in Iraq—513 of these were participating in infrastructure and governance projects and 1 auditor was killed in 2008 (Office of the Special Inspector General for Iraq Reconstruction 2012*b*). Moreover, SIGIR's own actions in Iraq were quite literally "oversight under fire" and eighteen project site visits were canceled between June 2005 to August 2008 due to security threats (Office of the Special Inspector General for Iraq Reconstruction 2013, pg ix). SIGIR auditors were later authorized to travel under DOD authority by General David Petraeus, the Multi-National Force-Iraq Commanding General (Office of the Special Inspector General for Iraq Reconstruction 2013).

Seeing the effect of this unsafe situation, common threads in policy discussions regarding future policies include the necessity of security during reconstruction to order to protect those doing reconstruction—while planning Iraqi reconstruction,it was assumed that security would be at safe levels merely due to US presence (Office of the Special Inspector General for Iraq Reconstruction 2009). As such, there is a push for future reconstruction projected to only include projects near US bases to build goodwill and enhance security in a protected environment (Office of the Special Inspector General for Iraq Reconstruction 2013). Based on interviews of battalion commanders, success measured by reduced violence levels was seen as useful and a manageable tool for future operations and that other goals (like expanding government capability) were weak and insufficient (Office of the Special Inspector General for Iraq Reconstruction 2012*a*). In fact, local violence did decline in those

areas that received higher levels of reconstruction spending in Iraq (Berman, Shapiro, and Felter 2011).

Where I would agree that the goal of reducing violence as a goal is appropriate, I argue that the current focus is still on first order infrastructure measures. Success occurs when an infrastructure project reduces conflict in that area in the short term rather than decreasing long-term political instability risks via socio-technical systems. The policy consequences of this is seen in SIGIR's recommendation that the Commander's Emergency Response Program (CERP) cap the financial size of projects in order to increase success likelihood and reduce fraud while also making sure that these project occurs in secure zones to limit resource stress (Office of the Special Inspector General for Iraq Reconstruction 2012*a*). Such recommendations are first-order reactions to conflict and only address US short-term tactical goals rather than the longer-term need of Iraq (Office of the Special Inspector General for Iraq Reconstruction 2013). As described by IST, initial infrastructure provision might evoke a spike of political instability. However, if causal mechanisms that connect such violence to infrastructure and reconstruction are accounted for, the risk of violence and political instability will drop over time.[28]

Conclusion

Overstatements on the power of infrastructure are unsurprising considering first order infrastructure-as-a-capability focus. Yet, having or not having a particular infrastructure is not the only determent of political instability—it is also about the social and political (Skolnikoff 1994). IST adds these social and political elements in its framing of existing literature into first order politics and novel conceptualization of second order politics. With it's long-term perspective, second order politics views

[28]See Chapter 3 for more on the inverted-U conflict pattern.

infrastructure as part of a larger socio-technical system. This allows for an appreciation of how society is embedded and structured around infrastructure, and it is through this system that resentment can be either baked in or partitions limited and grievances redressed (Fearon and Laitin 2003). Moreover, this long-term perspective allows for values like political stability to become part of the reconstruction narrative, which then allows for a discussion on how to improve future reconstruction policies to do better by being an extension of political strategy (Bozeman 2002).

Though second order politics in regards to infrastructure and reconstruction is a new concept, researchers have long been discussing similar ideas (i.e. grievances and identity politics). Yet, these conversations have occurred outside the realm of infrastructure, which I argue is a major oversight especially in post-conflict areas. By reconceptualizing the relationship between infrastructure and political instability into first and second order politics, it becomes possible to reposition this literature into reconstruction policy debates and build new theories with IST as the foundation. I caution here, though, of any structural or path dependent argument of why certain actors act in first or second order politics. While an organizational structure might constrain available tactical options, this does not limit a group to only short-term goals at the cost of long-term goals. (For more on the influence of organizational structure to strategic and tactical choices, see: Weinstein 2007 and Moe 1984.) In the same vain, I am not making a greed versus grievance argument even though it might seem that first order politics are solely based on greed while second order politics is concerned with long-standing grievances. One can be altruistic but still act with a short-term perspective by merely reacting to changes without consideration to long-term consequences.

I recognize that repressive regimes can use the same insights provided by IST to help solidify their control and reduce potential dissent. Although IST does not

specifically address the role of regime type behind infrastructure and reconstruction decisions, IST does not condone repressive regimes. The political elite in repressive regimes might perceive their state as stable per the definition used here, but their perspective is bounded in the short term. As the events in Egypt, Syria, and Libya have shown, order brought by repressive regimes can be quickly ruptured by the populous. Economic growth brought by infrastructure creates a growing middle class that will want control of its own fate and thus risk rupturing political stability (Bueno de Mesquita and Down 2005). In fact, IST's model of second order politics allows for the analysis pre- and post-rupture. Nevertheless, IST is not about building a democracy (examples of such imagining and building of democracies can be seen in Ezrahi (1997) and Winner (1986)). Though it can been argued that democracies are historically shown to be best suited to deal with such diverse populations (see Ireland with the IRA and Spain with the ETA) and better provide public goods, non-democracies or transitioning governments can still incorporate fragmentation by manipulating socio-technical systems (Buhaug 2006).[29] Ultimately, IST is both a normative theory about understanding the relationship between political instability and infrastructure specifically and reconstruction generally while also being a policy theory on how to choose infrastructure projects and design reconstruction project that mold a socio-technical system that limits political instability.

[29]Moreover, being a democracy does not preclude a state from such socio-technical manipulation—democracy and state control of technology is, in fact, compatible (Nye 1994).

Chapter 3

THE GEOGRAPHY OF RECONSTRUCTION

Infrastructure, as a technology, has a particular yet immensely significant characteristic: infrastructure is both the physical, man-made technology and the earth it lays upon. This intimate connection between infrastructure and the ground must be recognized when addressing why past reconstruction efforts have led to unintended consequences. When coupled with the heavy financial investment needed to construct infrastructure, this means that, once built, infrastructures are fixed to that spot. Relocating infrastructure (such as a road or communication network) is financially impractical and at most physically impossible. Keep in mind though that this immobility does not mean infrastructure networks are unchangeable: additional roads or power lines can be added, infrastructure can be completely destroyed (as shown by the initial need for reconstruction), and infrastructure availability can change based on the season.[1] Nevertheless, although infrastructure remains stationary, its consequence, such as political crises and social upheaval, are anything but fixed to a specific geographic region.[2] It is then imperative to directly address the connection between technology, location, and time to political instability.

With infrastructure tied to the land, IST is inherently a geographic-based theory. This opens the door to use Geographic Information Systems (GIS) as a way to systematically testing the existence of second order politics and the long-term consequences of infrastructure on political instability. If I cannot show this, then IST is essentially

[1]This distinction is key if IST is to be useful for future reconstruction policy, which must incorporate existing infrastructure.

[2]See Chapter 2 for a more detailed theoretical discussion on these changing consequences, which comes as a result of the unfolding relationship between infrastructure and political instability across time.

unneeded as there is nothing to explain. As such, this chapter begins by restating the geographic aspects of IST that I am specifically testing here. I then proceed into a geo-spatial study (both quantitative and qualitative) on the influence of infrastructure on conflict risks. First, I describe in detail the data used in this study, which includes both established data and self-created infrastructure data. I then present the results of the longitudinal analysis that models conflict to infrastructure across time. The results show how though infrastructure independently increases conflict probabilities (first order politics), certain infrastructure can then lead to a drop in conflict risks over time (second order politics). Supplementing these findings are two vignettes of Chad and Sierra Leone. In conclusion, I argue these results demonstrate the need for IST. Infrastructure has long-term consequences that current theories cannot grasp. Incorporating these varying consequences has implications for future research, policy, and thus political strategy, which I discuss.

The Geography of Infrastructure Systems

I argue that the relationship between infrastructure and politics shift as as time passes—moving from first order politics to second order politics.[3] First order politics follows previous literature on the relationship between public goods, infrastructure, and conflict. In first order politics, decisions by the political elite regarding infrastructure provision are based on private good logic with the goal of increasing loyalty, punishing dissidents, or fulfilling international agreements (Lichbach 1987; Bueno de Mesquita and Down 2005; Bueno de Mesquita et al. 2005). The populous (to include infrastructure users and non-users, dissident groups, the selectorate, and non-committed) react to this infrastructure provision or non-provision by: supporting or resenting the political elites, employing new infrastructure in their mobilization

[3]See Chapter 2 for a more detailed explanation of these two different types of politics.

strategies, igniting new conflict due to 'bad' infrastructure provision, or fighting neighbors as a result of new connections and intermingling (Francisco 1995; DeNardo 1985; Lichbach 1987; Gates 2002; Moore 1998; Van Evera 2001; Gompert et al. 2009). After seeing how others react to their output, the political elite adapt from the success or failure of their policies (Lichbach 1987; Roniger 2004; Cunnhingham and Weidmann 2007). Following this, conflict risks spike in first order politics. The rationale behind such conflict is based on short-term goals or those goals that achieve immediate results (i.e. ending a protest, destroying military capabilities, eliminating government officials, or gaining control of a town).[4]

In short, first order politics and existing literature largely predict that conflict risks will spike shortly after infrastructure provision and the initial phases of reconstruction. Yet, not all infrastructure provision will illicit conflict. Such conflict occurs in subnational/local areas where there was already a history of conflict between groups, there was high political distrust in the central government, and/or there was a latent dissident group. When infrastructure is newly provided in these areas, new conflict can be sparked based on: the intermingling of groups with a violent history, dissidents reacting defensively to perceived repression, and groups taking advantage of their increased capacity to mobilize support and resources.

Yet, infrastructure has an intrinsic long-term quality in that its consequences both remain and change long after the initial investment and construction. As infrastructure is designed to last for a long-period of time,[5] infrastructure shifts from being a private good into a public good where the consequences (both good and bad) are felt by the public (users and non-users; selectorate and non-selectorate) at large. As

[4]This does break the assumption seen in reconstruction and aid policy that the population will always be happy to have access to national infrastructure. 'Bad' infrastructure provision (as perceived by the group receiving the good) can lead to just as devastating effects as non-provision.

[5]How long depends and the quality of investment, design, and construction.

first order politics focuses on short-term consequences, an additional level is needed that accounts for this long-term quality and infrastructure as a public good in order to fully understand how infrastructure and reconstruction shapes political instability across time.

In second order politics, infrastructure becomes part of a larger socio-technical system that shapes political instability risks. In terms second order politics, socio-technical systems contain not only the various infrastructure and infrastructure networks, but also power structures (social structures that reinforce inequalities between groups of people, to include: social orders, political economics, and political constituencies) and the actions occurring within the system (i.e. the interactions created by transportation networks and patterns of social activity) (Jasanoff 2003). In such systems, these elements continuously interact and shape each other, which ultimately influences how society (individuals and groups) both act and feel.

I argue that second order politics offers the potential for a drop in conflict because of these socio-technical systems. Infrastructure can connect areas physically to the political core, national economy, and national identity. This follows Tobler's first law of geography where "everything is related to everything else, but near things are more related than distant things" (Tobler 1970, p. 236)— seen as distance decay. If national infrastructure is dispersed throughout the country, distant areas from the political core are no longer distant and the influence of the political core[6] will not decay across large territories. If second order politics are accounted for in reconstruction policies, the risk of future conflict will drop—creating an inverted-U shape of conflict risks. With this inverted-U conflict risk, conflict is inevitable. However, if policymakers acknowledge and plan for the initial outburst of conflict and forecasts are accounted

[6]The political core is the central geographic location of the political elites—in most all cases, this is also the country's capital (Campante and Do 2009).

for during the planning process, conflict risks will fall. This brings me to my first hypothesis about the observable/geographic effects of this shift from first to second order politics.

> *H1: Conflict risks after infrastructure provision follows an inverted pattern where conflict risks spike after provision and then drops as time passes.*

Second order politics can also trigger conflict coming as a result of the clash between the long-term goals of the state with the long-term goals of a group. In second order politics, dissident groups can find ways to undermine the state by directly exploiting the socio-technical system towards their goals and away from state goals (Habyarimana et al. 2007). Or, the lack of infrastructure causes groups to indirectly learn new ideational grievances by promoting physical and psychological ethnic separations (Van Evera 2001). In short, resentment and grievances are baked into socio-technical systems, which the current and future populous then learns from. As such, the cause for conflict in the second order are rooted in long-term goals revolving around issues of power and identity.

Given that states recovering from conflict are also commonly composed of a diverse set of people (ethnically and religiously) across a large area, the risk of potential separatist feelings and increased conflict risks remain high if left unattended (Fearon and Laitin 2003). Moreover, when such diversity is geographically reinforced with portions of the state separated from the political core (politically, economically, and ideationally), the state is essentially broken into different pieces. Once marginalized along territorial lines, the risk of conflict is high. Yet, current work on the connection between social/political/ethnic characteristics and geographic conditions assumes a direct connection between geographic-based conditions and conflict (e.g. Basedau

and Pierskalla 2014). Overlooked are the manmade changes to the geography (like the type created by infrastructure), which ultimately alters conflict risks. As such, second order politics offers an additional option for states to overcome diverse and/or fractionalized populations: having a national infrastructure system that connects periphery to the political center.

If peripheries are cut off from this political core, the control and influence of the political elite will decay in these areas. Cut off peripheries created by the lack of infrastructure are prone to having feelings of psychological separations, which increase grievances, resentment, and mobilization against the political core (Olzak 1983). Moreover, active rebels would have a place to hide when sections of the state are isolated from the central power in regards to infrastructure (Fearon and Laitin 2003).[7] As such, the aforementioned inverted U relationship where conflict risks eventually drops, will not occur.

> *H2: If peripheries are cut off from the political core by a lack of infrastructure, there will be an increased probability of political instability.*

By confirming these hypotheses, I would show the existence of infrastructure's varying long-term consequences to political instability and the need to better understand these connections.

Methods

This analysis proceeds in two steps: a geospatial-longitudinal study that connects place, time, and attributes (Paul et al. 2005) and two case study vignettes to better grasp the relationship between infrastructure and political instability. This will

[7]Nonetheless, I argue that this effect of distance decay can be altered and diminished (seen as spatial autocorrelation) with a unified socio-technical system where those areas that are also far away will still be tied to the political core—as argued in H1.

provide the key test for this chapter: demonstrating that there are in fact different, long-term consequences of infrastructure. Previous studies have limited the analysis by shortening their time time or excluding time all together. Thus, they were never able to see how their results may vary across time. As described below, time is a key indecent variable of my analysis.

Where IST focuses on political instability, conflict is used here as a proxy for political instability due to geo-coded data limitations in capturing other elements of political instability (i.e. government effectiveness). I employ two definitions of conflict in this dissertation. The first is broad and relates to *pre*-reconstruction conflict: large-scale violence between two or more groups that destroyed life and infrastructure. With this, I am making no assumptions on how infrastructure is destroyed or which side won or lost. It can be argued, though, that infrastructure destroyed by international forces might create a "rally around the flag" effect where nationalism and support for the political regime increases when foreign entities attack. As such, the population would be more forgiving of the lack of infrastructure provision. Such an argument though ignores ethnic and political divisions common in those very cases that are prone to have their infrastructure destroyed by another state. Moreover, these positive effects will be mitigated as time passes as the initial spark of national support is dimmed by long-lasting and everyday grievances.

The second conflict definition is narrower and relates to conflict that occurred because of infrastructure provision or non-provision, reconstruction policy, and the socio-technical system at large: intra-state violence. This second definition captures many forms of violence that can be affected by infrastructure and reconstruction—the political elite fighting against the local population, the local population fighting against the political elite, and locals fighting locals. Excluded by this definition is inter-state conflict. States in war with another state on the international level are

doing so for a multitude of reasons that transcend national infrastructure (balance of power, access to resources, ideology, etc.).[8] Moreover, though reconstruction planning and infrastructure construction can become an international event with international actors and pressures, the use of infrastructure is a local event. This does not preclude international influences in intrastate conflicts. Regional and/or interstate pressures can and often do force political elites to distribute goods differently than if those pressures were not there.

I formed the relevant set of post conflict situations where reconstruction was needed with this conflict conceptualization in mind. I used data from the UCDP/PRIO Armed Conflict Dataset, version 4 to derive a list of post-conflict situations (Gleditsch et al. 2002; Themnér and Wallensteen 2002).[9] This data was reduced to those cases that ended during the contemporary reconstruction period: after the Cold War or 1989.[10] Unlike the post-WWII era of reconstruction, the pressing issue for most states confronting political instability today is no longer the dynamics of global power. Rather, reconstruction efforts take place in states where conflict is commonplace, internal strife looms, governments are corrupt and weak, and public goods are increasingly limited. At the same time, not all conflicts require reconstruction at a national level. Conflicts requiring reconstruction at this level also need to be large enough to induce significant infrastructure destruction and/or to prevent infrastructure from being allocated at large. As such, only cases that were listed as a

[8]As an example, infrastructure was far more likely to be a factor in India's civil war than in India's war with Pakistan.

[9]I would ideally use data on the percentage of infrastructure destroyed in an conflict and the number of infrastructure projects not completed/allocated due to the conflict. In reality, this data is either not available (infrastructure data in general is limited) or difficult to measure (capturing counterfactuals in data format would require too many assumptions and postulations).

[10]An end date is needed as my theory is concerned with *post*-conflict situations and reconstruction. If the conflict reignites, there needed to be at least three complete and consecutive years of non-conflict to allow for some basic level of reconstruction to occur before continued violence prevents or destroys reconstruction projects at large. If conflict re-ignites, only the last conflict event was included to represent that series of conflict.

war (at least 1,000 battle field causalities) or had three or more consecutive years of minor conflict (with culmination battle ground causalities of at least 1,000) before an episode ended were included. I am assuming here that large-scale war and drawn-out minor conflicts pose a risk to infrastructure directly or indirectly. These steps provide a diverse population of 33 cases where post-conflict reconstruction was needed. Each case was then expanded to cover ten years following war's end beginning the year war officially ended. In the cases with consecutive conflict in the sample, the end date is the year before the next conflict-case begins. The sample of cases used for this analysis and years covered are listed in Table 3.1.[11] These cases are also used in the following chapters.

[11]Due to the manner conflict was compiled in this dataset, a state can be listed as experiencing simultaneous yet 'separate' conflicts. However, these are essentially one large conflict in the eyes of the state and its strategies. As this dissertation takes a state prospective, these conflicts were aggregated into a single case: Bosnia and Herzegovina (Bosnian War), Ethiopia (Ethiopian Civil War), Iraq (1990 uprisings).

Table 3.1: List of Cases

Location (abbr.)	Side B	Incompatibility	Start	End
Afghanistan (AF)	UIFSA, US, Allies	Government	4/27/78	12/7/01
Angola (AO)	UNITA	Government	3/12/98	4/4/02
Azerbaijan (AZ)	Rep. of Nagorno-Karabakh	Territory	1/1/92	5/9/94
Bangladesh (BD)	JSS/SB	Territory	2/1/75	11/5/92
Bosnia and Herzegovina (BA)	Serbian & Croatian Reps. of BiH	Territory	5/1/92	11/21/95
Chad (TD)	CNR, CSNPD, FNT	Government	3/3/89	12/31/94
Croatia (HR)	Croatian irreg., Rep. of Croatia	Territory	8/2/1991	11/12/95
Ethiopia (ET 1)	EPRDF	Territory/Gov't	3/15/64	5/28/91
Ethiopia (ET 2)	EPLF	Territory	5/6/98	12/12/00
Guatemala(GT)	URNG	Government	1/1/65	12/31/95
India (IN 1)	NSCN-IM	Territory	7/1/92	8/1/97
India (IN 2)	Pakistan	Territory	1/1/96	11/26/03
Indonesia (ID 1)	Fretilin	Territory	12/7/75	12/31/89
Indonesia (ID 2)	GAM	Territory	6/19/99	10/12/05
Iran (IR)	KDPI	Territory	5/1/46	12/31/96
Iraq (IQ 1)	Kuwait	Territory	8/2/90	3/2/91
Iraq (IQ 2)	KDP, PUK, SCIRI	Territory/Gov't	7/1/73	12/31/96
Iraq (IQ 3)	Australia, UK, US	Government	3/20/03	4/9/03
Israel (IL)	PNA	Territory	1/1/65	12/31/96
Liberia (LR)	INPFL, NPFL	Government	12/29/89	8/19/95
Myanmar (MM)	KNU	Territory	1/1/49	4/28/92
Nepal (NP)	CPN-M	Government	7/13/96	11/21/06
Peru (PE)	Sendero Luminoso	Government	8/2/92	12/31/99
Russia (RU)	Chechen Rep. of Ichkeria	Territory	12/11/94	8/31/96
Rwanda (RW)	FDLR	Government	5/25/97	12/31/02
Serbia (RS)	UCK	Territory	3/1/98	6/3/99
Sierra Leone (SL)	RUF, WSB	Government	4/1/91	11/10/00
Somalia (SO)	USC/SNA	Government	3/3/86	12/31/96
Sri Lanka (LK)	LTTE	Territory	7/27/75	12/24/01
Tajikistan (TJ)	UTO	Government	6/29/92	12/23/96
Uganda (UG)	ADF	Government	2/21/94	10/18/07
United Kingdom (UK)	PIRA	Territory	8/1/71	12/15/91
Yemen (YE)	DRY	Territory	2/25/94	7/7/94

Note: The start date is when a conflict episode reached 25 battle-related deaths in a year.
The full name of conflict type "Internationalized" is "Internationalized Internal."

This method of case selection is not perfect and opens the door to difficult cases being included or cases that others might argue should be in the final sample. These cases include areas where reconstruction did not occur (i.e. Myanmar), cases that the political elite was seemingly never under 'real' direct threat (i.e. the United Kingdom and Russia), and split geographic cases (Israel/Palestine and Serbia/Kosovo). To begin with, I argue that cases of non-active reconstruction (whether by choice or by inability) are still relevant cases as they are states in a post-conflict situation who do have infrastructure at some level—removing such cases would bias this study. Moreover, removing cases that are not necessarily unstable would create bias by selection on the dependent variable. These cases can provide insight into why conflict risks are lower. Moreover, this sample includes cases with disputed territorial claims: Israel with Palestine and Serbia and Kosovo. Though one is internationally recognized (Kosovo) while the other is not, I treated each as part of the larger country. This was done as, in the eyes the central political elite, this territory is part of their state. I recognize that this might trigger concerns, but I am not making claims of political support for one side or the other. Including these territories, I argue, will provide a more comprehensive picture of the post-conflict environment and infrastructure consequences. Lastly, arguments can be made that this is not an exhaustive list of cases that theoretically needed reconstruction at the national level—i.e. Mozambique. Though missing from my analysis, these out-of-sample cases can provide useful insight in the future, as long as they met this analysis' scope conditions.

Although IST is a state-centric theory, these hypothesized outcomes are subnational in nature. Thus, to adequate test the existence of second order politics, I must also account for subnational independent and dependent variables. Following this, the base data and unit of analysis for this analysis is the PRIO grid. The PRIO-GRID dataset version 1.01 (Tollefsen, Strand, and Buhaug 2012) is a population of

standardized spatial grids worldwide.[12] As these grids are systematically assigned, a grid can cross national and subnational political and social boundaries. It is this characteristic that makes the PRIO-GRID a powerful geographic unit of analysis. Mainly, endogeneity issues are lessened compared to if the grids were assigned according to some political demarcation, which can change and are often in dispute after a conflict. Moreover, these grids absorb some of the spatial uncertainty involved in geocoding landmarks, are small enough to capture the variability of infrastructure access felt by individuals, and yet large enough to quiet noise and spurious variability. Though all data is aggregated to this level of analysis, case characteristics must still be accounted for. I do this through a mixed effects model where grids are grouped by which case (country) a majority of the grid's area lies.[13] National administrative border shapefiles were pulled form the database of Global Administrative Areas version 2 (GADM) (Hijmans et al. 2011) and used to spatially clip the PRIO-GRID and other geo-coded datasets where needed.

In this analysis, conflict is operationalized by whether a grid was located in a conflict zone in that year—as related to the second definition of conflict previously discussed.[14] The data from this comes from the UCDP/PRIO Armed Conflict Dataset (Gleditsch et al. 2002; Themnér and Wallensteen 2002).[15] Only those conflicts that were coded as internationalized intrastate or intrastate conflict (civconf)

[12]Grids at the equator are approximately 55 x 55 kilometers with decreasing area with grids at higher latitudes. See Tollefsen, Strand, and Buhaug (2012) for continued discussion on the development of PRIO-GRID.

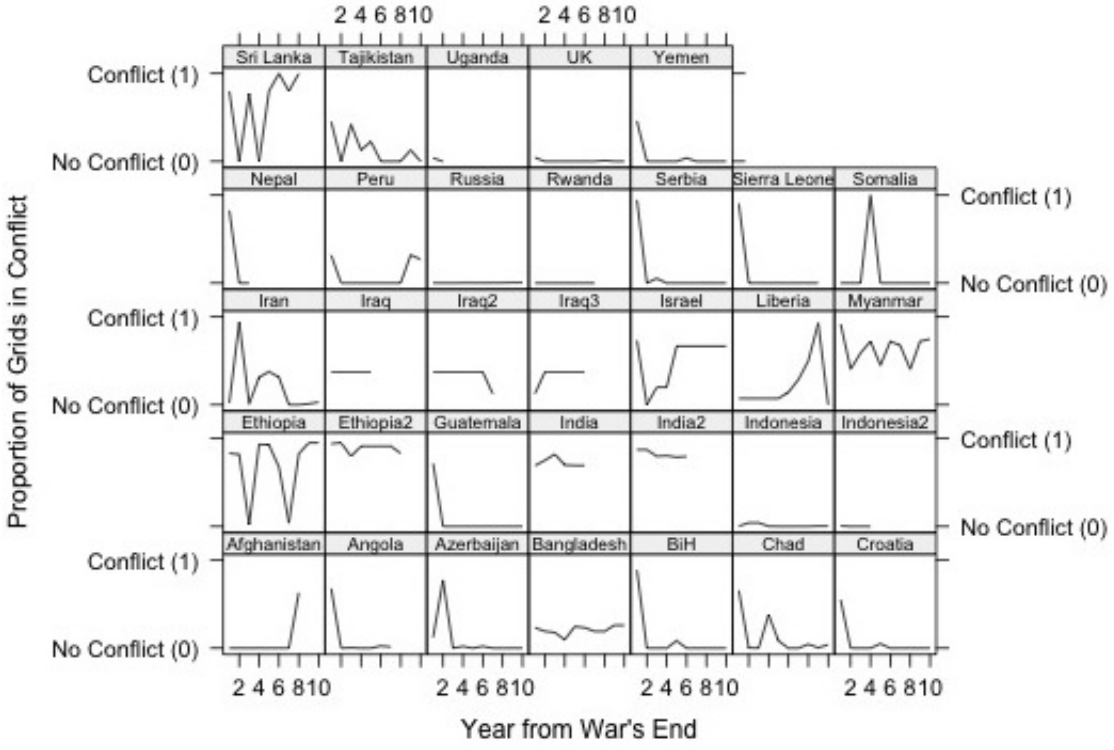
[13]This does mean a loss of area being analyzed with grids not in a majority of one of my cases. Nonetheless, the majority role is common and most of my outside data sources follows the same role.

[14]A measure of conflict presence is used over conflict count or number of deaths for two reasons. First, reporting issues and bias makes intensity measures (i.e. death count) unreliable across such a broad spectrum of cases. Nonetheless, in order for a grid to be counted as 'in conflict', there must have been at least 25 battle related deaths.

[15]See Tollefsen, Strand, and Buhaug (2012) for more on how the UCDP/PRIO data was placed in grid format.

were included. As compared to the 1,000 battleground death threshold (large-scale violence) used to shape the cases in this analysis, this dataset sets a 25 battlefield death threshold (intrastate violence) to form conflict areas. By using this dataset, this analysis is cut off at 2008, which does truncate some cases. I do not foresee this as biasing the results due to the longitudinal structure where unbalanced data can be accounted for. Moreover, these truncated cases offer opportunities to test the model in future research to see if the predicted result is seen. As can be seen in Figure 3.1, there is much variation both within and between cases on the proportion of grids in conflict over time. I ague that such conflict variation cannot be fully understood in such a two-dimensional mode—geographic location (or z) must be included.

Figure 3.1: Proportion of Conflict Presence Over Time



The independent variables of interest capture subnational infrastructure levels (both location and access). Infrastructure data currently available is limited. The World Bank and other data sources do have some basic infrastructure measures that

capture both presence and quality (for example, % of paved roads or average kilowatt of electricity consumed per capita). Yet, these are aggregated at the national level. Yet, infrastructure is not evenly dispersed within a country with areas having higher infrastructure density than others. Even infrastructure at the second or third administrative districts varies. Maps offer the best available option to capture infrastructure access. As such, I made best use of available data, updated others, or created my own where missing. This includes data on road networks, airports, railways, and power plants—each is described in detail below. These infrastructure were chosen based on the technologies being used in various forms by individuals at large following a conflict (Edgerton 2008). Sample-wide density maps of these four infrastructure are provided in Appendix A. As the hypotheses in this dissertation are system level hypotheses, It can be asked why I did not create a general index of infrastructure access instead of breaking up infrastructure type like I do here. Lumping various infrastructure variables into one infrastructure index would only gloss over their different effects and ignores the distinctive, individual aspects each infrastructure technology as both independently and jointly within the system. This is especially true when the rest of the chapter is already disaggregated in other areas, let along the difficulties involved in weighting, operationalizing, and creating this new index.

Though my theory and hypotheses are system level and not infrastructure-type specific, I still chose to separate the different types of infrastructure for several reasons. First, all these different infrastructure types are necessary for a well-functioning state and all four are focuses of reconstruction policies. Secondly, none of them have deterministic outcomes in regards to political instability. By including them as separate variables, I am able to incorporatate the fact that each type might have different effects depending on how individuals interact with that infrastructure type on a daily basis, where the infrastructure-type tends to be built, and the infrastructure's history.

Constructing an index measure of infrastructure access would be inadequate due to these varying influences.

Road Networks: Road network data came from the Global Roads Open Access Data Set, version 1 (gRoads). I limited the type of roads to major roads—roads that were built in some manner and can handle a large amount of *public* traffic by removing minor roads listed as territory, local/urban, trail, and private.[16] IST is primarily concerned with infrastructure that connects an area to the core that can be used for private, public, and commercial uses. Minor roads cannot be used for all three of these reasons. Nonetheless, not all roads have been classified in gRoads. These unclassified roads were kept in the dataset as I had no justification to remove them. As most of these roads are located in rural and periphery areas, I argue that this actually biases the data against my theory. From here, I created a global density raster of road density where each raster cell represented 10 square kilometers and a search radius was set at 30 square kilometers.[17] This raster was then aggregated to the grid level by mode density score.[18] A density measure is used to capture the concentration of and varying levels of access to infrastructure.

Aeronautical Infrastructure: The Digital Chart of the World (DCW) project offers a starting point for geo-coding some infrastructure networks (Danko 1992). This dataset though does not included temporal information and is often incomplete. As such, I updated DCW for the sample to include airports that operated commercial flights and any appropriate first year of operation and/or closure dates—excluded were solely military airports, airports with dirt/grass runways, or airports with no

[16]Roads listed as questionable existence were also removed.

[17]These settings were chosen so that each density cell would represent an average 'daily life neighborhood' and the search radius would represent a large trade area. If no major roads amongst themselves and thus be isolated.

[18]Aggregation by mode was used over mean to account for density cell scores.

operating air-service. It is not enough to have air-service capabilities, aeronautical infrastructure must be invested in, constructed, used by society at large, and reliable. From this, I created a measure of aeronautical infrastructure proximity aggregated (mode) to the grid level. The search radius for the aeronautical point density measure was set at 250 kilometers.[19]

Railroads: DCW also acts for the foundation for railroad infrastructure data. The railroad networks data though faced similar limitations as the aeronautical data. Thus, I needed to update DCW railroad data to include information on when a line rail line was constructed, in operation, and/or closed. Railroad infrastructure is highly vulnerable to conflict destruction and looting. Thus, I also needed remove those lines that were no longer in existence after a conflict. From this, a dummy variable on whether a grid has railroad infrastructure and railroad network density.[20]

Power Plants: To ensure comparability across national boundaries, I compiled geo-coded information about power plants from two web-based sources: Enipedia (Davis et al. 2012) and the Global Energy Observatory (Global Energy Observatory 2013). Both these data sources are collaborative in nature, which is why both are included as to insure comprehensiveness and counter potential holes coming as a result of being open-sourced. Only those power plants that provide energy at a large scale are included. There are many power-generating sites that make power at a local level—especially in Indonesia. Such generators though are provided for by local individuals/groups and not the central state. Moreover, I also make no distinction on the type of power plant (e.g. diesel, hydro, nuclear)[21] ; I am more concerned if a

[19]These setting were chosen as to represent the proximity of aeronautical national infrastructure. While such infrastructure does not necessarily have to be in one's grid area to benefit, the further away an airport is, the more difficult it is for the general population to access it frequently. Density measures capture such proximity.

[20]A presence measure is used instead of density measure due to the lack of data on rail station locations cross-nationally.

[21]Not included here are green-sources of energy due to limited data: solar or wind.

society has the benefits of power generating infrastructure and not where the power is coming from. From this dataset, I created a measure of aggregated (mode) power plant proximity. The search radius for the power plant point density measure was set at 300 kilometers.[22]

I recognize that by using such infrastructure measures, I am not capturing most of infrastructure's initial provision as most of the infrastructure was pre-exiting. In fact, the measures do not vary drastically across time if at all (gRoads is time invariant). Although I am not capturing the initial provision, I also argue that I am capturing the point of 'full use', as war prevented the use of national infrastructure to its full potential. Moreover, such pre-existing infrastructure must be included as reconstruction policy must also contend with exiting infrastructure that survived the initial war. These are not perfect measures, but its the best possible at this level and across many cases.[23]

Literature has shown how political characteristics makes it harder for the political elite to redress group grievances. Such grievances will affect how a group reacts

[22]Being in the proximity of a power plant does not necessarily mean that the local population will have full access to its electricity. After construction, the local population can be ignored as transmissions lines are strung directly to the capital—it is cheaper to ship electricity than it is coal. What this measure is capturing then is the *possibility* of power access based on geographic location. One option that has been popular across many fields is measuring the geographic distribution of electrical use by using satellite imagery to capture night-time lighting (see Elvidge et al. (2009) for an example of this). However, such imagery is not available across all years of this study.Other types of temporal, cross-national, geographically disaggregated data on electricity use is currently unavailable.

[23]One way to potentially capture infrastructure at the point of provision is to follow the aid money (i.e. using Aid 2.0 data (Tierney et al. 2011)). There are two limitations to such data though. The first is practical. Disaggregated data on aid type (which is needed to ensure that only aid that is committed to infrastructure construction is used) is currently only available for Africa. Worldwide infrastructure project data is available, but is limited to World Bank projects only, which only represents a small portion of the aid going to infrastructure projects. Not captured in either are infrastructure projects done and paid for my the political elite themselves. Moreover, such data cannot be commonly disaggregated by type of infrastructure provided, which limits analysis. The second shortcoming is conceptual. Aid commitments only capture one portion of infrastructure provision. Ignored are the multiple steps following aid provision: planning, allocation, and construction. These steps are important in regards to infrastructure provision as infrastructure takes a long time to provide/construct and there are multiple points where provision can go awry. Aid commitment data as a proxy for infrastructure provision might be best suited for a micro level analysis where the research can better trace the money from commitment to provision.

to infrastructure provision or non-provision. For instance, those with pre-exiting grievances will be less flexible to non-provision and see such decisions as a continuation of their plight. Controlling for such pre-exiting grievances requires political status and historical data on the politically-relevant groups living within a cell. Using the GeoEPR-ETH, version 2 dataset (Cederman, Wimmer, and Min 2010), I include a control (Political Exclusion) on whether there was a significant portion of the population (more than 33%) that were excluded from the political system.[24] And, using the Minorities at Risk (MAR) dataset (Gurr 2009), I included a control (Lost Autonomy) on whether there is a significant portion of the population (more than 33% of the population in that grid) that had a history of losing their autonomy.[25] There is a weak, negative significant correlation between these two measures of grievances.

Moreover, structural factors such as economic level, terrain, population size, and natural resources that shape incentives and opportunities for insurgency must be accounted for (e.g., Fearon and Laitin (2003), Taber (1970), and Buhaug and Rød (2006)).[26] A proportion measure is included of how much of the grid is mountainous or forested (Tollefsen, Strand, and Buhaug 2012), as terrain influences both conflict and the presence/type of infrastructure constructed. I also control for economic conditions via a measure of gross cell product (gcppc), which is pulled from the G-

[24]Those groups that are listed dominant, junior partner, senior prawner, monopoly, regional autonomy, separatist autonomy, or irrelevant were coded as 0 or in the political system. Those listed as powerless, discriminated again, or in a state collapse are coded as 1 or excluded from the political system.

[25]MAR's measure of lost autonomy was recoded into a nominal control on whether that group was autonomous, lost autonomy, or were never autonomous. Coding for these autonomy measures was done following the coding procedures found in Siroky and Cuffe (2014).

[26]I did run the models with a spatial conflict lag to control for the share of ongoing conflict (conf=1) among contiguous cells. However, these measures are high correlated with my dependent variable. There was little error and thus little to no variance to explain: neighbors in conflicts a proxy if an area is also in conflict. By itself, the fact that one's neighbor is in conflict means that they have a high probability of conflict is not theoretically interesting. If a different dependent variable was used (i.e. conflict intensity), then such spatial lags will be useful controls as the correlation would be far less.

Econ dataset (Nordhaus 2006). A population density measures was created using data from the Gridded Population of the World, version 3 (CIESIN).[27] I also include a control accounting for the presence of mining and drugs within in the cell (Lujala, Gleditsch, and Gilmore 2005; Lujala 2009). Key to my theory is the relationship between the political core to an area—seen as spatial autocorrelation. To account for such physical distance, the distance ("as the crow flies") from the grid's center to national capital is included and comes from the cShapes dataset (Weidmann, Kuse, and Gleditsch 2008). Lastly, I controlled for a case being disjointed geographically or having a large portion of the country not geographically connected to the political core (i.e. Indonesia, United Kingdom, and Azerbaijan) under the assumption that such territories would be harder to control to the political core via a national infrastructure system.

Finally, the ten years since war's end were coded into an orthogonal time trend measure (Quadratic Year)—this has been a key component missing from past research. In H1, I theorize that the relationship between infrastructure and conflict follows an inverted U shape across time (a negative quadratic time trend). Modeling such a relationship is problematic though as T_{Linear} and $T_{Quadratic}$ are highly correlated, which then creates collinearity problems. Using orthogonal polynomials for the time trend allows for such independence (Bock 1975). Keeping this time measure as a fixed allow me to directly test my quadratic time trend hypothesis.[28]

Results

The results of the generalized linear mixed model (GLMM), can be seen in Table 3.2. GLMM models incorporate both random and fixed effects in a linear predictor

[27] As the latter two datasets only includes measures in 5-year increments, linear interpolation was used to fill in the missing data years.

[28] In such models, the intercept term represents an average over time all else equal.

using a logistic link function (the dependent variable here is dichotomous). I include a random intercept at the case level with quadratic time treated as a fixed effect.[29] Doing this allows for across year variance (both within and between effects) of conflict dynamics. being controlled for while leaving year-based variances to be estimated (Allison 2009). I acknowledge that many of the variables used (especially in regards to infrastructure and terrain) rarely change or are completely time invariant at the grid level. This does not create modeling problems as I do not include random effects at the grid level but only at the case level. Moreover, these measure do differ with-in a case. It is this variance that I am interested in and not necessarily the variances at the grid level, which has no substantive meaning themselves.

I present three models in Table 3.2.[30] The reduced model includes only the infrastructure measures of interest; the control model includes only the control variables; and lastly, the full model includes all variables and controls. At first glance, there are minimal substantive differences between the three. In fact, the prediction rate between the three models are at best marginally different. While the final model miss predicts 4% of the grid-years overall and miss predicts conflict (false negatives) specifically 19% of the time (predicts no conflict when there actually was conflict), the reduced model does marginally better at predicting conflict with a miss predict rate at 18%. In comparison, the control model's overall miss rate was also 4% while the miss rate for conflict (false negatives) was 18%. Yet, comparing AIC and BICs,

[29]Concerns can be raised with the grouping effect set at the case level, as there are cases with multiple case or multiple periods of post-conflict reconstruction periods. Yet, each case is the result of a different conflict with different opposition and influences. Nonetheless, I did run the full model with an additional random intercept at the country level. If these duplicate country cases were not independent, then I would expect substantive differences in sign and significance. This was not the case and this new model resulted in a higher BIC score, which penalizes for the additional complexity.

[30]The same three models were also ran using linear time and linear + linear^2 time. Reduced measures of model quality across the board supported my decision to use an orthogonal quadratic time tend measure.

the full model appears to best represent the 'true' model. This appears even in the BIC score, which discounts for model complexity, which my four infrastructure measures and interactions add. In fact, an anova test between the full and control models comes back with a significant chi-square score of 1049. Thus, I can be confident in continuing model interpretation using the full model.

Table 3.2: Model Results

	Reduced Model		Control Model		Full Model	
Random Effect						
Case (Intercept)	6.06	(2.46)	3.87	(1.84)	4.39	(2.10)
Fixed Effects						
(Intercept)	-3.52	(0.44) ***	-3.10	(.36) ***	-3.69	(0.41) ***
Aero Proximity	-0.48	(-0.16) **			-0.75	(-0.16) ***
Rail Presence	0.26	(0.04) ***			0.12	(0.04) **
Power Proximity	2.39	(0.10) ***			1.75	(0.11) ***
Road Density	0.09	(0.00) ***			0.06	(0.00) ***
Linear Year	-0.51	(0.05) ***	-0.45	(0.51) ***	-0.56	(.05) ***
Quadratic Yave	1.88	(0.09) ***	1.33	(0.05) ***	2.02	(0.09) ***
Disjointed			-3.29	(0.99) ***	-3.32	(1.13) **
Capital Distance			-0.00	(0.00) ***	-0.00	(0.00) **
Drug			0.34	(0.04) ***	0.33	(0.05) ***
Mining			-0.12	(0.10)	-0.25	(0.10) *
Oil			0.30	(0.04) ***	0.35	(0.04) ***
Mountainous			-0.04	(0.04)	0.00	(0.05) .
Forested			-0.00	(0.00) ***	-0.00	(0.00) ***
Political Status			0.02	(0.04)	-0.05	(0.04)
Never Autonomous			-0.14	(0.03) ***	-0.04	(0.04)
GCPPC			0.00	(0.00) ***	0.00	(0.00) ***
Pop Density			-0.00	(0.00) ***	-0.00	(0.00) ***
Aero Proximity : Quadratic Year	2.22	(0.43) ***			1.73	(0.43) ***
Rail Presence : Quadratic Year	-1.13	(0.11) ***			-1.09	(0.11) ***
Power Proximity : Quadratic Year	1.49	(0.23) ***			1.37	(0.23) ***
Road Density : Quadratic Year	-0.13	(0.01) ***			-0.13	(0.01) ***
AIC	35086.61		35555.66		34522.70	
BIC	35207.36		35706.59		34754.14	

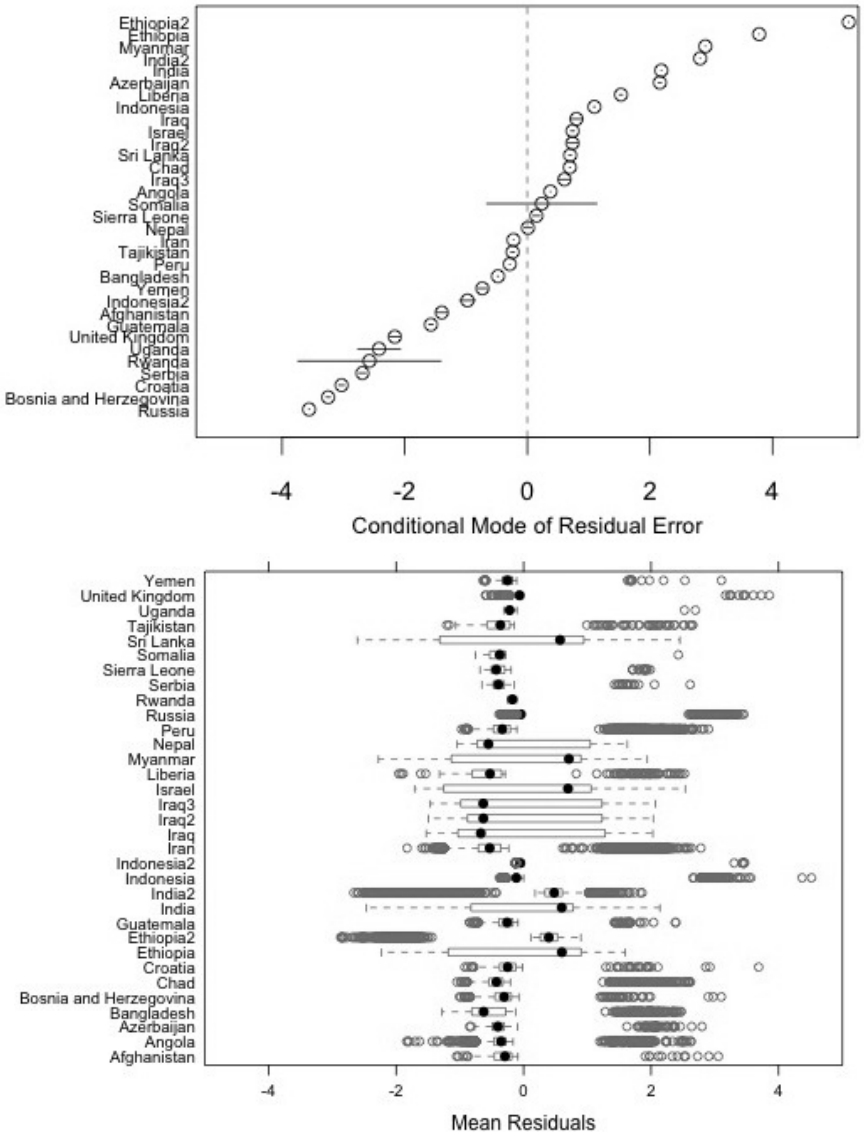
Standard errors listed in parentheses.
Number of observations: 173,237; Number of Groups: 33
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Figure 3.2 shows both the strengths and weakness of the model. The top panel tests of case (random) effects. Considering the size of my case-level n, these random effect residuals are normal distributed. Moreover, only two cases have insignificant random effects: Somalia and Nepal. In short, though adding an additional level

of complexity, the random effect specification is needed. As shown in this panel, conflict's over prediction is significantly above average when to the right of the zero line or is below average when to the left of the zero line. With more outliers seen to the right of the 0 line, my model better predicts where conflict should not be rather than where conflict should be in some cases—conflict is over predicted. These residuals are further broken down in the bottom panel where mean residuals are plotted by case. Most of the mean residuals (represented by a point) are off the 0 line—the further away from the 0-line, the residuals within a case are not normally distributed. Yet, after pulling a random sample of 5,000 from the residuals and testing their distribution, the residuals overall are found to be normally distributed. In addition, a similar pattern of conflict's over prediction of conflict is seen in this bottom panel.

Initial interpretation of the final model seen in Figure 3.2 seems to show that adding infrastructure measures (both independently and across the quadratic time trend) improves the overall model—all are significant. Nevertheless, significant levels should be taken with a grain of salt due to the large N (173,237). Patterns and correlations are bound to appear. Instead, I need to use my theory to analyze the effect (size and direction) to offer better insight and hypotheses testing. These results are represented in Figure 3.3, which shows the effects on conflict probabilities when moving from low to high levels of infrastructure. There is support here for first order's and exiting literature's prediction of increase of conflict risks after infrastructure provision—seen in the positive change in predicted probability in the individual infrastructure measures. Increased levels of infrastructure leads to higher levels of conflict risks as compared to lower levels of that infrastructure. This is where past research as stopped. The bottom set of variables add the essential time element. These offer mixed support for H2 with the interaction measures being negative only half of the time—more infrastructure leads to lower conflict probabilities across time as com-

Figure 3.2: Model Diagnostics

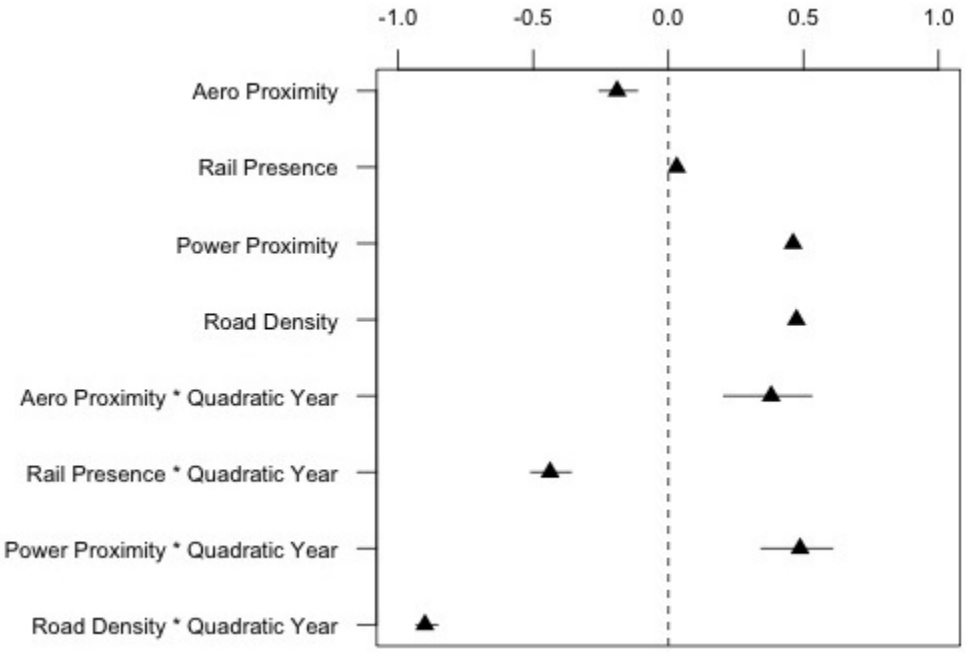


Note: Segments represent 95% confidence interval.

pared to lower levels of that same infrastructure across time. As such, rail presence and road density consistently matches my theory, power proximity is split (supporting first order politics but not my first hypothesis), and aero proximity consistently going against my theory.

With the well documented effect of grievances on conflict, I recognize that these

Figure 3.3: Change in Predicted Probabilities of Conflict from Min to Max Infrastructure



Note: Point segments represent 95% confidence interval.

results could be driven by pre-existing grievances.[31] Though both my political grievance controls are insignificant in the full model, I ran models with one grievance measure instead of both to make sure that this lack of significancy was not the result of measurement error. There were no significant differences between the models in sign nor significance. Models were also ran that subset the sample into those grids with some type of preexisting grievance and those without such grievances. No major difference with sign nor significance was found when using the sample subset that have some sort of grievance. Using a subset of sample with no grievance, all individual

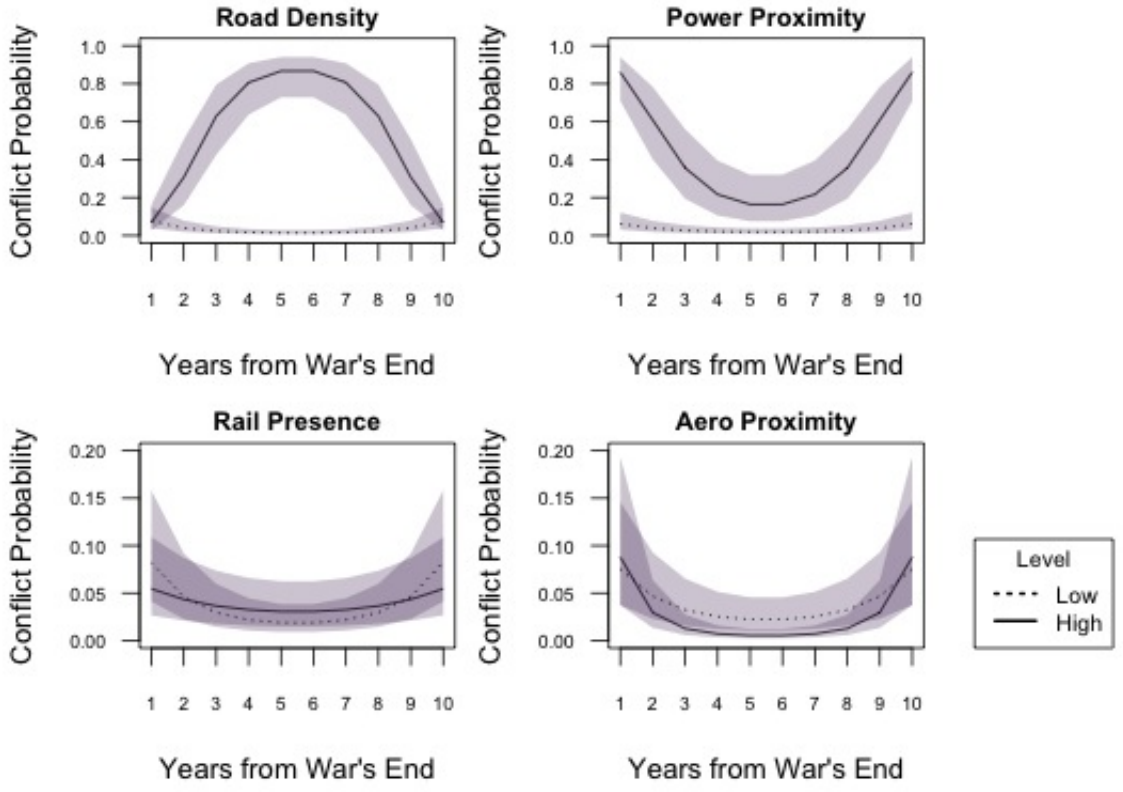
[31] Additional tests were run to ensure that other triple interactions are not effecting these results. Subsetting the sample based on dense or sparse population density measures (as compared to the case's mean population density) reveals no substantive changes in sign or significance other than power density across quadratic time trend dropping out of significance. Moreover, there were minor changes when subsetting the sample based being close of far to the capital city (as compared to the mean distance for that case). For far grids, aero proximity across quadratic time changed signs with grids far from the capital experiencing less conflict risks across time when also having higher aero proximity—this supports my theory. In short, though there are minor changes, I can be ensured that the results are not being driven by distance to capital or population density.

infrastructure coefficients were positive while all interacted coefficients were negative (aero proximity across quadratic time though lost significance)—these changes are towards my theory. IST seems to marginally better fit in areas with no political preexisting grievances. Such political grievances have been shown to lead to conflict themselves and these areas did not need post-conflict reconstruction grievances to ignite conflict.

An additional model was run with the grievance measures interacted with the infrastructure measures, as to directly test how grievances play into infrastructure provision consequences. These interactions were significant while also bringing back into significance the grievance measures themselves. Initial results from this model demonstrate that areas with a significant portion of the population excluded from the political system or have lost autonomy and high levels of road density also have lower conflict risk as compared to areas that are included within the political system or never had autonomy and high road density. The costs of having high grievances seem to be mitigated by having access to major roads, which follows IST and first hypothesis. Nevertheless, the opposite is seen with power proximity where high levels of power proximity in areas of high grievances actually experiencing higher conflict risks. Though these results are interesting, they are outside the limits of this chapter. I leave it for future research to further explore this relationship.

Figure 3.4 offers a clearer picture these relationships based on different levels of infrastructure across time—note that these are all significant relationships. Briefly, these varying result come as the result of where that infrastructure type is commonly built, its history, and how individuals act with it on a daily basis. In other words, the socio-technical dynamics of different kinds of infrastructure are different from one another. Each operates differently with respect to what it enables people to do or not to do, and thus we get different patterns of risk of conflict over time.

Figure 3.4: Quadratic Interaction Effects



To begin with, the magnitude effects of airport proximity and rail presence as compared to the other two infrastructure measures is significantly less. I did run the model without these two infrastructure measures to make sure that these are not hiding stronger or substantively different correlations in regards to the other two infrastructure measures, which was not the case as minimal substantive change was seen.[32] These two types of infrastructure differ from roads and power plants in two important ways that might explain this difference in influence. Airport and railroads are not typically 'everyday' infrastructure. Though they are essential for national economic growth by helping connect supply lines and large-distance travel, rarely does an individual depend on railroads or airports for their everyday life in post-

[32]Moreover, I argue later that as reconstruction policy address all types of infrastructure together, so must research.

conflict zones. Moreover, airplane and railroads require expensive maintenance and hardware (e.g. airplanes and locomotives) to use that individuals cannot afford or conduct by themselves, which then requires a third party to intervene. As such, the effect of these infrastructures will be smaller as compared to road density and power plant proximity.

Keeping with these infrastructures, aero proximity and railroad presence do not support H1 as the relationship seen follows a traditional U pattern in Figure 3.4: while there is an initial drop in conflict risks, conflict risks increases as time passes. In regards to railroads, the effect of long-term structuring around infrastructure is seen even if the inverted U relationship is not. As seen in Figure 3.3, the independent influence of rail infrastructure on increased conflict risk is minimal at best. Moving from not having railroad infrastructure to having it significantly decreases conflict risks as time passes by about 50%. Moreover, there is no significant difference on conflict probability across time seen in Figure 3.4—the effect line can be a flat. This overall but consistent drop in conflict risks across time surrounding railroads is the result of the infrastructure's colonial history. Railroads in areas of recent conflict were often built by or with the help of colonial powers for economic reasons to benefit those in power. As years and decades passed, the presence of railroad infrastructure led to the formation of new cities and ways of life (socio-technical system) around the railways (see: Jones (2013) for an example of how this occurs in regards to energy-based infrastructure). Thus, these areas were also less susceptible to fluctuating conflict risks post conflict as 'their' railway' was still there and operating and thus their way of life and socio-technical system were sustained. These results demonstrate the long-term importance of this infrastructure history on shaping society.

Proximity to aeronautical infrastructure often went against IST independently

and across time.[33] The reason for this comes as the result of the particularities of airport technology. A grid in proximity of an airport has lower (rather than increased) independent conflict risks as airports cannot safely operate with commercial flights (a key criteria of being included in the dataset) if there is conflict—an airline company is not going to risk its profit margin. I am not saying that airports create non-conflict in the short term but that operative airports post-conflict are more likely to be in areas with less conflict risk overall—peace draws in airports. However, as time passes, conflict risks increase in the proximate areas of aeronautical infrastructure. In short, airports remain or increase in strategic value as a conflict target for rebels and/or the political elite recognize the airport's strategic value as a tool for rebels.[34] Moreover, airports are a resource-efficient target as little resources are needed to create a large impact. Thus, conflict risks increase as time passes.

An inverted U relationship for road density interacted with quadratic time is clearly visible in Figure 3.4 with high levels of road infrastructure, which supports H1. Though high levels of road density might increase the probability of conflict over time this risk will drop. Increased conflict risks brought about by grievances, intermingling, and mobilization is tampered over time as individuals and groups are absorbed into the national economy and identity.[35] In other words, major roads are mostly a means of conflict and are not a cause of conflict. Thus, conflict risks do eventually drop in areas with high road density. Roads have limited uses—they are used to transport people, livestock, private and public goods, and military/police forces. Such transport thus increases individual and society livelihoods and capabilities, education and health

[33]Moreover, aeronautical proximity was also the most sensitive to various model tests.

[34]An example of such continued conflict surrounding airport infrastructure is seen in Ukraine after the Crimean crisis. Both sides focused much of their attention on the Donetsk International airport. As of October 2014, the airport remains severely damaged due to the fighting.

[35]See Chapter 2 for more discussion on this.

services become easer to access, and economies can grow in scale. On the other hand, though lower levels of infrastructure might decrease the probability of conflict due to the inability to mobilize or intermingle, the magnitude of this decreased risk is minor and will eventually increase over time as new identities are learned and/or long-standing grievances are re-enforced. Groups find ways around not having access to roads to mobilize and act as their grievances and motivation grow.

Varying consequences between infrastructure density levels is also seen with power plant infrastructure. Rather than the theorized inverted U though, the effect of high power proximity levels is a traditional U relationship. Conflict risks a year after war's end (T_1) remains high, as if the war never ended in the proximity of power plants. Power plant locations are not random; power plants are built in geographic areas that can support power production. Often these are the very same places that also support rebels: forested, remote, and/or economically poor areas (Buhaug 2006). Thus, power plants located in conflict prone areas are never really truly 'secure' in regards to conflict risks. This conflict risk does initially drop in the early years of post-conflict reconstruction. As time passes though (T_5), proximity to power plants fuel conflict as conflict risks raise. Power proximity has many different uses. They power cell phones, lighting, medical tools, refrigerators/freezers, computer/broadband equipment, and radio/televisions. When receiving power for the first time, conflict risk drops as the area begins to absorb the multitude of these newly gained capabilities. However, such capabilities seem to eventually increase conflict risks. I suspect this is due to *how* and *what* electricity is being used to do—i.e. making education easier with lighting at night vs. downloading information and propaganda of radical groups. This follows past research like Pierskalla and Hollenbach (2013), who demonstrate how access to communication technologies, which are dependent on access to electricity, helps explain the location of insurgent violence due to the positive influence communication

and information sharing has on rebel mobilization. I leave it to future research to examine the mixed influence of power infrastructure after a conflict.

I recognize that these are post-hoc explanation of these relationships. At the same time, some might argue against including non-road infrastructure types and the results constantly match my theory in regards to road infrastructure. Yet, all must be included and these results demonstrate the complexity that reconstruction policy must contend with on the ground. All these infrastructure types are needed, they are dependent on each other, all commonly existed at some level before the war, and one type cannot be ignored for another.

Vignettes

With these results, I would expect to qualitatively see an initial uptick in conflict numbers in the areas where infrastructure was provided. As time passes tough, I would then expect to see a relative drop in conflict as conflict shifts location to the periphery/areas lacking national infrastructure. To see if this is the case, I include here brief vignettes into two cases of my population: Chad and Sri Lanka.

Chad (1994-2003)

Chad represents a case of overall low infrastructure levels and little infrastructure change (even compared to other African countries). Nonetheless, Chad offers a great opportunity to see clear divisions of infrastructure levels. As seen in Figure 3.5, road density is less in the Borkou-Ennedi-Tibesti (BET) region in the north.[36] In comparison, the southern portion of the state is quite connected to the capital. Moreover, all other infrastructure is located in the south except for one airport. Though the

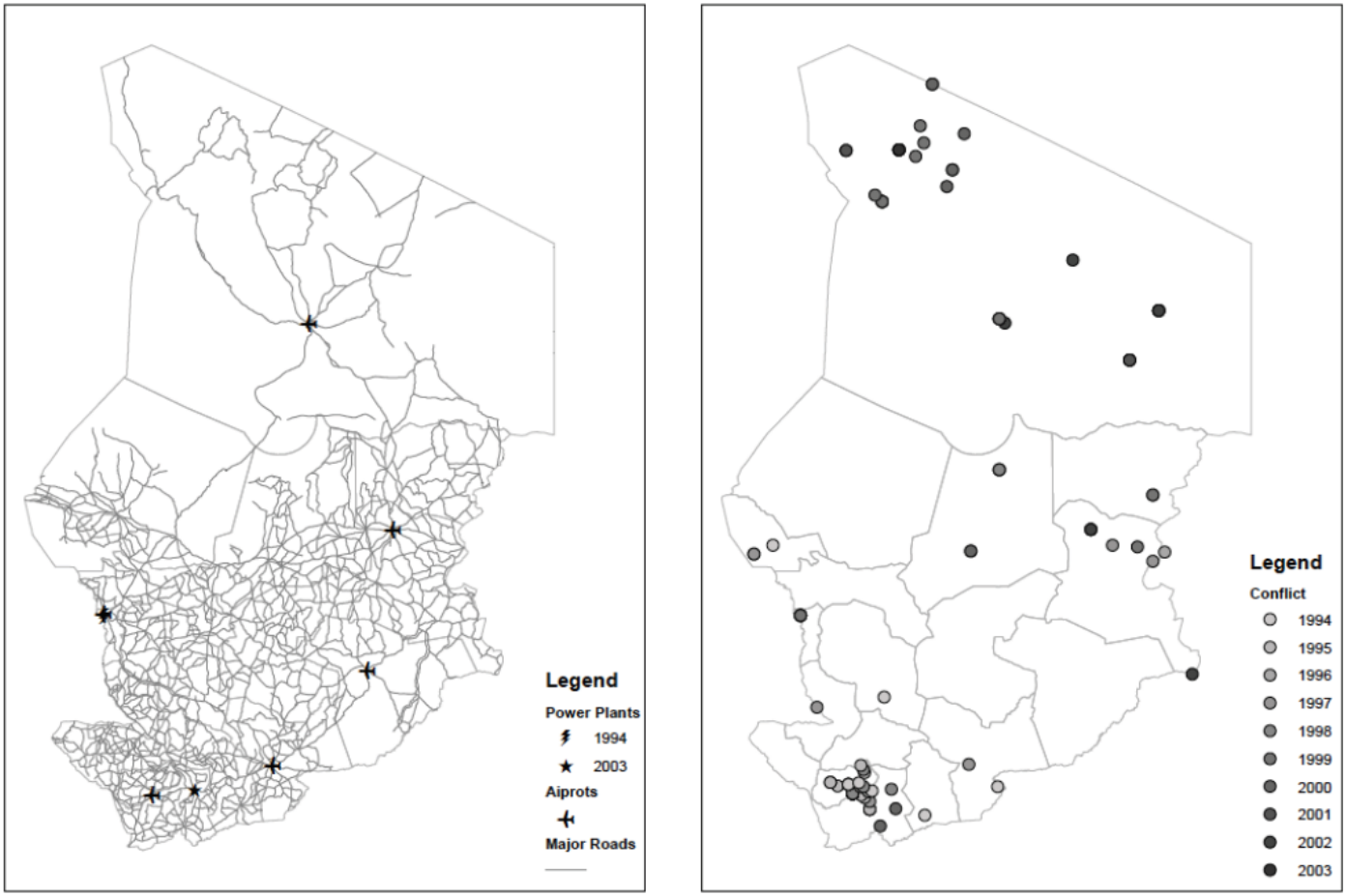
[36]The BET region was split into three separate regions in 2008: Borkou Region, Ennedi Region, and Tibesti Region.

BET region is also mostly comprised of the Sahara Desert and does not have a high population (many of its inhabitants are nomadic), this division reenforces tensions between the Arab-Muslim north and the predominantly Christian south

The initial need for reconstruction came after a string of conflict put Idriss Déby, a northerner, into power. The following year were filled with coup attempts, a failed peace agreement, and continued violence that resulted in a high number of civilian casualties and large scale infrastructure destruction (Amnesty International 2001). As seen in Figure 3.5, there were a number of conflict events initially during the reconstruction period, which was focused in the south. In 1998, President Déby former defense chief, Youssouf Togoimi formed the Movement for Democracy and Justice in Chad (MDJT), an armed insurgency from in the north. Going back to Figure 3.5, there was less conflict as time passed following war's end, but the conflict that did occur shifted to the north. The north was not only cut off from the political core in regards to infrastructure, it faced Libyan pressures, which stemmed from the long-lasting Libyan-Chad conflict and dispute of the Aouzou Strip along the Chad-Libya border (Nalbandov 2013). This continued violence and destruction scared foreign investors away from investing resources into Chad. Without private investment, Chad was left with few options on how to reconstruct at the national level.[37]

[37]A peace deal in 2002 failed to end rebellion. Refugees from neighboring Sudan entered Chad and jointed Chadian civilian in camps shoe were also trying to escape the continuing violence. With help from Sudan, rebel groups stormed N'Djamena, which ignited a new Chadian civil war that lasted from 2003 and 2010.

Figure 3.5: Chad Infrastructure and Conflict (1994-2003)



Note: Where no time year variation is shown, all operated on or before 1994.
Conflict data comes from Sundber, Lindgren, and Padskocimaite (2010) and Sundberg and Melander (2013).

Sri Lanka (2001-2008)

The Liberation Tigers of Tamil Eelam (LTTE) started fighting in 1983 for an an independent state (Tamil Eelam) in the north and east of Sri Lanka—see Figure 3.6 for exact territorial claim. In Figure 3.6, the disconnect in regards to national infrastructure between the Tamil area and political core becomes clear. Road density is visibly greater than the non-Tamil Eelam area.[38] This trend is only continuing.[39] Power plant infrastructure is also focused in non-Tamil Eelam areas with only one power plant in a contested area, which became operational in 2004. The most dispersed infrastructure, railways, focuses on connecting port areas economically to the capital to support the political elite and not provided to help the population as a whole. Nonetheless, the data do not include damage caused by the 2003 Tsunami. But, much of the damage to infrastructure during this natural disaster was done to fisheries, industries, and local costal roads—broad, large-scale damage did not necessarily occur to major national infrastructure being studied here (United Nations Environment Programme (UNEP) 2005). Moreover, the tsunami offered a chance to rebuild with an influx of aid.

Though Tamil areas felt the most tsunami damage in 2003 (to both infrastructure and lives), they did not receive a large portion of the aid that went to the country and there was disagreement on who should be able to disperse the aid in these areas: the Sri Lankan government or the Tamil Rehabilitation Organization, who are are closely tied to the LTTE. National reconstruction aid was perceived as a threat to the LTTE who were not dependent on the local population due to international

[38]The high density of roads in the east is capturing more minor roads as compared to other area. As previously mentioned,gRoads does not have classification data all roads especially in rural areas.

[39]An expressway (E02) began construction in 2009 that will connect Colombo and Kandy in the middle of Sri Lanka (Road Development Authority (RDA) 2013).This is occurring outside the Tamil areas, which is in dire need of such roads.

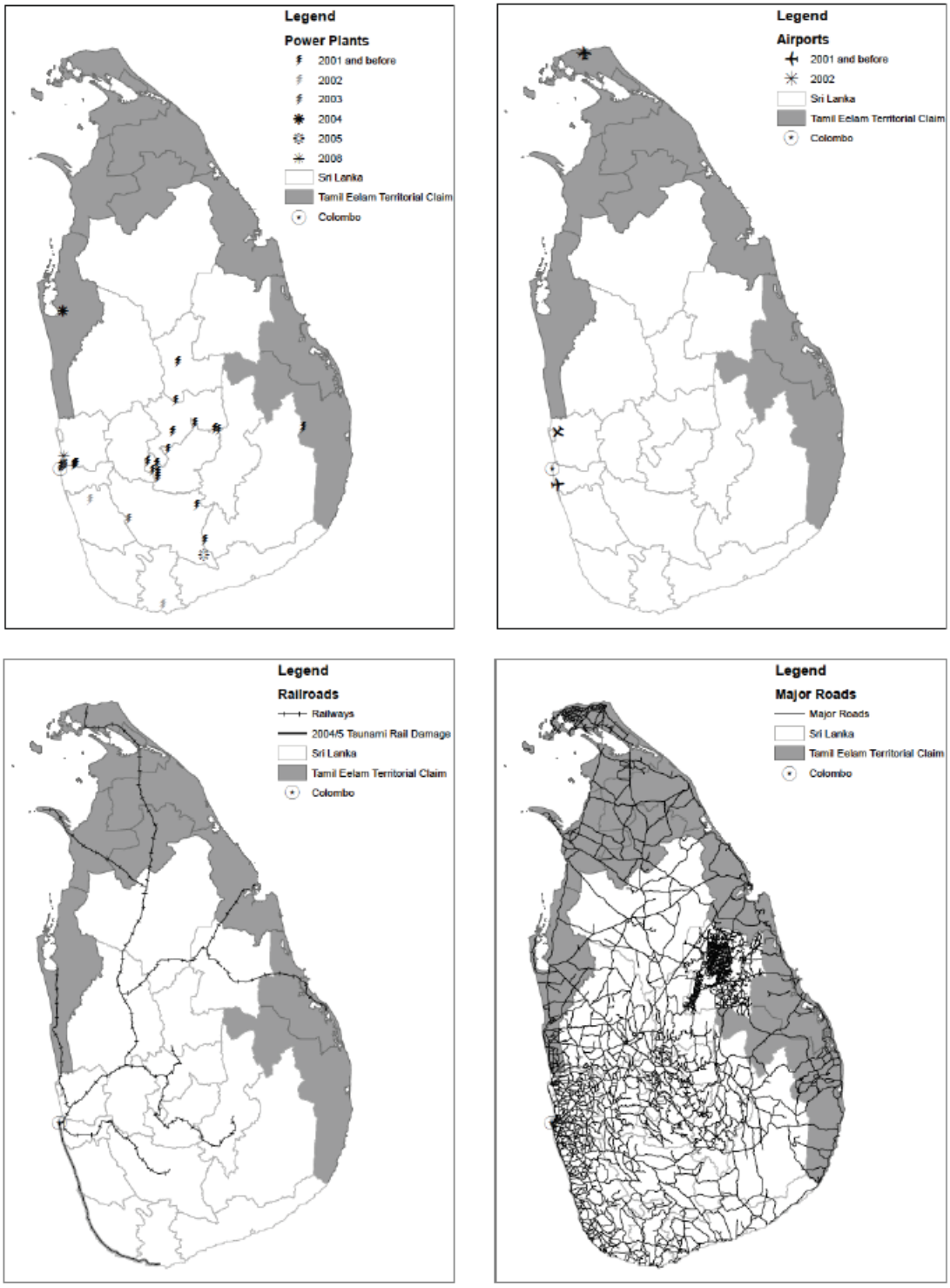
resources and remittances while also running a *de facto* government in areas hit the tsunami (Beardsley and McQuinn 2009; Le Billon and Waizenegger 2007; United Nations Environment Programme (UNEP) 2005). In short, the Tamils learned to exploit infrastructure (and forced non-provision) to their favor and long-term goals. As such, they were never really absorbed into the national identity as seen by the political elite and conflict continued. Though Sri Lanka did experience a lack of infrastructure good provision following the civil war, the Tamils did not need these additional reconstruction based grievances to motivate opposition forces.

Conclusion

The purpose of this chapter was to demonstrate the need for IST in order to fill a theoretical gap and create improved infrastructure policies and political strategies. According to IST, the relationship between infrastructure and infrastructure varies across time; there are both short-and long-term consequences of infrastructure to conflict risks. If I was unable to show these varying consequences, then current theories of infrastructure would be adequate to address post-conflict reconstruction and resulting political instability. However, this was not the case and the results support the need for IST and my hypotheses about varying, geographically-unbounded consequences of infrastructure across time to a country's political instability. Thus, future reconstruction and political strategies to combat political instability must incorporate both types of politics and conflict.

An alternative hypothesis to my findings is that these post-war countries are merely returning back to conflict. Countries with a history of conflict and poor countries isn general are at a higher risk of future conflict. Yet, if this is merely the case, one would not find the geo-spatial and temporal patterns I found here. My findings are not just about conflict reigniting. IST and my methods allowed me to

Figure 3.6: Sri Lanka Infrastructure (2001-2008)



Note: Where no year variation is shown, all operated on or before Year 1 (2001).

look at where conflict is occurring (or not occurring) and when it is occurring (or not occurring). The results of this chapter have shown the existence of both first and second order politics and their differing consequences to political in stability risks. This is important as it is IST's conceptualization of shifting consequences across time and second order politics that makes the theory novel and exciting. By providing evidence to validate H1 and H2, continued IST evaluation can occur to explore the causal mechanisms that connect infrastructure and post conflict reconstruction to political instability.

Viewing infrastructure as a capability, actors providing post-conflict reconstruction focus on infrastructure projects and who is or is not receiving benefits and assume economic benefits will occur, which will automatically lead to less conflict. Thus, success was ultimately measured by the presence or lack of infrastructure and not the long-term social and political consequences of that infrastructure. Such measures and assumptions are insufficient in regards to capturing infrastructure's role in conflict risks over time. As shown in this chapter, *merely having infrastructure is not enough to eliminate conflict risks associated with having infrastructure* Such overstatements on the power of technology via technological fixes and jumps are common. Overlooked here is an appreciation of how the population will use, become dependent on, and be shaped by the infrastructure itself. This chapter shows how infrastructure's influence over time after a conflict should not be overlooked, which requires incorporating infrastructure's long-term consequences and role in shaping a population. Populations rely on and demand for some basic level of infrastructure. With infrastructure's inverted U relationship and general drop of conflict risks as time passes, policymakers must then convince constituents and funding agencies to continue investing in infrastructure throughout turbulent times and initial spikes of conflict if reconstruction is going to be an useful aspect of political strategy. Preventing or preparing for system

failure and unintended infrastructure consequences requires actors to remove their blinders, which are limiting their perspective, and include long-term benefits and costs into their decision-making processes.

Yet, this research also demonstrates that actors must consider different types infrastructure together during the planning and execution phases of reconstruction. Current literature addressing infrastructure tends to focus on one type at a time with a focus on high technology—i.e. cell phone use (Pierskalla and Hollenbach 2013). Though such research is exciting and needed, it can only provide one perspective to post-conflict reconstruction and risks leading to policies that are also narrow and blind to other infrastructures. To begin with, infrastructure does not exist independently from other types of national infrastructure and high technology (broadband internet and cell phones) require basic forms of nationally provided "old technology" like infrastructure (Edgerton 2008)—what use is a computer with internet access if there is no reliable power source nearby? As described by Edgerton (2008), these technologies, though common place in much of the world, achieve a greater status in post-conflict areas who have had limited limited access to these basic technologies before its transfer.

Moreover different types of national infrastructure have different relationships with conflict risks during post-conflict reconstruction, which must be understood in conjunction with infrastructure interdependence—an airport without electricity to operate it and roads or rail lines to connect it to population and economic centers is not a very useful airport. Yet, each infrastructure type is necessary, society interacts with and depends on each infrastructure type both independently and in conjunction with other infrastructure types, and all are components of reconstruction policy as a whole. When considered together, one can truly begin to appreciate the role of infrastructure and difficulties in creating good and comprehensive reconstruction policy

to achieve a desired long-term, strategic goal.

Chapter 4

SEALING THE CRACKS OF RECONSTRUCTION

It is not enough to merely show the existence of different long-term consequences of infrastructure and second order politics. I must also demonstrate *how* these varying effects are occurring. Society does not become embedded and structured around infrastructure's technical configurations overnight. And though it might appear to do so, infrastructure systems do not suddenly collapse and fail. System failure is an amalgamation of past decisions and actions. Thus, it is possible to see the various decisions and conditions that eventually add up to promote failure in the future.[1] One reason past literature fails to appreciate the role of infrastructure and reconstruction in political instability across time, I argue, is due to its short-sighted and deterministic viewpoint of infrastructure. IST takes a more comprehensive approach by including both short and long-term perspectives in regards to how infrastructure ultimately shapes political instability risks over time. To test how infrastructure and reconstruction leads to political instability requires uncovering IST's causal mechanisms (H2, H3, and H4).

Rather than testing the causal mechanism hypotheses discussed in Chapter 2 as individual variables leading to political instability, these can be evaluated together as a single entity by placing IST in terms of set relations and configurations of conditions.[2]

[1]For example, the infrastructure failure in New Orleans following Hurricane Katrina was not solely the result of an uncontrollable, naturally-occurring storm. The storm might have sparked the failure, but decisions on where and how to build the levy networks vis-á-vis disadvantaged neighborhoods occurred years, if not centuries, before.

[2]Not only are set theoretic logic and relationships common within social science, necessary condition arguments are a core component of social science. Goertz (2003) lays out 150 necessary set hypotheses found in social science, many of which are the foundations of large research programs (i.e. democratic peace).

Set theory logic moves attention away from individual variables and onto the interplay of reconstruction conditions that lead to political instability as an outcome. As shown in Chapter 3, it is not sufficient to not have roads, electricity, or any other type of infrastructure for a state's infrastructure system to produce political instability. However, when populations are cut off from the political core, capability-building benefits created by reconstruction are unavailable, and infrastructure networks are unsustained in the same space, conditions combine and interact to shape political instability. By focusing on how these conditions manifested together in past cases of post-conflict reconstruction, it becomes possible to evaluate IST hypotheses, better understand how infrastructure and reconstruction leads to political instability, and guide later analysis.

In theoretically and analytically evaluating these causal mechanisms, this chapter proceeds as follows. First, I recapitulate ISTs theorized causal mechanisms discussed in Chapter 2. Following this, I present an argument on the importance of employing fuzzy-set Qualitative Comparative (fsQCA) analysis. From here, I set up a population of 33 conflict-prone cases where post conflict reconstruction was needed and describe in detail is how the outcome (political instability) and four conditions (cut off peripheries, reconstruction aid discrepancies, high unemployment during reconstruction, and poor infrastructure quality) are calibrated. From here, a truth table is presented along with the final solution, which supports IST in regards to how reconstruction conditions increase the risk of political instability via relative and absolute deprivation and hindering a nationalistic we. The concluding portion of this chapter places this Chapters results alongside of those from Chapter 3 and discusses the next step of IST evaluation.

IST Causal Mechanisms

Chapter 3 explored and provided evidence for IST's first and second order politics and the shifting consequences of infrastructure across time. Nevertheless, it is not enough to show the existence of second order politics; also needed is an understanding how second order politics leads to political instability. Following Chapter's 3 results, it is now possible to examine the causal connections, themselves. The theorized mechanisms discussed below revolve around conditions within the socio-technical system that lead to political instability resulting from misallocation: integration, power, and system security.[3]

National Unity

Though the Westphalian system normalized the current international structure, the modern state is a compulsory association with its borders being artifacts of history and politics (Wright 1991). Just as fledging states needed to create a unified "we", the need for a unified state after a conflict is also paramount in order to create national trust and concord after turbulent times. If the state is essentially broken into different pieces, the risk of separatist mobilization against the state and political core based on peripheral nationalism increases based on the degree of marginalization (Buhaug 2006; Olzak 1983; Wright 1991; Gourevitch 1979; Coakley 2003). IST provides a way for states and political elites to combat heterogeneous populations: the creation of a national infrastructure system that connects the peripheries to the political center.

In Chapter 3, there was support for this hypothesis where increased levels of two infrastructure measures were shown to generally decrease conflict risks across time while high road density was shown to eventually decrease conflict risk after an initial

[3]See Chapter 2 for more in-depth discussion on each of these conditions and an overall discussion of IST.

spike of risk. This condition is also included in the fsQCA to better understand under what conditions does being cut off from the political core lead to political instability—reduction in political instability might be the result of a contingent relationship to other reconstruction conditions.

Individual Capabilities

Power within socio-technical system is not limited to the political elite. In second order politics, power is delivered to society at large via capability building benefits—benefits that increase individual capabilities that allow individuals to better themselves and their families and thus boost real, sustainable freedom (Sen 1999). Yet, in creating infrastructure, the central state exposes itself to several risks, especially if the local population does not see the full potential benefits from the creation of the infrastructure. This would then risk increasing grievances against the central state. One broad category of such capability building benefits include the educational and training programs available during and after infrastructure construction.

Despite an abundance of domestic workers, foreign entities are brought in by aid organizations and/or governments providing reconstruction support due to contractual obligations or claims of efficiency. Such decisions are based on short-term goals and first order politics; the use of local workers is a long-term, second order investment. Seeing foreign entities benefit from local resources increases resentment and impotent feelings by the local population willing and able to hold these jobs. Moreover, feelings of deprivation may lead individuals to be recruited into social movements and political violence against the state as they fight for what they view as rightfully theirs (Gurr 1970).

Sustainability

Socio-technical system are in constant flux, which opens the door to a seemingly stable system rupturing to create political instability at any point. As a result, if a socio-technical system is to reduce long-term political instability, the system must both limit political instability risks and be secure overtime itself. Moreover, infrastructure's benefits are not self-reinforcing and the initial investment must be continuously re-provided in order to maintain infrastructure benefits (Sen 1999). Such sustainability in socio-technical systems require infrastructure and infrastructure networks that pass the test of time by being well built and/or continuously and domestically maintained. These are difficult to do for a state recovering from a recent conflict. If the system is at risk of failing due to erosion or the lack of aid as external revenue sources dry up, those who depend on the system will be unsure about its future and the risk of political instability increases as grievances grow and any stability created via the socio-technical system crumbles away.

Following this, poor quality infrastructure—infrastructure that is perceived as deteriorated enough to prevent maximum use—is just one characteristic of an unsustained infrastructure brought about by the lack of investment and up-keep that puts a system at risk of failing. In the long term, poor-quality infrastructure erodes beyond usability and increases political instability risk by increasing system uncertainty.

Methods

Theories based in set theory are not well suited for testing via correlation or probability analysis (more will be explained on why this is the case below or see: Ragin 2008; Goertz 2003; Schneider and Wagemann 2012). Such frameworks view set-theoretical relationships as causal statements, treat related membership data as

'simple' nominal-scale measures, and thus limit evaluation to cross-tabulation and other descriptive analysis (Ragin 2008). Rather than restricting set-theory analysis, qualitative comparative analysis (QCA) incorporates the uniquely valuable characteristics behind set theoretical relationship. This allows for more in-depth analysis by addressing a couple of hurdles that any investigation into the relationship between infrastructure and reconstruction provision and political instability must contend with and that correlation/probability frameworks are ill-suited to fully incorporate.

First, the causal story between political instability and infrastructure provision is complicated by the likelihood of endogeneity; political instability decreases the likelihood a state will provide public goods, yet a lack of public goods provision will lead to political instability. This, however, is overcome by QCA's focus on necessary and sufficient, rather than correlational relationships. Second, IST values complexity and expects that there are many ways reconstruction may lead to political instability. QCA allows me to analyze this equifinality. Third, IST argues that the causes of instability are not the opposite of the causes of stability; the ability to capture such asymmetry is a major benefit of QCA (Ragin 2008). Fourth, IST does not make sufficiency claims regarding any particular reconstruction condition. Rather than pinpoint a single variable that causes political instability in each case, QCA focuses on the *configurations* of variables in order to capture the causal story in each case. (Mahoney and Goertz 2012; Ragin 1987). Finally, war is rare; war large enough to require post-conflict reconstruction at the national level is rarer. QCA has a comparative advantage when dealing with the reality of such limited case diversity while still allowing for causal inferences (Schneider and Wagemann 2012; Ragin 2008). Adequately evaluating IST when all five hurdles are present at some level becomes convoluted in a non-set theoretical approach. Table 4.1 summarizes these differences between set theoretical approaches to correlation and probability approaches while

also providing useful connections between the terms used in this chapter.

Table 4.1: Key Methodological Comparisons

Correlation/Probability	QCA/Set Theoretical
Variables	Sets
Measurement	Calibration
Dependent Variables	Qualitative Outcomes
Given Populations	Constructed Population
Correlation Matrix	Truth Table
Explain Variation	Explain Outcomes
Net Effects	Equifinality
Counterfactual Estimation	Counterfactual Analysis

Table based on Ragin (2008).

As a medium-N, middle-path method between case and variable based research, QCA's advantages are, nonetheless, dependent on theory and case-specific knowledge. There is a constant dialogue between ideas and evidence throughout the QCA process—meaningful data is an end product and not a starting condition. At the same time, QCA does require a level of case simplification and assumptions about calibration (how membership scores are assigned) and counterfactuals (how to address negative or no case situations) that some might object to (Schneider and Wagemann 2012; Rihoux 2008; Ragin 2008).[4] While this concern is valid, the potential risks from simplification are reduced within QCA by requiring the researcher to loop between theoretical ideas and evidence while simultaneously examining between- and within-cases in order to derive the best solution.

Ultimately, the objective in this chapter is to demonstrate how infrastructure and reconstruction leads to political instability. Doing this does not necessitate model fitting and testing—QCA is not a theory-testing method. The focus here instead is

[4]These assumptions are actually quite similar to the ones seen in traditional variable-based approaches. Both assume a well specified model/causal inputs and both have ways to analyze the role of omitted variables—as there is no error term in QCA to soak up missing variable's influences, counterfactual assumptions must play this role in QCA (Ragin 2008).

on theory evaluation and see whether "initial theoretical hunches are supported by the empirical findings" (Schneider and Wagemann 2012, p. 304). Such an approach stresses the importance of using the knowledge learned—whether it confirms with the theory at hand or not—to refine and improve IST and understand why we see Chapter 3's result of different long-term consequences of infrastructure.[5] For this reason, I did not restate here the hypotheses mentioned in Chapter 2 (H2, H3 H4). Nonetheless, with this dissertation's triangulation approach to evaluate IST, evidence will incrementally build on top of itself so that these hypotheses can then be ultimately validated or not.[6]

Population Selection

Case selection plays a central role in comparative methods and many insights are available on how best to select cases (see: King, Keohane, and Verba. 1994; Collier, Mahoney, and Seawright 2004; Mahoney and Goertz 2004; Seawright and Gerring 2008). To aid in overall comparability of results throughout this dissertation, I employ the same set of cases used in Chapter 3. I do recognize that this is merely a sample of post-conflict cases where reconstruction was needed, which might limit generalizations of QCA results that typically rely on populations. Yet, relying on populations has similar limitations and generalization outside that population are hard to make. I argue, though, that steps can be taken to mitigate the cost of this in this QCA. To begin with, scope conditions must be clearly specified (Ragin 2008; Schneider and Wagemann 2012; Walker and Cohen 1985). Without this, inferences from QCA solutions are limited to the set if cases only—the scope conditions for this

[5]This is a similar process of Bayesian updating where learned information (or priors) is used to update and find the best fitting model.

[6]For a discussion of QCA 'best practices' that I attempt to follow in this chapter, see: Schneider and Wagemann (2010*b*).

study are discussed in below. Secondly, counterfactuals (non-observed configurations) must be fully incorporated. If counterfactuals are removed from study, they must meet a strict set of criteria. More on this will be discussed in the analysis section of this chapter, but in short, these steps allow for generalization to non-observed cases as long as they meet the same scope conditions (i.e. future cases). For a list of this study's sample, see Table 4.2 or see Table 3.1 in Chapter 3.

Table 4.2: Cases for fsQCA

Location (abbr.)	Time Covered	Location (abbr.)	Time Covered
Afghanistan (AF)	2001—2008	Iraq (IQ3)	2003—2008
Angola (AO)	2002—2008	Israel (IL)	1996—2005
Azerbaijan (AZ)	1994—2003	Liberia (LR)	1995—2004
Bangladesh (BD)	1992—2001	Myanmar (MM)	1992—2001
Bosnia and Herzegovina (BA)	1995—2004	Nepal (NP)	2006—2008
Chad (TD)	1994—2003	Peru (PE)	1999—2008
Croatia (HR)	1995—2004	Russia (RU)	1996—2005
Ethiopia (ET1)	1991—2000	Rwanda (RW)	2002—2008
Ethiopia (ET2)	2001—2008	Serbia (RS)	1999—2008
Guatemala(GT)	1995—2004	Somalia (SO)	1986—1995
India (IN1)	1997—2002	Sierra Leone (SL)	2000—2008
India (IN2)	2003—2008	Sri Lanka (LK)	2001—2008
Indonesia (ID1)	1989—1998	Tajikistan (TJ)	1996—2005
Indonesia (ID2)	2005—2008	Uganda (UG)	2007—2008
Iran (IR)	1996—2005	United Kingdom (UK)	1991—2000
Iraq (IQ1)	1991—1995	Yemen (YE)	1994—2003
Iraq (IQ2)	1996—2002		

Note: See Table 1 in Chapter 3 for more detailed information about the cases listed here Time covered is 10 years from the year conflict ended or is cut short to the year before the next conflict in that case begins or 2008, whichever comes first.

Following the description provided in Chapter 2, the scope conditions of this dissertation are post-conflict cases in the post-1989 period where there was a significant threat towards existing infrastructure and/or providing new infrastructure project.[7] As such, IST can only address intra-state (civil, rebel, an other internal) conflict during the reconstruction period. Moreover, IST may not adequately address cases

[7]The broad range of cases examined in this dissertation increases the probability that different types of conflict destruction is included in the analysis and results.

where natural disaster destroyed the infrastructure even if in a conflict prone area (i.e. 2010 Pakistan Floods). Though it might not predict such cases, IST does offer insight into how these cases can potentially best rebuild to lower future risks.

IST Conditions and Calibration

The following conditions were compiled for this QCA: political instability (outcome), cut off peripheries, reconstruction aid discrepancies, high unemployment during reconstruction, and poor infrastructure quality. At first glance, these conditions may seem dichotomous: peripheries are either cut off or they are not. Yet, such crisp set measurement where conditions are measured with either a membership (1) or non-membership (0) ignores real-world variation. Advances in fuzzy set QCA (fsQCA) allow for varying degrees of condition membership without losing set theory properties valued in traditional crisp set QCA. In fsQCA, a condition (x) is assigned a membership score (m_A) ranging from 0/no membership to 1/full membership. Linear, qualitative, and dichotomous properties remain upheld via fsQCA's .50 membership score, which is the threshold between membership and non membership (Seawright 2005*ab*; Ragin 2008).[8]

As much of the data used to base fuzzy set membership scores assignment in this analysis are continuous, it is tempting to calibrate such data based on quantitative, descriptive statistics (e.g. population mean). This approach, though, diminishes

[8]Unfortunately, QCA and boolean algebra, as it stands now, is not well suited for to examine IST's time element—boolean operators are commutative in nature and time is not commutative. Yet, steps can be taken to include time characteristics. To begin with, changes across time can be incorporated into calibration through averaging, differences, and sequencing. More formalized strategies are available to include: temporal QCA (tQCA) where all logical possible sequence of events are included in the truth table (see: Caren and Panofsky 2005, two-step QCA (see: Schneider and Wagemann 2012), and Ragin and Strand 2005), or sequence elaboration and process tracing (see: Mahoney, Kimball, and Koivu 2009). This this study employs the latter two by including temporal sequences into the calibration process and expanding temporal analysis via process tracing after the initial analysis. This allows me to contextualize the effect of X on Y by elaborating on sequences and intervening conditions (Z) between X and Y (Schneider and Wagemann 2010*b*).

one of the main strengths of QCA in that it eliminates theoretical and case-specific knowledge (Schneider and Wagemann 2010*b*). Yet, the alternative method of indirect, end-point assignment comes with a risk of biasing towards one's own theory when setting these endpoint anchors. To counter this risk, I based calibration on quantitative measures with explicit qualitative and quantitative rules on where to place three anchors—non-membership (0), midpoint (.5) and membership (1). The linear function shown in Equation 4.1 then takes these thresholds to transform base data into calibrated membership scores. The listed six qualitative anchors help further distinguish relevant variation from random noise from each other (Ragin 2008; Verkuilen 2005).[9]

$$m_A(x) : \Xi \rightarrow \{0, 1\} \qquad where: \tag{4.1}$$

- 1 denotes membership in the set
- .8 denotes mostly in the set, but not fully in
- .6 denotes more in the set than outside the set
- .4 denotes more outside the set than in the set
- .2 denotes mostly outside the set, but not fully outside
- 0 denotes no membership in the set at all

Chad, for instance, has a low national road density average (4.49 road segments per 30 square km) at first glance. This average is forced down in part due to the Borkou-Ennedi-Tibesti (BET) region in the north, which has a road density average around 1.55. Yet, the BET region is also mostly comprised of the Sahara Desert and does not have a high population. On the other hand, the southern portion of the state is quite connected to the capital with the N'Djamena region having an average road density at 9.26. Chad would be assigned a score of 0 (peripheries not cut off) in crisp set QCA. However, in fsQCA, Chad was assigned a score of .25 (mostly connected,

[9]An additional calibration approach, transformational assignment, maps data on unit intervals using continuous functions (Thiem and Dusa 2012). Theoretical, case-specific knowledge is not use here though and thus I chose not to employ this method.

but not fully connected), which better represents reality on the ground.

Theoretical foundations and descriptions of the conditions with relevant calibration thresholds are provided below. I did not separate based on infrastructure type like I did in the previous Chapter. Besides for cut-off peripheries, this would have been nearly and in some cases completely impossible to do for the other conditions. Rather than disaggregating one condition and not the others, I kept this at a system's level analysis. The post-calibrated data and its relationship to instability is plotted in Figure 4.1 and available in raw form in Appendix B. As these are membership scores, it can be argued that these are merely arbitrary, and that the following results are heavily dependent on these arbitrary data.[10] However, I take great care below in maintaining one of QCA's great strength: looping between theory, case knowledge, and data to help use the appropriate data and set anchors on which membership scores are based.

Political Instability (Outcome): Common operationalizations of political instability place heavy emphasis on conflict. To capture this "traditional stability" conceptualization, measures of political instability must include data on armed conflict, ethnic tensions, and social unrest (c.f.: Marshall and Cole (2010); Foltz (1995); Zartman (1995); Brown (2001)). Yet, political instability measures must also include data on risks to political legitimacy like regime effectiveness: bureaucratic quality, governmental trust quality of public goods, and efficiency—see below for further discussion on this. As such, the final political instability measure used here is a combination of the World Governance indicator for political stability/absence of violence[11] and

[10]Similar critiques and problems are also faced in quantitative analysis and the creation of nominal or ordinal variables.

[11]This index measures the risk that a government will be destabilized or overthrown by unconstitutional or violent means.

perceived government effectiveness[12] from five years after the end of the conflict (Kaufmann, Kraay, and Mastruzz 2010).[13] A five year time lag was included as it takes time before second order politics takes hold: policy decisions must be made, resources must be allocated, and infrastructure must be constructed. I do acknowledge that these two variables are highly correlated (a positive and significant Person's correlation test demonstrates this). Nevertheless, I argue that this collinearity is actually a result of measuring different components of the same latent variable: political instability. Where the political stability/absence of violence measure captures traditional notions of security and regime's military capability, the government effectiveness measure captures a regime's internal governing strength and legitimacy (Weaver and Rockman 1993). The absence of either of these factors will increase political instability. With a Cronbach's alpha of .806, I can be confident that a combination of these two indexes creates a measure that better represents the latent variable of political instability. Following this, an average was used to combine these measures with greater weight given to instability at 3:1. Doing this allows for the role of physical security to stand out as it has in the literature while also acknowledging the role of regime effectiveness. In other words, having membership in political instability does not mean that the central government is at imminent threat of removal (i.e. Russia). As conceptualized, having membership in political instability means that the central government s experiencing a threat so that it no longer has full control of its actors or territory and/or that it is losing its legitimacy to power. The three anchors used to calibrate this index are: .2, -.8, and -2.[14] The membership threshold does not

[12]This index captures perceptions of the quality of public service, credibility of policies, and independence of policy decisions from other pressures.

[13]These two indicators are measured on a scale from -2.5 to 2.5 (positive numbers represent stability and effective and negative number represent the lack of these).

[14]This and all anchors listed in this chapter are listed from non-membership, midpoint, membership.

continue to the lowest value possible as these extreme values are not substantially different from each other: a country with an instability score of -2.1 is just as unstable as -2.5 and a country often fluctuates between these values across the years (e.g. Iraq). Non-membership is not limited to a score of 0 for the same reasons.

Cut Off Peripheries (PERIPHERIES): When placed in set-theoretic terms, having cut off peripheries from the political center is theorized to be a reconstruction condition for political instability. Comparative developmental theories measure such separatist mobilization in terms of social, economic, and political differences between the core and peripheries (Olzak 1983; Wright 1991; Gourevitch 1979). How this separation occurs physically is essentially overlooked. I ague that one significant cause of this peripheral break down is the lack of infrastructure connecting peripheries to the political core. To operationalize cut off peripheries, I use a three step process. First, using gRoads and GIS, I created a raster dataset[15] of road density where each cell represented 10 square kilometers and a search radius was set at 30 square kilometers.[16] This raster was then spatially joined to the GADM database of Global Administrative Areas (Hijmans et al. 2011), which allowed an average road density per first administrative level to be calculated.[17] These averages were then compared to the density level of the area around the capital (political core). If a case had over a third of first administrative road density averages two standard deviations higher than the road density of the capital area, the case received an automatic 1. If a case had overall high road density (> 45), then that case got an automatic 0. Moreover, those administrative areas with an average road density one standard deviation

[15]Briefly, rasters are an array of equally sized cells arraigned in rows and columns with each cell having a value and a coordinate location.

[16]These settings were chosen so that each raster cell would represent an average 'daily life neighborhood' and the search radius would represent a large trade area. If no major roads are in one's trade area, that neighborhood would only be able to trade amongst themselves and thus be isolated.

[17]Road density was aggregated this level instead of smaller geographic units due to the substantive political and social meaning behind first level administrative districts.

smaller than the capital ares were considered as 'cut off'. A proportion of cut off administrative areas was calculated and used to assign membership scores using the thresholds: 20%, 30%, and 40%. These thresholds were intentionally set high to account for common post-conflict state characteristics: large rural areas and continued development/industrialization. Nevertheless, these memberships scores only include roads and are time invariant (geo-coded data about roads across time is not currently available). As such, I took an additional step and qualitatively adjusted these membership scores to the six anchors described above to account for infrastructure system change across time and other types of infrastructure. Maps of infrastructure from five years after the conflict ended where used in this adjustment—a five-year threshold was chosen in recognition that infrastructure takes time to build.

Reconstruction Aid Discrepancies (AID): To address whether the local population received the capability increasing benefits of reconstruction, I include both a measure of reconstruction aid and unemployment during reconstruction. Before reconstruction workers can be hired, there needs to be an acknowledgement by the political elite and international aid community of the need to pay particular attention to infrastructure in post-conflict situations. After a conflict, an influx of international aid from many multilateral and unilateral sources is common (Collier and Hoeffler 2004). Yet, each aid program usually comes with it a particular purpose and directions on how the funds are to be used. This donor-selected purpose opens the door to some areas of post-conflict stabilization and reconstruction to become overfunded at the expense of other neglected areas. If minimal aid goes to infrastructure, the central government, itself, must find the resources to rebuild. However, central governments after a conflict are often weak and preoccupied with solidifying and rebuilding its power base (Rotberg 2003). Moreover, turning to private funds is not always a possibility; private investment in developing countries for infrastructure has been steadily

decreasing since a peak around WWII (Harris 2003). With limited resources, a government might opt not to provide infrastructure or provide it without investing the additional resources to also build individual capabilities (i.e. use foreign workers in lieu of local workers). To capture this, I compiled a list of aid programs for each case during the five years after the conflict's end using data from AidData.org (Tierney et al. 2011). From here, a membership score was assigned based on the proportion of how many of these aid programs went towards infrastructure (as listed by the purpose code: reconstruction, physical infrastructure, and/or training/education on infrastructure systems). The three anchors used in this calibration were: 25%, 15%, 5%. Having only 5% of aid delegated towards physical reconstruction, I argue, does not give the recovering and/or new political regime enough resources or incentive to rebuild in a way the promote growth of individual capabilities. On the other hand, having a quarter of post-conflict international aid delegated towards infrastructure reconstruction theoretically provides the needed financial funds for rebuilding while still leaving resources for other pertinent areas of post-conflict reconstruction and stabilization.

High Unemployment During Reconstruction (UNEMPLOYMENT): Building off the preceding condition and capturing another characteristic of the local population not receiving reconstruction benefits, I include a measure of unemployment during infrastructure. In post-conflict situations, states are susceptible to economic shocks as they transition into the global economy. Federal unemployment programs offer one way for the state to combat this risk (Miguel, Satyanath, and Sergenti 2004). Post-conflict reconstruction is an opportunity for the state to provide a social net to those who lost their formal jobs during a conflict while also investing in its long-term economy. The lack of such programs should be seen in high unemployment figures during the reconstruction period. As such, data on unemployment as percent of total

workforce from at least two years after conflict were complied and used to establish membership scores of high unemployment during the time reconstruction is/should be occurring (World Bank 2012)—a two year threshold was used to capture a high-point of reconstruction projects. The three anchors used for calibration here—10%, 20%, 30%—are pertinent to the population at hand and would not make qualitative sense in countries not in a post-conflict situation whose population would expect lower unemployment numbers. In post-conflict situations, local economies are recovering and national economies are shifting from a war-time to a peace-time economy with employment numbers falling victim to this transition phase. While it is expected that unemployment in post-conflict areas be higher than those who had not experienced conflict, the local population will expect some minimal level of employment opportunities, however that is perceived locally.

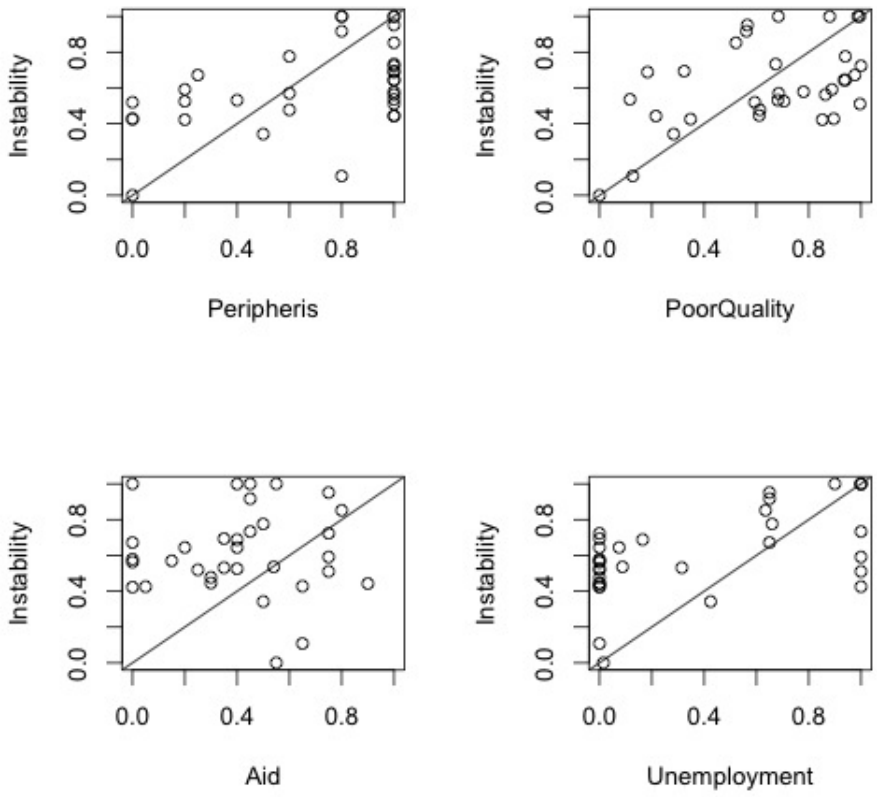
Poor Infrastructure Quality (POORQUALITY): Unsustained infrastructure systems is theorized to influence political instability. Unsustained infrastructure is defined as infrastructure that is of poor quality and failing to a point that it can no longer be used to its full potential. Nevertheless, poor quality infrastructure is often in the eye of the user and there is no universal measure of infrastructure quality. To capture such a latent concept, I constructed an index (Cronbach's alpha of 0.876) using business leader's opinions of infrastructure quality from the World Economic Forum[18] and measures of improved water and sewage systems access, energy consumption per capita, and paved roads of at least five years after the conflict ended (Schwab 2012; World Bank 2012). The latter infrastructure measures were added per the recommendation of Briceño Garmendia, Estache, and Shafik (2004) as business leaders often discount "general good" infrastructure like water system in favor for

[18]The exact survey question used here was: How would you assess general infrastructure (e.g., transport, telephony, and energy) in your country? This is measure from 1 (extremely underdeveloped) to 7 (extensive and efficient by international standards) (Schwab 2012).

business related infrastructure. The anchors used for each component are: low executive opinion (5, 3, 1), low access to improved water sources (90%, 80%, 70%), low access to improved sanitation (80%, 70%, 60%), low proportion of paved roads (70%, 55%, 40%), and low electricity use per capita (4000 kilowatt hours (kWh), 2000kWh, 100kWh). These five membership scores where averaged to achieve a calibrated membership score of poor quality infrastructure. As with the previous conditions, these thresholds must not be made in comparison to the infrastructure scores expected in developed nations. Though achieving the same level of infrastructure quality should be/often is the goal of many developing states, it would be very difficult for and disingenuous to expect a post-conflict state to achieve that level of infrastructure in a short amount of time.

Once compiled, it is tempting to run these membership scores in a statistical model. As mentioned earlier this chapter, there are inefficiencies when modeling the calibrated conditions via quantitative approaches. To begin with, IST is not a symmetrical theory: an explanation of political instability existence is not an explanation of political instability nonexistence. Not only do the endpoints matter in these calibrated condition, but there is a natural 0 that represents a phase shift (Verkuilen 2005; Ragin 2008). A simple logistic model (ordinal or otherwise) of political instability assumes symmetry to explain both 0's and 1's (Ragin 2008; Mahoney and Goertz 2012). Even if one was to use a continuous distribution (political instability is conceptualized as a continuous latent variable and fuzzy set operationalization partition this into specific categories), classical regression assumes a linear relationship between different levels of the dependent variable. Yet, fsQCA membership scores are neither ordinal nor interval variables as traditionally understood: they are purposefully calibrated types. A move from .6 to .8 political instability membership is different from .4 to .6 membership as the latter includes the threshold between having membership

Figure 4.1: fsQCA Data



and not having membership.[19] As such, the above membership scores were run through various necessary and sufficiency tests.

Due to the complexity of reconstruction induced political instability, I do not expect any of these conditions to be necessary and/or sufficient alone. In the final fsQCA solution, I do expect to see conditions that are not individually necessary nor sufficient yet necessary for a jointly sufficient configuration (INUS). INUS conditions come as a result of the interplay of individual conditions that exist in the same physical space. Grouped INUS conditions connected by logical AND or logical OR

[19]In addition to these assumption problems, there is also a degree of freedom problem due to the limited diversity of cases.

(configurations) will provide the beginnings of a causal story between reconstruction efforts and political instability. Just as I don't expect one condition to be sufficient for political instability due to the concept's complexity, I do not expect there to be one jointly sufficient configuration to explain cases of political instability.

Necessity Results

While no unilateral configuration was found to be necessary as expected, two disjunctive configurations were found to be necessary with the inclusion cut off set at .965 and coverage cut off set at .600 so to remove any potentially irrelevant configurations)—see Table 4.3 for these necessity results.[20] The meaning behind these disjunctive necessary configurations (X1 condition OR X2 condition is necessary for political instability) is not straightforward. As the "or" here is inclusive (A or B or both), these two necessary results are not mutually exclusive (Schneider and Wagemann 2010*a*).[21]

Table 4.3: Necessity Results

	incl	PRI	cov.r
1 PERIPHERIES+POORQUALITY	0.980	0.976	0.709
2 UNEMPLOYMENT+aid+PERIPHERIES	0.985	0.982	0.687

Note: CAPS represents membership while lowercase represents non-membership.
+: logical OR incl: inclusion; PRI: proportional reduction in inconsistency; cov.r: raw coverage.

[20]To help in reading this table, coverage signals strength and importance while high inclusion scores describes the amount of outcome explained and signals whether the configuration needs further investigation. Where I use inclusion, the term consistency is often often used in the literature. The two terms are interchangeable.

[21]I would additionally argue both are possible, and thus this is not a exclusive OR. The reason for this is that it is possible to have peripheries, poor quality infrastructure, high unemployment, and no aid discrepancies. Foreign workers can be doing most of the work and those planning infrastructure are focused on project numbers and first order politics.

Necessity and sufficiency tests are prone to paradoxical results (i.e. a condition that is necessary for both the outcome and negated outcome), which must be tested for. The proportional reduction of inconsistency (PRI) provides a quick check for such contradictions and the high PRIs seen in Table 4.3 implies a large difference between the inclusion of that configuration in the outcome and negated outcome (Thiem and Dusa 2012). This result is further confirmed when testing the negated configurations to the outcome, which resulted with low inclusion scores ($< .170$) and moderately low coverage scores ($< .737$). These results imply that the negated configurations do not also have membership in political instability. Nevertheless, a test on the negation of the outcome does counter this with a moderately high inclusion score ($>.884$) and quite low converge scores ($< .401$)—meaning there are a few cases with configuration membership but no political instability as predicted. In short, I can be relatively confidents in the validity of these results. The final questionable test result opens the door to continued analysis into why these cases do not have political instability and uncovering a missing reconstruction condition.

Independently, having cut off peripheries did not meet the requirements to be a necessary condition. Yet, when additional conditions were included, the new configuration of conditions does meet the requirements to be necessary for political instability as it now explains more cases. In other words, cases with political instability are also likely to have cut off peripheries. This suggests that there is a characteristic of cut off peripheries that enables politically instability to occur. Yet, this is not the only explanation of political instability. With an instability membership of .52, Peru does not have membership in periphery (0.2), but still has membership in both of the necessary configurations (0.71 and 0.60 respectively), as it does have poor quality infrastructure and high unemployment. In short, there are other reconstruction conditions that

leads to political instability other than cut off peripheries.[22]

Truth Table and Sufficiency Solutions

In contrast to necessity tests, sufficiency tests attempt to find if there is evidence for the statement: X condition is sufficient to explain Y outcome or X having condition(s) yields to political instability but there are other conditions that also lead to political instability (Thiem and Dusa 2012; Mahoney and Goertz 2012; Ragin 2008). Such tests require the construction of a boolean truth table with the above calibrated conditions. A boolean truth table includes all logically possible configurations of conditions with each case only having has membership (>.5) in one row—though cases often have partial membership in multiple rows. When a configuration has no observed cases, it is considered a logical remainder.[23] The resulting truth table is shown in Table 4.4.[24]

[22]The high PRIs seen in Table 4.3 implies a large difference between the inclusion of that configuration in both the outcome and negated outcome. Nevertheless, a test on the negation of the outcome does counters this with a moderately high inclusion score (>.884) and quite low converge scores (< .401)—meaning there are a few cases with configuration membership but no political instability as predicted. In short, I can be relatively confident in the validity of these results, but the final questionable test result suggests that continued analysis is needed into why these cases do not have political instability.

[23]This one case threshold is a common in fsQCAs with small to medium sized populations as the one here (Ragin 2008).

[24]Note that even though this truth table merely shows membership/non-membership, related fuzzy data is hidden behind the 1's and 0's in this truth table.

Table 4.4: Full Truth Table for Political Instability

	UNEMPLOYMENT	AID	POORQUALITY	PERIPHERIES	OUT	n	incl	PRI	cases
12	1	0	1	1	1	5	1.000	1.000	AF, IQ 2, IQ 3, LR, NP
11	1	0	1	0	1	1	1.000	1.000	TD
8	0	1	1	1	1	1	0.991	0.969	MM
14	1	1	0	1	?	0	0.973	0.939	
10	1	0	0	1	?	0	0.972	0.931	
16	1	1	1	1	1	4	0.958	0.929	AO, IQ 1, SO, TJ
2	0	0	0	1	1	2	0.932	0.758	RU, LK
15	1	1	1	0	1	1	0.928	0.810	RW
7	0	1	1	0	1	1	0.921	0.491	SL
13	1	1	0	0	?	0	0.917	0.556	
4	0	0	1	1	C	7	0.883	0.632	ET 1, GT, IN 1, ID 1, ID 2, UG, YE
3	0	0	1	0	C	4	0.881	0.453	AZ, BS, IN 2, PE
9	1	0	0	0	0	1	0.839	0.499	BA
6	0	1	0	1	0	3	0.818	0.487	HE, IR, IL
1	0	0	0	0	?	0	0.800	0.237	
5	0	1	0	0	0	1	0.727	0.127	UK

Note: ?- Remainders; C- Contradiction

OUT: outcome value; n: number of cases; incl: inclusion; PRI: proportional reduction inconsistency; cov.r: raw coverage.
inconsistency; cov.r: raw coverage.

Minimum inclusion for outcome membership was set at .9 while maximum inclusion for outcome nonmembership was set to .85. Those configurations that fall between these scores are marked as C.

This was done as to mark borderline configurations that are mostly nonmembership but meets Ragin (2008) recommended inclusion setting of .85 for membership. This was done as I wanted to make sure include all relevant configurations while excluding irrelevant ones.

Before boolean algebra can be used to minimize this truth table into causal configurations, the amount of remainders (marked as ? in Table 4.4) needs to be noted. Even though there are no observed cases for these logically possible configurations, remainders provide good opportunities for counterfactual thinking as there might be a reason no cases were observed in a configuration—the remainder might not be even realistically possible (Schneider and Wagemann 2012; Thiem and Dusa 2012).[25] Different treatments of these remainders can potentially lead to different solutions and interpretation. Thus, three different solutions need to be presented and discussed: the complex solution (no assumptions on remainders and none are included), parsimonious solutions (simplifying assumption used and most remainders used), and intermediate solution (directional assumptions made based on easy counterfactuals) (Schneider and Wagemann 2010*b*). See Table 4.5 for these three solutions.

FsQCA solutions are often mapped onto a single dimension measuring their simplicity. At one end of the spectrum is the complex solution where no remainders are included. As can be seen in Table 4.5, no single condition is of itself sufficient for political instability in the complex solution. Instead, there are three configurations that are sufficient as a whole for political instability with each theorized condition appearing as an INUS condition for political instability. Yet, this solution is just like its name suggests: complex. This complexity is similar to the overfit statistical model where explaining all variance takes precedence over theoretical clarity.

By addressing remainders and counterfactuals, a more parsimonious solution on the other end of the simplicity spectrum can be found (Schneider and Wagemann 2010*b*). Parsimonious solutions use a simplifying assumption (a remainder) to find

[25]Broadly, remainders come as a result of limited diversity of cases. Specifically, the causes of limited diversity range from arithmetic remainders (logical configurations expand exponentially as conditions are added and can surpass the amount of cases available), clustered remainders (social, political, cultural groups that rule out certain configurations), or impossible remainders (configurations that are not possible in the world as is today) (Schneider and Wagemann 2010*b*).

Table 4.5: Fuzzy Set QCA Solutions

Complex Solution

S1: AID*POORQUALITY + UNEMPLOYMENT*POORQUALITY + unemployment*aid*poorquality*PERIPHERIES

		incl	PRI	cov.r	cov.u
1	AID*POORQUALITY	0.936	0.852	0.481	0.109
		Cases: MM; AO, IQ 1, SO, TJ; RW; SL			
2	UNEMPLOYMENT*POORQUALITY	0.924	0.889	0.470	0.171
		Cases: AF, IQ 2, IQ 3, LR, NP; TD; AO, IQ 1, SO, TJ; RW			
3	unemployment*aid*poorquality*PERIPHERIES	0.932	0.758	0.270	0.098
		Cases: RU, LK			
	S1	0.915	0.838	0.756	

Intermediate Solution

S1: AID*POORQUALITY + UNEMPLOYMENT*POORQUALITY + aid*poorquality*PERIPHERIES

		incl	PRI	cov.r	cov.u
1	AID*POORQUALITY	0.936	0.852	0.481	0.109
		Cases: MM; AO, IQ 1, SO, TJ; RW; SL			
2	UNEMPLOYMENT*POORQUALITY	0.924	0.889	0.470	0.160
		Cases: AF, IQ 2, IQ 3, LR, NP; TD; AO, IQ 1, SO, TJ; RW			
3	aid*poorquality*PERIPHERIES	0.941	0.814	0.313	0.098
		Cases: RU, LK			
	S1	0.915	0.838	0.756	

Parsimonious Solution

S1: AID*POORQUALITY + UNEMPLOYMENT*POORQUALITY + (aid*poorquality*PERIPHERIES)
S2: AID*POORQUALITY + UNEMPLOYMENT*POORQUALITY + (unemployment*aid*poorquality)

		incl	PRI	cov.r	cov.u	(S1a)	(S1b)
1	AID*POORQUALITY	0.936	0.852	0.481	0.087	0.109	0.087
		Cases: MM; AO, IQ 1,SO, TJ; RW; SL					
2	UNEMPLOYMENT*POORQUALITY	0.924	0.889	0.470	0.160	0.160	0.17
		Cases: AF, IQ 2, IQ 3, LR, NP; TD; AO, IQ 1, SO, TJ; RW					
3	aid*poorquality*PERIPHERIES	0.941	0.814	0.313	0.000	0.098	
		Cases: RU, LK					
4	unemployment*aid*poorquality	0.877	0.596	0.300	0.008		0.106
		Cases: RU, LK					
	S1	0.915	0.838	0.756			
	S2	0.892	0.797	0.763			

Note: Cases in same configuration are separated by a comma, those from different configurations by a semicolon.
Conditions in CAPS represents membership and non-caps represents non-membership.
+: logical or; *: logical and
incl: inclusion; PRI: proportional reduction in inconsistency; cov.r: raw coverage; cov.u: unique coverage[26]
Parameters-of-fit table displayed below dotted line
Number of multiple-covered cases in all three solutions: 5

the least complex minimal sum. Two similar minimal sums appear as a part of the parsimonious solution. The last/unique configuration in each solution uniquely explains just two cases (Russia and Sri Lanka). Just as complex solutions tend to be too complex, parsimonious solutions risk being too simplistic, which can lead to paradoxical solutions. In testing for this, negating the configurations resulted in configurations with relatively low inclusion scores ($< .731$). While negating the outcome did result in the first two configurations of both solutions also having low inclusion scores ($< .585$), the last configuration in each had a moderately low to high inclusion ($> .741$ and .819 respectively). Thus, the last configuration in each of the parsimonious solutions also has partial membership in 'no political instability' (S2 more than S1). This calls into question the validity of the two minimal sums together in the parsimonious solution.

Balancing between these two solutions, an intermediate solutions minimizes truth tables based on theory—or Theory-Guided Enhanced Standard Analysis (TESA)—to set directional expectations while also addressing remainders (Schneider and Wagemann 2012). Key to this process is a simplifying assumption that follows both the empirical evidence and theoretical expectations. In the intermediate solution, several difficult counterfactuals—remainders not used as a simplifying assumption—must be addressed. Configuration 13 (UNEMPLOYMENT * AID * poorquality * peripheries), I argue, is an untenable assumption. Misallocation of infrastructure resources, as seen in poor quality infrastructure and cut off peripheries, theoretically comes as a result of a lack of and/or selective financial investment. If a case had a large discrepancy in infrastructure aid while also missing these other conditions, the political elite must then have its own resources to rebuild and/or break past corruptive practices and avoid the misallocation of infrastructure resources—this has not been the case in post-conflict states. Thus, this configuration is part of a clustered remainder

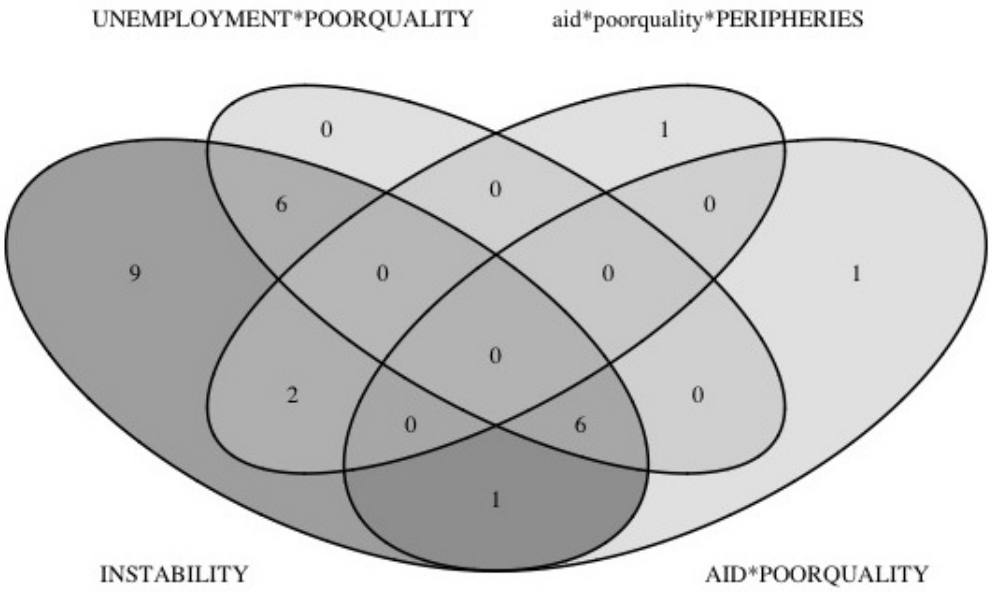
and was removed from the equation (Schneider and Wagemann 2012)—this solution is shown in Table 4.5. By removing only this unattainable remainder while keeping other theoretically and logically attainable remainders, generalizations are allowed beyond the population(i.e. future cases of reconstruction) into cases that still meet the previously discussed scope conditions. In fact, a logical remainder has the potential to come an observed case, which will change the inclusion and coverage scores accordingly without changing the underlining causal story seen in the results.

In testing this intermediate solution, negating the configurations and negating the outcome resulted in solutions with moderately low inclusion scores (<.708 and <.741 respectively). Moreover, a similar pattern seen with the parsimonious solution was seen, where the two configurations seen in all three solution (UNEMPLOYMENT*POORQUALITY; AID*POORQUALITY) have better (e.g. lower inclusion) scores in these tests as compared to the last one (aid*poorquality*PERIPHERIES). The reason that this intermediate solution has only one minimal solution compared to the parsimonious solution's two minimal solutions, is due to TESA assumptions. In short, there are no solutions between the complex and parsimonious solutions when no directional assumptions are made. It is only when theory guides the minimization process that a single minimal sum takes precedence over another—the parsimonious solution with the lowest inclusion score and most questionable test results was removed from the intermediate solution.

There is no agreement in the literature on which of the solutions types should be deemed 'correct' and further explained. With the lack of TESA procedures in ether the complex or parsimonious solutions and questionable result of the parsimonious solution, the intermediate solution best fits with the goal of this chapter: theory evaluation. Though I will discuss each of the intermediate solution's configuration below separately, fsQCA solutions are found based on the interplay between conditions and

configurations that lead to an outcome (Schneider and Wagemann 2010*b*). As seen in Figure 4.2, no one configuration explains all instances of political instability in the population and six cases have membership in more than one configuration. This leads to the low unique coverage scores (the percent of coverage separate from other configurations) seen in Table 4.5. When a causal configuration has a higher unique coverage score (assuming high consistency scores too), it is a better explainer of post-conflict political instability (Ragin 2008, pp. 66-68). I acknowledge that none of these unique coverage scores are relatively high with one configuration explaining at max 16% to 10% of the population. Yet, neither can these be ignored as together, they explain 76% of the cases.

Figure 4.2: Intermediate Solution



Note: Outcome condition is shown in darker gray.

*Configuration 1: UNEMPLOYMENT*POORQUALITY*

Configuration 1 explains the effects of the local population not receiving the full, long-term potential benefits of reconstruction and of a sustained socio-technical sys-

tem. But, this is not how I expected it would appear—I argued that high unemployment and aid discrepancies, together, captures the lack of local level reconstruction benefits. Nevertheless, when the two reconstruction conditions interact in configuration 1, there are increased feelings of being deprived something that people or groups feel they are entitled to—relative deprivation (Walker and Smith 2002; Bayertz 1999; Olson, Herman, and Zanna 1986). This feeling of relative deprivation may lead individuals to be recruited into social movements and political violence against the political regime as they fight for what they view as rightfully theirs (Gurr 1970). Though being deprived of reconstruction and infrastructure benefits does not automatically lead one (group or individual) to mobilize against the state, there were no observed cases that had membership in this configuration but did not have membership political instability predicted by IST.

While this configuration uniquely describes six cases (Afghanistan, Chad, Iraq 2, Iraq 3, Liberia, and Nepal), Chad after the Libyan-Chad Conflict offers an illustrative example of the aforementioned relative deprivation. Ethnic-based infighting within Chad's Hisséne Habré government led to Idriss Déby, a general at the time, to defect to Darfur and lead a series of attacks against Habré—the former supported by Zaghawas and the latter by Goranes. With Libyan assistance, Déby's forces overturned Habré's government and Déby became President of Chad. The following years were filled with coup attempts, a failed peace agreement, and continued violence that resulted in a high number of civilian casualties and large scale infrastructure destruction (Amnesty International 2001). The violence and destruction only continued after Chad's first multi-party presidential election and in Déby's re-election, which scared foreign investors away from investing resources into Chad. Without private investment, Chad was left with few options on how to reconstruct their country.

Nevertheless, the number of paved roads did increase from the pre-war period (19

miles in 1987) to post war period (163 miles in 1997). Yet, the proportion of paved roads remained quite low even compared to other developing nations (World Bank 1997*a*). Moreover, Chad's economy, which at this time was largely based on cotton, was dependent on Cameroon's rail system for both exporting and importing goods (Chowdhury and Erdenebileg 2006). The prospect of improving its infrastructure networks and becoming independent from other country's infrastructure was hindered by the push to privatize agricultural sectors even as rebel attacks remained a constant threat preventing private investment into the country. In 2003, a Wold Bank (WB) funded pipeline was completed and oil production began. A portion of the oil revenue was to go to development project, but the WB suspended the program when the Chadian government reduced the amount to go to public programs (Maier 2008).

Moreover, during this post-conflict period (1995 to 1999), Déby turned to the International Monetary Fund (IMF) and WB help under the IMF's Enhanced Structural Adjustment Facility. The resulting economic and financial reforms were successful during this time with an average GDP growth of 5%. Even as the national economic situation was slowly improving, little improvement was felt at the local level as seen in high unemployment rates during ESAF programs. With growth and progress being made at a crawling pace, the local population was deprived of the full potential reconstruction benefits because of decisions made by the political elite and international aid community—the very people and organizations who promised to help.

*Configuration 2: AID*POORQUALITY*

Only one case is uniquely explained by configuration 2 (Myanmar) while the six other cases who have membership in configuration 2 are also explained by Configura-

tion 1.[27] Rather than telling a relative deprivation story though, this configuration tells an absolute deprivation/neglect story. In response to widespread pro-democracy protests, Myanmar's military staged a successful coup d'état in 1988 and formed the State Law and Order Restoration Council (SLORC), which ruled the country until 2011. After Than Shwe became the Senior General of the SLORC in April 2002, the SLORC was accused of countless of human rights abuses and Myanmar's population remained in extreme poverty with little prospect for improvement. During the post-conflict period, sanctions against Myanmar by the international community severely limited international aid in general and prevented any aid for infrastructure projects specifically. These sanctions also hindered the already reduced capability of the SLORC to provide and maintain high quality infrastructure. In short, Myanmar's infrastructure was ignored for years on end and any potential economic, social, or political benefits of infrastructure in preventing political instability were not accessible.

Unlike the previous 100% political instability rate seen in the first configuration, configuration 2 does include a case of political instability non-membership while having membership in the configuration: Sierra Leone. In Sierra Leone, the infamously corrupt Joseph Momoh government allowed bureaucratic and physical infrastructure to deteriorate under his reign. Moreover, the Revolutionary United Front (RUF) used this deterioration to recruit in their struggle to overturn the political regime. After years of violence, intervention by both the British and United Nations (UN) finally brought an end to the conflict in 2002 (Gberie 2005). International presence continued in Sierra Leone as United Nations Mission in Sierra Leone's (UNMISL) mandate was extended into 2005 and the UN continued to have some degree of representation in the country as of this research. (Mustapha and Bangura 2010). These international actors focused their attention on conflict management and stabilization—though there

[27]The overlap of the cases are: Angola, Ethiopia 2, Iraq 1, Rwanda, Somalia, and Tajikistan.

was bureaucratic fighting between the UN and IMF concerning projects and related goals. During this period, infrastructure in Sierra Leone was systematically ignored in the post-war period in lieu of other post-conflict decisions. Moreover, the IMF made infrastructure rebuilding difficult due to privatization clauses in their aid commitments. In spite of this, political instability was reduced in part due to continued international focus on fostering peace in the area. Though feelings of absolute neglect and resentment of not receiving reconstruction benefits remained present after the conflict, acting upon these feelings was constrained.

*Configuration 3: aid*poorquality*PERIPHERIES*

Even without the aforementioned infrastructure deprivation or neglect, political instability can still exist as shown in the third configuration. Here, political instability is explained by the existence of cut off peripheries when there is also no perceived poor quality infrastructure and no aid discrepancies toward infrastructure/reconstruction. This uniquely explains the least amount of cases: Russia and Sri Lanka. Though these two cases are on different geographic scales with Russia being approximately 260 times larger than Sri Lanka, both are cases of ethnic separatists fighting against the political core for control of their own independent county. Moreover, both ethnic groups are listed as being at risk by the Minorities at Risk Project due to among other factors, geographic concentration (Gurr 2009). In short, the story being told with configuration 3 parallels the peripheral nationalism and broken identity theories previously described. These cases did not need the additional reconstruction based grievances to motivate opposition forces as peripheral nationalism grew unchecked. Furthermore, a relatively good infrastructure system meant that rebel groups were better able to conduct their attacks against the political elite. This might also help explain the low unique coverage score of less than 10%. Separatism is rare, violent

campaigns rarer (Siroky and Cuffe 2014).

The Liberation Tigers of Tamil Eelam (LTTE) in Sri Lanka started fighting for an an independent state (Tamil Eelam) in 1983 while the Chechen Republic of Ichkeria has been fending off Russian forces since declaring themselves independent in 1991. These areas were cut off from the political core in regards infrastructure; the opposition was able to grow their resistance and/or retreat when blocked as the political elite could not easily exert their power or control in theres areas. Nevertheless, both conflicts eventually resulted in the political regime quelling the separatist movement and signing a peace accord/treaty to end the conflict (Stiles 2005; Dunlop 1998; Kapferer 2011). Yet, there was little improvement in connecting these peripheries to the political core and absorbing them into the national identity and economy. Thus, the grievance of losing their autonomy previously and their failure for future autonomy could not be diminished (Cuffe 2012). While there was a brief interlude, conflict reignited in both Chechnya and Sri Lanka not long after.

Yet, not all cases with membership in configuration 3 also have membership in political instability as predicted by IST: Serbia. Similar to the other two cases in this configuration, the Kosovo War was ethnically based with the Kosovo Liberation Army fighting for an independent Kosovo. Unlike the other two cases, Serbia is a case of eventual secession success (even though Serbia does not officially recognize Kosovo at the time of writing). I do not argue that secession of peripheries is key to prevent political instability; secession does not automatically remove all grievances against the political regime. Serbia (then Yugoslavia) differs from the previous two cases in that the international community (specifically NATO) acted as a wall between the Kosovo periphery and Yugoslavian political regime. While Kosovo was under international protection, Milošević fell, Serbia and Montenegro parted ways, and Serbia was able to stabilize its regime (Stiles 2005; Judah 2002).

Conclusion

Political instability, as described in Chapter 2, is process that takes time to occur. Reconstruction-induced political instability is no different and is the result of many past decisions and conditions. The fsQCA presented here allowed me to evaluate IST, give support for its causal mechanism hypotheses, provide a better understanding of just how infrastructure and reconstruction conditions lead to political instability throughout a country. This Chapter has shown how infrastructure and reconstruction decisions can play into feelings of deprivation regarding reliable access to both infrastructure and its benefits. Additionally, these results compliment and provide more context to Chapter 3's results regarding the influence of cut off peripheries on political instability. Appearing as a weak necessary condition and an INUS condition of a weak significant configuration, evidence seems to be pointing to the role of cut off peripheries as an enabler or even the cause of political instability. By pinpointing these connections, it becomes possible to see exactly how reconstruction can be an extension of political instability. These conditions are not inescapable. As such, policymakers and the political elite have the ability to shape potential outcomes and reduce the risk of future failure.

Some have questioned QCA's utility for policymakers.[28] QCA results do not explain change in the margins or magnitude of effect—i.e. how much will political instability change based on X change in investment to connect the purifies? However, that is not what I tried to do here. This fsQCA was concerned with finding common policy outcomes that are associated with political instability. Evaluating whether my theory actually matched what has occurred and with the data. Though providing invaluable insight, fsQCA does not provide all the answers to understanding the how

[28]For more on this current debate, see Lucas and Szatrowski (2014) and Collier (2014).

component of IST evaluation. With the solution seen in Figure 4.5 describing differences and similarities between cases, further in-depth analysis may also uncover additional conditions that help describe cases of political instability not fully explained by these configurations: Azerbaijan, Ethiopia (1991-2000), India (1997-2008), Indonesia (1989-1998), Israel, Peru, Uganda, and Yemen. As will be discussed in the Chapter 5, the results of this fsQCA and Chapter's 3 geo-spatial longitudinal study will act as the bases from which Chapter 5's case study and process tracing was chosen (Schneider and Wagemann 2010*b*). An in-depth analysis of a case studies allows for better insight into both how the above conditions and configurations influence political instability by untangling differences and similarities across time.

Chapter 5

THE NARRATIVE BEHIND A RECONSTRUCTION CASE

In the previous chapters, I have shown the existence of varying long-term consequences of infrastructure and reconstruction to political instability (Chapter 3) and elaborated on the how political instability is being shaped based on where and how infrastructure is provided vis-á-vis excluded populations (Chapter 4). Missing from these results, though, is an understanding of *why* these infrastructure and reconstruction conditions and configurations ultimately influence political instability risks. Throughout this dissertation, I have argued against taking a deterministic stance in regards to infrastructure and the results support this. At the some time though, the hypothesized infrastructure and reconstruction causal mechanisms described in Chapter 4 do not automatically lead to political instability. To prevent system collapse and reconstruction failure, it is of vital importance to understand why political instability can occur when these conditions are present. This allows for more precise and context-driven political strategies and policies so that reconstruction efforts be reorganized to do better.

This chapter examines the impact of infrastructure on conflict patterns by way of a case study with process tracing and historical explanation (Bennett 2008; Mahoney and Rueschemeyer 2003; George and Bennett 2005; Sagen 1993; Zelikow and Allison 1999). Such an analysis provides key insight into the mechanisms behind the varying consequences of infrastructure and reconstruction.[1] Additionally, case studies offer

[1]Where the benefits of combining quantitative analyses with case studies are well studied, the same cannot be said with QCA and case studies. Schneider and Rohlfing (2013) offers initial insight and information on how QCA and process tracing can be used side-by-side to best evaluate theory. I argue that a triangulation approaches that includes process tracing, QCA, and a quantitative analysis is the best opportunity to capture the many benefits a mixed methods approach offers.

useful insight for policymakers by adding context and "real" factors to help guide future policy decisions (Davis et al. 2009). This chapter contains an in-depth case study on Ethiopia—see Appendix C for a discussion on how this case was chosen based on previous results. Though this is just one case, Ethiopia represents both a deviant case for my theory (IST would have predicted more political instability than what actually occurred) and a typical case (both the predicted reconstruction conditions and political instability outcome). This allowed me the unique opportunity to provide a narrative across time and policy changes in a most-similar situation.

The process tracing into Ethiopia combines qualitative narrative with descriptive maps. In creating exploratory maps, the goal achieved was to visually and analytically depict conflict and infrastructure in each case and see in greater detail if their geographical and temporal relationship described in Chapter 3 can be seen (Paul et al. 2005). The detailed case study provides a narrative on infrastructure planning and provision, infrastructure use, societal impacts, and resulting effects on political instability. Additionally, this narrative dives deeper into the conditions and configurations described in Chapter 4 to better grasp reconstruction's consequences. Based on the previous hypotheses and results, I expect the resulting case study to demonstrate: that conflict surrounding infrastructure morphs as time passes after infrastructure provision, how conflict moves into disconnected peripheries, and how reconstruction feeds into existing or creates new grievances and deprivation feelings. Nonetheless, I must contend here with the fact that one cannot observe the effect of a treatment in such historical cases; it is impossible to observe the same case in history with different reconstruction inputs (i.e. what would have happened if a road was or was not built where or how it was).[2] Though limiting the ability to analytically test IST hypothe-

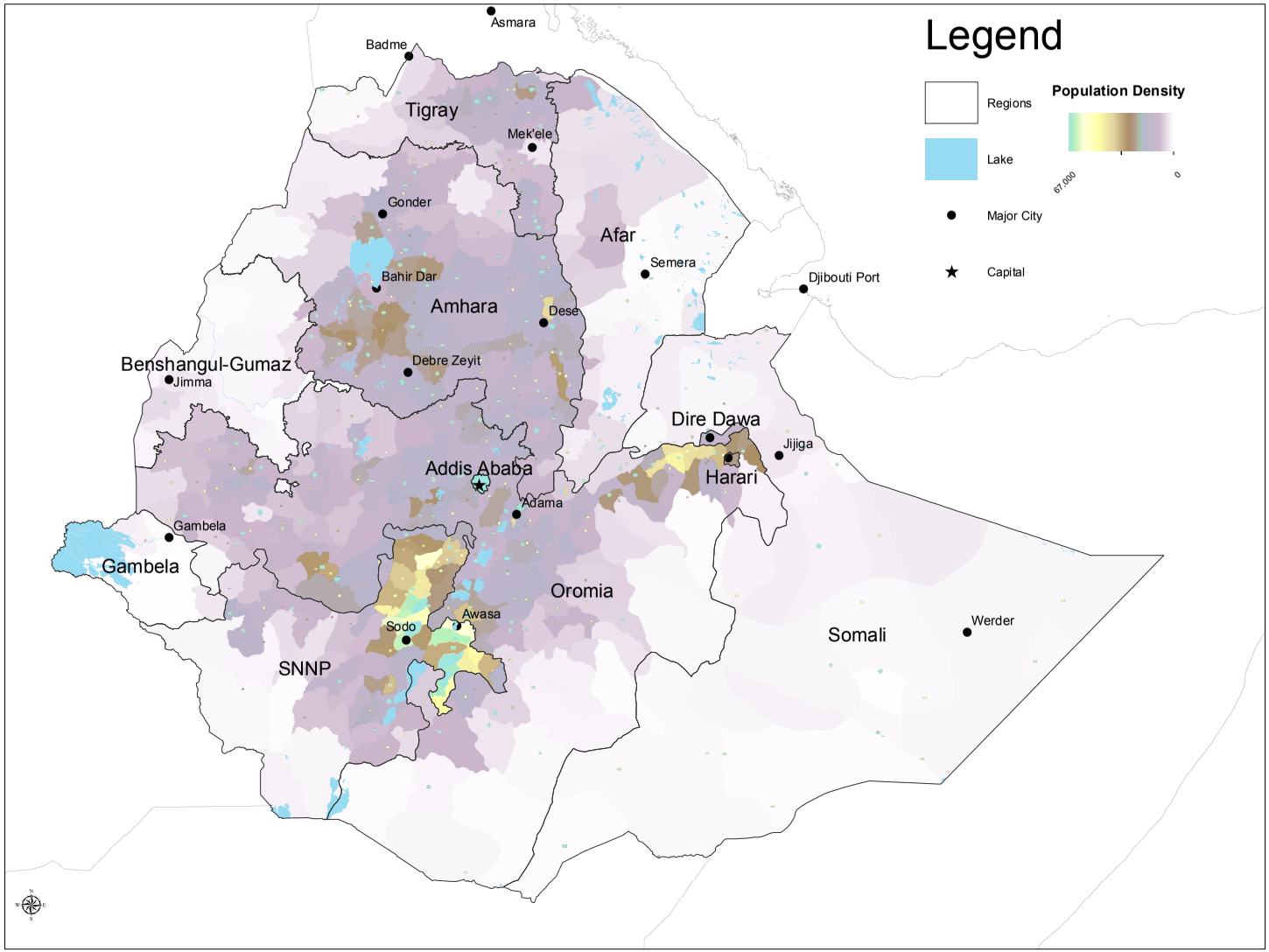
[2]Forming this narrative, I use Bennett and Checkel (2014) and Sagen (1993) as guides. Bennett and Checkel provide a template of best practices for making inferences from process tracing (Brady 2008; Mahoney 2012).

ses, this does not reduce the potential gains in knowledge and theory evaluation for future reconstruction policy recommendations.

Overview of Ethiopian Infrastructure

Ethiopia, located in the horn of Africa, is one Africa'a largest countries in regards to both geographic size and population—see Figure 5.1 for a general map of Ethiopia's regions, population density (CIESIN - Center for International Earth Science Information Network , Columbia University et al. 2011), and major cities. Ethiopia is also overwhelmingly a rural country with low rural accessibility. Moreover, Ethiopia's infrastructure is isolated from neighboring countries and coastal access when excluding a functioning road artery and inactive rail line connecting the capital, Addis Ababa, to the Port of Djibouti. This scattered rural settlement and lack of coastal access promoted uneven infrastructure provision with high costs and inefficiencies—both of which are major threats to economic and industry growth (Bloom et al. 1998; Tybout 2000; Gallup, Sachs, and Millinger 1999). Before delving into Ethiopia's reconstruction periods themselves, the rest of this section provides a brief early history and general status of Ethiopia's infrastructure. Ultimately, Ethiopian aggregated infrastructure indicators remain on par with other similarly wealthy African countries (Foster and Morella 2011); regional infrastructure indicators vary drastically.

Figure 5.1: Ethiopian Regions, Cities, and Population Density



Note: Population data comes from the Global Rural-Urban Mapping Project, Version 1 (GRUMPv1): Population Density Grid

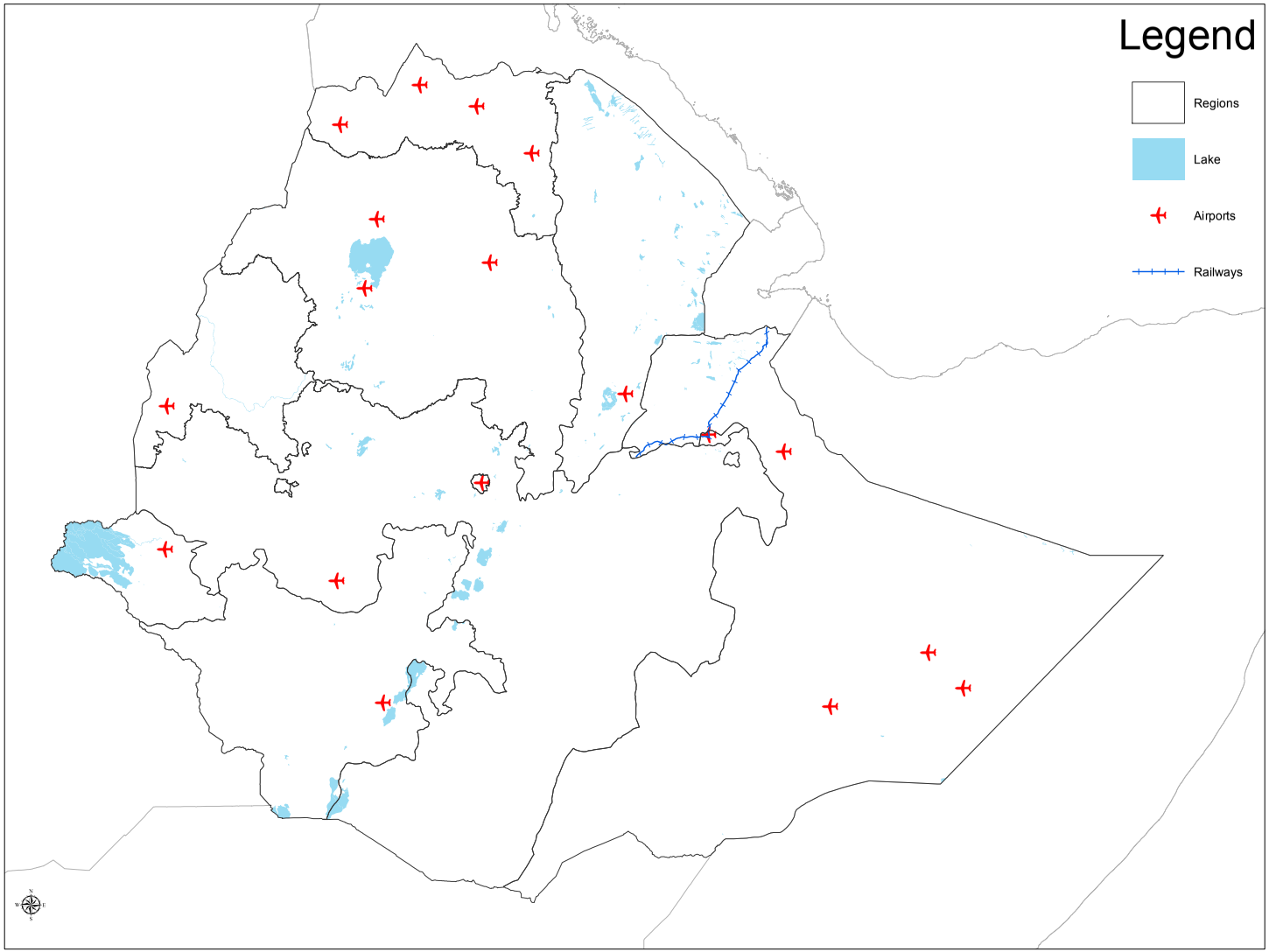
The railway network in Ethiopia is a relic of the early 1890s when the French founded the Imperial Railway Company of Ethiopia to build and operate a railway through Ethiopia to the Port of Djibouti—this attempt failed in 1906 with the line only extending from the Djibouti Port to Harar. The line was eventually extended to Addis Ababa in 1917 after the Franco-Ethiopian Railway revived the project. Control of the line exchanged hands many times with the seizure of the line by Italy during the Second Italo-Abyssinian War, restoration Ethiopia control following WWII, and the independence of Djibouti from France that passed the responsibility of the railway to the Ethiopia-Djibouti Railways company in 1982. Nonetheless, the railway was allowed to deteriorate during the early 20th and 21st centuries in Ethiopia that disconnect the Addis portion of the rail line and passenger services remained nonexistent during most of period of interest (Marcus 2002). See Figure 5.2 for a map of the operative portion of this rail line.[3]

Ethiopia's aviation and aeronautical infrastructure history revolves around Ethiopian Airlines, which was established in 1945 under the name Ethiopia Air Lines. It became Ethiopian Airlines in 1965 after shifting from a corporation to share company (Ethiopian Airlines 2014). Though the company is fully owned by the Ethiopian government, the airline has operated with minimal government intervention and under its own management and business structure (Hiltzik 2014). As will be discussed below, Ethiopian Airlines has gained a high level of international success compared to other African carriers, which has also led to a relatively good airport infrastructure network. Yet, this was not always the case—see Figure 5.2 for a map of the aeronautical infrastructure as seen in 2008. In 1990, there were only about 20,600 domestic and international takeoffs of air carriers registered in the country (World Bank 2012).[4]

[3]Note that this map does not include where areas of the line are inoperative.

[4]For comparison, South Africa had 84,000 domestic and international takeoffs during the same year (World Bank 2012).

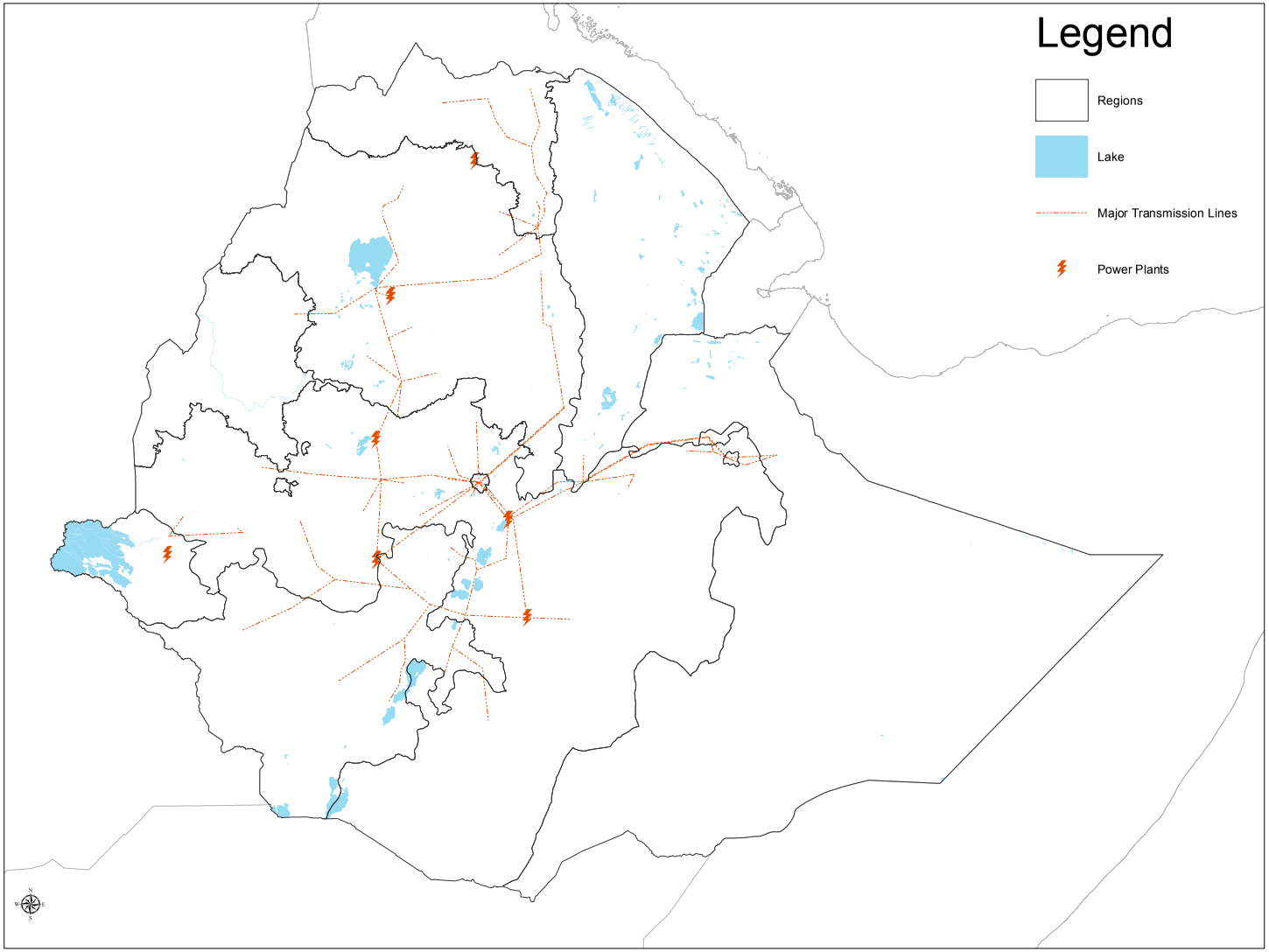
Figure 5.2: Aeronautical and Rail Infrastructure



Note: Infrastructure listed are as of 2008.

Electric power was introduced in Ethiopia under the Minilik regime in 1909 when the first generator was used to light his palace. It was also under Minilik that the first hydropower plant was constructed on the Akaki River in 1923, which supplied power to small factories and public places around the palace in addition to the palace itself. During the Italian occupation, Coneil, an Italian company, took control of Ethiopia power generation and focused its attention on Addis Ababa while letting power supply to towns around Ethiopia deteriorate. After the Italians left in 1941, the Enemy Property Administration was established and took control of power generation and distribution—the company later became Shewa Electric Power in 1948. Even being hindered by limited capacity, Shewa did manage to increase power supply and the company became the Ethiopian Electric Light and Power Authority in 1955 with its the board of directors appointed by the government (Ethiopian Electric Power Corporation 2013). Even with this long history, Ethiopia's power system is one of Africa's most underdeveloped with an installed generation capacity of less than 20 megawatts (MW) per million of population in 2011. Moreover, power consumption remains low at 33.6 kilowatt-hours (KWh) per person annually (power consumption on average across low-income countries is 99.5KWh) and access to electricity is at 12% of the population. Moreover, the access that does exist is not evenly distributed—Ethiopia's urban access to electricity is at 86% while rural access remains extremely low at 2% (Foster and Morella 2011). See Figure 5.3 for a map of Ethiopia's power infrastructure in 2008.

Figure 5.3: Power Infrastructure

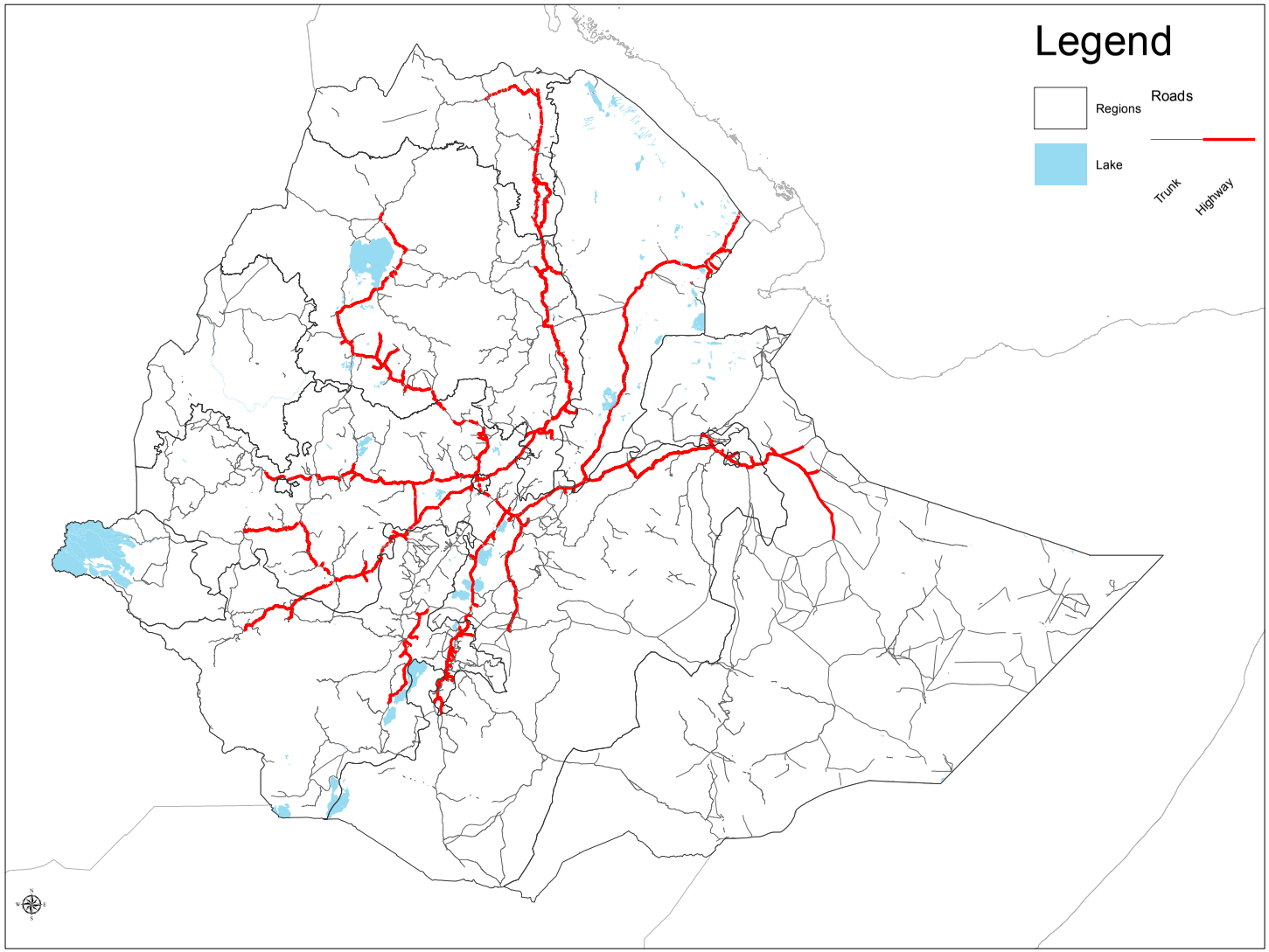


Note: Infrastructure listed are as of 2008.

These overall low indictors are surprising given Ethiopia's high levels of hydropower potential, which can be used both internally and for export (Foster and Morella 2011). Especially when available at the levels seen in Ethiopia, hydroelectric power is one of the cheapest sources of power and an effective way towards development (Solomon 1998). Nonetheless, hydropower development is also highly politicized in Ethiopia, where colonial-era water use agreements for the Nile Basin are seen by many Ethiopians to have stymied the country's right to earlier development of a hydro-based economy (Hathaway 2008). Before the reconstruction periods in focus here, hydropower infrastructure faced a lack of maintenance and investment. For instance, the Aba Samuel plant, located in the Oromia region, has been inoperative since 1970 while three small hydropower stations around Jimma, Debre Birhan and Dire Dawa were abandoned during this time due to old age and lack of maintenance (Solomon 1998).

"Roads are the backbone of a country's infrastructure and they frame of a country's economic development" (International Development Associaion 2009). A national road network provides access to not only international and domestic markets, but also critical social infrastructure. Although the Ethiopian Roads Authority (ERA) was established in 1951 to address low levels of road infrastructure in Ethiopia, it did not result in the widespread provision of a good-quality, all-weather road network. In fact, many of the all-wether roads that existed before the start of the time period of interest were the result of inefficient policies and road contracts based on miles rather than on need. Thus, these roads often do not follow a logical path and unnecessarily twisted throughout the countryside. A 120 kilometer (km) distance between Debark and Aksum was a 10 hour slow trip by bus due to such construction—this road, though, was all that the local population had to rely on (Barraclough 2000).

Figure 5.4: Road Infrastructure



Note: Infrastructure listed are as of 2008.

Before the Ethiopian Civil War, 15% of Ethiopian roads were paved and there was a total classified road length of only 18,611km: 4,109km of asphalt roads 9,270km of gravel roads, 5,232km of rural road, and 13,379km of urban roads. This results in a road density of only about 0.9km per 1,000 people or 31km per 1,000 square-km (Ethiopian Roads Authority 2011). With no coastal access, Ethiopia is economically dependent on the Port of Djibouti to handle its imports and exports. At the same time, there is only one major road that connected the Addis to this power. This meant that the strategic and economic value of this single road increased in conjunction with economic growth. As will be discussed below, this value was recognized by both the government and ethnic groups. See Figure 5.4 for a map of Ethiopia's 2008 road network.

In summary, Ethiopian infrastructure's roots go back to the late 19th century and have been shaped by many political regimes. Basic maps of Ethiopia's infrastructure at 2008 paint a picture of the consequences of this long history in regards to just how connected or disjointed regions are to each other and to the political core—Addis Ababa. As seen in Figures 5.2, 5.3, and 5.4, the southern portion of Ethiopia has less formal infrastructure as compared to the northern regions. Yet, this division and its consequences cannot be fully understood until more context is given.

Ethiopia experienced two back to back reconstruction periods during the time: following the Civil War from 1991 to 2001 and following the Ethiopian-Eritrean War from 2001 to 2008. I proceed for each reconstruction period by describing the conflict itself that resulted in the need for reconstruction and post-war political and economic environment. From here, I then delve into the resulting infrastructure reconstruction policies and connect these to the conditions and configurations discussed in Chapters 2 and 4.

Ethiopian Civil War

Ethiopian economic development and state investment (to include infrastructure provision) in the 1950s had a bias towards the coffee producing regions in south-west and sugar and cotton providing regions in the eastern lowland—the Abyssinian provinces in the north were largely ignored, which continued throughout Emperor Haile Selassie's reign (1930-1974) (Stavenhagen 1996). The potential consequences of this uneven development to groups on the ground were not recognized. Instead, Selassie reinforced a myth during his tenure that Ethiopia was mostly a unitary nation-state even though it was also multiethnic (Roeder and Rothchild 2005). In actuality, Ethiopia has about 80 to 100 distinct ethnic groups with over 70 languages. The largest ethnic groups being the Oromo at 32% of the population and Amhara at 30%. The eventual success of the Marxist Derg's coup d'état was not just a function of corruption, but also the failure of the government to pay close enough attention to ethnic cleavages (Roeder and Rothchild 2005).

Life in Ethiopia under this military junta and Mengistu, though, was not any easier and was filled with land redistribution, mismanagement, and corruption by the political elite and a large drought and famine in the 1980s. On top of this, the Derg still had to contend with the previously ignored ethnic inequalities and tensions that threatened political stability (Keller 1991). The Derg attempted to quiet separatist movements in the north (Eritrea and Tigray) by using military force and the eventual expulsion of foreign aid workers in the north. Yet, Ethiopia's poor infrastructure inhibited the Derg's attempts to control these rural territories; local rebel groups were able to control rural areas, turn devastating social dislocation and economic privatization towards their own benefit, mobilize support, and consolidate their activity (Prendergast and Duffield 1999).

During this time, Tigray was the poorest area in the Abyssinian province (and in Ethiopia) and essentially isolated from the rest of Ethiopia due to the lack of infrastructure (Stavenhagen 1996). Food aid entering the area, a lifeline for many locals, needed to go through the Sudanese border and often faced a barrage of attacks from nomadic bandits and government jets (Henry 1990). Northern Ethiopia (to include Tigray) was also primarily pastor land, and between 1945 and 1974, no public projects (including infrastructure) were funded or built in Tigray. Local rebel leaders used this used this marginalization and pastoralism to claim that this continued policy of neglect and repression was purposeful and intended to keep the province underdeveloped, which played well with the the local narrative of Tigrayian subjection in general. Ultimately, a local rebel group, the Tigrayian People's Liberation Front (TPLF) gained support by use of selective benefits to include parallel systems of governance and provision of public goods like infrastructure and security (Young 1998; Stavenhagen 1996; Henry 1990, p. 172).

During the following Civil War, infrastructure played a key role in TPLF strategies. Fighting closed principal supply roads between Addis Ababa and the northern port of Massawa in present-day Eritrea, roads which were controlled by the regime but went through rebel controlled areas. Relief vehicles carrying grain and medical supplies were forced to travel from the Port of Sudan to Kassala and Gedaref before crossing the border at night in order to evade aid strike attacks. This was a six-night drive to get aid and supplies Eritrea and the Tigrean town of Adigrat across treacherous mountain roads—roads that were built by the Tigrean rebels themselves (Giles 1989; Biles 1989).

Outside of Tigray, rebel factions made use of Ethiopia's existing infrastructure networks in their strategy to starve out the regime and gain control of the capital. Rebels put increased pressure on the Derg by attempting to cut the vital road link

between Addis Ababa and the Red Sea port of Assab, thus threatening one of the last supply roads to Addis Ababa. At one point, according to the Eritrean People's Liberation Front (EPLF), the EPLF and the Afar Liberation Front (ALF), which was based in eastern Ethiopia near the Djibouti border, destroyed nine military aircraft and 120 military vehicles along the road. Such attacks led to the evacuations of towns along the Asmara to Addis Ababa road and further increased the susceptibility of the regime (Brittain and Rose 1989; Giles 1989; Biles 1989).

The Ethiopian People's Revolutionary Democratic Front (EPRDF) formed in 1989 when the TPLF and Ethiopians Peoples Democratic Movement merged as a coalition—additional groups later joined to include: the Oromo Peoples' Democratic Organization (OPDO), the Amhara National Democratic Movement, and the South Ethiopian Peoples' Democratic Front. When the Derg was further weakened after the fall of the USSR and communism in Europe, it was the EPRDF that ultimately overthrew the Derg in 1991 (with US diplomatic intervention). Over 1.4 million were left dead and Derg officials were found guilty of genocide in 2006.

The swiftness of Mengistu's overthrow and lack of central state structure meant that political mobilization did not/could not occur before the EPRDF began creating the new state structure and establishing a transitional government under their control. Early in the process, the EPRDF promised democratic elections, which some questioned due to the TPLF's self described Marxist ideology (Prendergast and Duffield 1999; Stavenhagen 1996; Shaw 1995). This fear never materialized and the resulting 1994 Ethiopian Constitution formed the Federal Democratic Republic of Ethiopia with nine regional state and two self-governing, multiethnic cities (Addis Ababa and Dire Dawa). Five states (Afar, Amhara, Oromia, Somalia, and Tigray) are dominated by one ethnic group while four (Benishangul-Gumuz, Harar, Gambela, and the Southern Nations, Nationalities, and Peoples' Region (SNNPR)) are

multiethnic. Eritrea, now under the EPLF, also received de facto independence and Assab was designated as a free Ethiopian port (Stavenhagen 1996). Each region is further divided into zones and then woredas (districts); kebeles (towns) makes up the smallest unit of local government. Ethiopia's first election took place in May 1995 with a landslide victory for the EPRDF with Meles Zenawi elected as Prime Minister and Negasso Gidada elected as President (Prendergast and Duffield 1999).

Initially, Ethiopia's federal system appeared from a desire to preserve a united country (Roeder and Rothchild 2005; Riker 1964). Yet, it was also believed that any form of liberalization in Ethiopia required breaking away from the central control of the past. The EPRDF focused not on stopping potential nationalism of ethnic groups, but instead empowered certain ethnic groups while devolving certain powers to ethnic based authorities (Roeder and Rothchild 2005; Prendergast and Duffield 1999). These region states have separate parliaments and government in accordances with their local ethnic groups and have the right to "self-determination up to and including secession" (Federal Democratic Republic of Ethiopia 1995, Article 39). Additionally, the EPRDF created surrogate parties, People's Democratic Organizations, to foster a perceived multiethnic federal state. The transition to a federalist system was not a smooth though. Regions, such as Tigray, were accustomed to de-facto independence and now had to integrate themselves into a central political structure with calculated autonomy (Roeder and Rothchild 2005). Ultimately, the EPRDF became entrenched in the federal system while the TPLF and other powerful ethnic groups grew resilient and entrenched in their respective regions. Ethnic federalism here was a means rather than an end to prevent a single dominate economic class or ethnic group overpowering a poor majority (Prendergast and Duffield 1999, p. 49).

Drawing boundaries along ethnic lines did become problematic as families were forced out of their generational land, long standing ethnic frictions were highlighted,

and ethnicity became politicized through the promotion of exclusionary policies. Such actions led to: limited ethnic cleansing from 1991 to 1993; battles between the Oromo Liberation Front (OLF), the Islamic Front for the Liberation of Oromia, and Oromo Peoples' Democratic Organization; and, the hostilities between Ethiopian Somali Democratic League and Ogaden National Liberation Front (ONLF). The central government was dragged into these conflicts and EPRDF forces waged counter-insurgency operations against OLF and ONLF's military factions (Prendergast and Duffield 1999). As time passed and ethnic-based conflict continued, Ethiopia's federal system was imposed from the top down, as the central government began a 'national integration' campaign with assimilationist policies to remove cultural differences (often from the perspective of the single party) (Stavenhagen 1996; Roeder and Rothchild 2005; Prendergast and Duffield 1999).

Economic recovery following the Civil War was slow and faced a decline in GDP per capita, which was only exacerbated by new famine conditions in 1994 (Collier 1999).[5] Yet, any economic growth is only possible with adequate infrastructure, which was lacking due to the previous regime's mixed-market policies and war damage (Solomon 1998; Mwase 2003). While regions did focus on productivity related infrastructure programs, it varied across regions—the expenditure shares of infrastructure ranged from 18% for SNNPR to 38% for Oromia (World Bank 2008*b*). To combat against its failing national infrastructure networks while also promoting economic growth, Ethiopia initiated a hybrid system of revue sharing where the central government shared tax and other revenue down to the regional states (often in the

[5]As argued in Collier (1999), the decline of GDP per capital following a civil war relative to if no civil war had occurred is the result of both a drop in production and the loss of capital stock due to destruction (here, with infrastructure destruction). Thus, areas of the economy dependent on capital (manufacturing and construction) contracts relative to GDP while substance agriculture (which has opposite characteristics) expands relative to GDP. Nonetheless, peace does not autonomically reverse this GDP loss (Collier 1999).

form of block grants). The amount allotted was based on a formula using inputs such as population share, relative development level, and relative projected revenue generation ability, whose goal was to account for the disparities between regions (Foster and Morella 2011). This was done to help states efficiently develop themselves while preventing uneven development across regions (Roeder and Rothchild 2005; Transitional Government of Ethiopia (TGE) 1992).

Yet, such a structure ultimately resulted in regional dependency on the federal level in addition to uneven revenue sharing between the money received and money spent. Though regions had power over their development and spending plans on paper, state spending was (and remains) heavily guided by national Five Year Programs (Roeder and Rothchild 2005). These plans do not necessarily match all needs across all regions. Moreover, while any public investment is channeled almost entirely through the national government, operating expenditure was channeled almost entirely through state-owned enterprises. Yet, profit generating infrastructure, such as power and water utilities, did not report any significant investment using their own resources (Foster and Morella 2011). Breaking away from this dependency is nearly impossible, as donor assistance is also still heavily controlled by the federal government and the amount is then often subtracted from future revenue. This discrepancy between nationally controlled investment and private operation created funding gaps and hindered potential investment programs. Nonetheless, reconstruction slowly began on war damaged infrastructure, construction broke ground, and private/local investment appeared.

In summary, ethnicity has long been politicized and un-politicized. After years of being disregarded, Ethiopia's diverse ethnic groups were both empowered in their regional state and relegated beneath the federal government in Addis Ababa by the Ethiopian Constitution. Nonetheless, the Ethiopian Civil War hurt an already weak

Ethiopian economy were liberalization policies had begun to take hold. It was in this transitional environment coupled with a population boom in rural areas that Ethiopia's first reconstruction period occurred. Where infrastructure played a pivotal role in rebel mobilization and combat strategies during the Civil War, uneven and unsustainable infrastructure policy later became a symptom of the federalist structure.

First Ethiopian Case Reconstruction Period (1991-2001)

Within this political and economic context, Ethiopia's first period of reconstruction policies occurred, which ran from 1991 to 2002, and set in motion future successes and failures. Ethiopia's various reconstruction policies and progress during this time are described in detail below and are broken down by infrastructure type.[6]

Railways

Rehabilitation of railways within Ethiopia remained low to nonexistent during this reconstruction period. National transport sector deregulation, which began in 1990 and continued after the Civil War, helped both the Ethio-Djibouti Railway and Road Transport Authority change tariff policies. As discussed below, the latter remained partially regulated and private sector transport fleets were nursed into growth. With more power to increase rates according to the market, deregulation offered the opportunity for the transport sector to become self-reliant, profitable, and invest in itself. Yet, fixed charges for road and rail services did not increase even as vehicle and fuel

[6]After the fall of the Derg in 1991, the UN Emergency Prevention and Preparedness Group (EPPG), who coordinated international famine relief delivery to drought affected highlands, helped create a program to assist post-war recovery and the reintegration of soldiers/fighters. In 1994, the EPPG became the UNDP Emergencies Unit for Ethiopia (UNDP-EUE) and it's mission shifted to supporting humanitarian and interagency coordination for the UN (UN Emergencies Unit for Ethiopia 2002). The UNDP-EUE faced first hand much of effects of Ethiopia's poor infrastructure in their delivery of humanitarian aid and provided updated reports on post-conflict reconstruction—reports that much of this section are based.

costs did during this reconstruction period. Thus, the Ethiopian Freight Transport Corporation (EFTC) and Public Transport Corporation often had cash flow problems and relied on government subsidies as profits were rare (Mwase 2003). This lack of investment incentives hindered any potential rehabilitation and future growth for the railway—passenger serves were nonexistent during this reconstruction period As such, railway infrastructure continued to fall prone to inadequate maintenance and poor quality technology—rainy season often temporarily suspended railway freight service due the mere to a threat of flooding over the tracks (UNDP Emergencies Unit for Ethiopia 1999*a*).

Airports

In contrast to the railways, Ethiopian Airlines is one of the top African carriers and Addis Ababa's Bole International airport was and remains a major regional hub for Africa. This success has allowed the airline to operate relatively independently from the government and grow to new levels (Foster and Morella 2011). During this reconstruction period, Ethiopia's aeronautical infrastructure followed the airline's success and continued to expand with the Lalibela Airport (North Welo Zone of Amhara) going into operation in mid-August 1997 at a construction cost of Ethiopian Birr (ETB) 53 million. This airport not only connected the central highland more directly to the political core/Addis Ababa, but it also helped grow the local tourism industry—the famed rock-hewn churches of Lalibela lay nearby—and brought new service jobs and tourism money (UNDP Emergencies Unit for Ethiopia 1997). Not long after, Ethiopia made a large step in becoming an international aviation hub with the start of flights to the US from Addis Ababa in 1998—Ethiopian Airlines received an FAA Category 1 certification and passed audit without remark (Ethiopian Airlines 2014). By 2001, the number of domestic and international takeoffs of air carriers

registered in the country mirrored this success with an increase of 37% to 28,128 flights (World Bank 2012).

Power Plants

The agency responsible for electric power in Ethiopia during this reconstruction period was the Ethiopian Electric Light and Power Authority, which was later renamed the Ethiopian Electric Power Corporation (EEPCO) in 1997. The EEPCO was established as a public enterprise owned by the government and was responsible for the investigation, development, and forming of power policies in addition to the transmission and distribution of electrical energy itself. In 1998, the EEPCO had distributed electrical power to over 365 towns and provided about 92% of the total energy produced in Ethiopia (Solomon 1998; Ethiopian Electric Power Corporation 2013).

Nonetheless, access to and use of electric power in Ethiopia during the 1990s remained low (8% of the total population with per capita energy consumption at 20 kilowatts) (Environmental Protection Authority 2012). Compounding these low indicators was the fact that power shortages and resulting power rationing occurred frequently during Ethiopia's first reconstruction period. This did not come as a complete surprise; a 1993 forecast predicted the possibility that there would be acute power and energy shortages by 1995 (Solomon 1998). Partially responsible for these shortages was the fact that Ethiopia did not exploit its high potential for hydropower, even though this was a priority in national development plans. Out of about 15,000-30,000MW of potential energy, only about 360MW (less than 2%) had been exploited by 1997 (Environmental Protection Authority 2012).

Ethiopia's plan to overcome this electric power supply deficiency during this reconstruction period focused on Medium Scale Hydropower Development (MSHD)—

hydropower plants with a capacity between 40MW to 60MW—throughout the major river basins. One such hydropower plant, Tis Abay II on Lake Tana, was completed in 2001 with a final capacity of 73MW(Environmental Protection Authority 2012). Relying on larger hydropower plants would have required large amounts of investment with longer construction periods—both of which went against the reconstruction goal of meeting the varying demands in all regions within the shortest time period possible. With this stated national plan, the Gilgel Gibe hydropower plant (180MW capacity) on the Gilgel Gibe Reservoir, whose construction began in 1986, was long delayed during this reconstruction period—this plant was eventually completed in 2004 with a final capacity of 183MW. The expansion of the transmission grid brought promises of more consumers and increase in total energy demand. Yet, the EEPCO did not charge more as consumption increased during this reconstruction period as a way to incentivize the population to convert to electric power (Solomon 1998; Environmental Protection Authority 2012). Such underpricing along with the already low power tariffs meant that the EEPCO only recovered about 46% of the cost to produce the power (equal to 1.3% of the GDP) (Foster and Morella 2011). Moreover, relying on hydropower (whether medium or large scale) in Ethiopia does come with its risks as Ethiopian history is filled with back-to-back droughts. This lack of rain meant that existing dams fail to fill and prevents hydropower production—such a drought pushed back the completion of the aforementioned Tis Abay II plant (Gadaa 2010).

Construction of new hydropower plants or associated damns would often take place in an already inhabited area, which led to the displacement of entire villages. A resettlement plan was designed to address the adverse social impacts linked to the Gilgel Gibe reservoir project in the Oromia Region. Though this was not the first dam to displace people in Ethiopia, it was the first official recognition by the Ethiopian government of its responsibility to address displacement in the development of such a

project. The project was completed under a 1997 World Bank project at a final cost of $331.4 million (compared to the 1997 estimate of $281.9 million). Both the Federal Government and the Regional Government of Oromia regarded this resettlement project, which was to include the construction of social infrastructure, schools, and health clinics, as a development opportunity. In total, 706 households (more than 5,000 people) were relocated. Beyond this initial move though, the government did not address all problems caused by resettlement. Years later, those displaced by the dam continued to suffer the effects of a poor resettlement program: livestock wealth and crop productivity declined, project infrastructure was not maintained, and resource conflicts between the host and resettled communities continued (World Bank 1999; Hathaway 2008).

Roads

In the early 1990s, there were only about 23,000km of classified roads in Ethiopia and 75% of this network was rated in poor condition (Environmental Protection Authority 2012). In fact, nearly 75% of farms were more than a half day walk from an all-weather road (World Bank 1997*b*). This lack of all-weather roads meant that rain made remote (often rural) areas inaccessible and prevented access to relief food aid and regional/international markets (UNDP Emergencies Unit for Ethiopia 1999*b*). For instance, during a period of extreme rainfall in early September 1999, a bridge collapsed at Mersa along the north-south road connecting Addis Ababa to Tigray. This closed the road in both directions to anything but light traffic and prevented essential internally displaced people (IDP) relief operations and aid. (UNDP Emergencies Unit for Ethiopia 1999*a*). Given that a significant portion of Ethiopia's population lives in rural areas, economic growth and overall development depends on the ability of the country's transport system to effectively integrate these areas year round (World

Bank 1997*b*). Moreover, Ethiopia's low road density was a significant obstacle towards it's agricultural based economic strategy during this first reconstruction period (UNDP Emergencies Unit for Ethiopia 1998*b*).

Two executing agencies, the Ethiopian Roads Authority (ERA) and the Regional State Rural Roads Organizations (RROs), were charged with addressing this failing road network.[7] Beginning in 1993, the ERA substantially increased its contracting-out of road works and supervision services (World Bank 1997*c*). Also during this reconstruction period, Ethiopia formed a 10-year Road Sector Development Program (RSDP), which covered the years from 1997 to 2007. The RSDP was a two phase package of investments, sectoral reforms, and institutional reorganization—Phase 1 occurred in this reconstruction and went from 1997 to 2002 (International Development Associaion 2009). The RSDP was intended to reestablish fair to good operating conditions over a majority of the 23,812km of existing trunk and rural feeder roads, while also expanding the road network by 18,344km of new feeder roads.

Phase 1 of the RSDP had a budget of ETB 9,823.9 million (ETB 7,384.4 million distributed) with funds coming from loans and grants from donor nations, international organizations, and Ethiopia's own budget (International Development Associaion 2009; Ethiopian Roads Authority 2011; UNDP Emergencies Unit for Ethiopia 1998*a*). The goals of this first phase specifically were the rehabilitation, strengthening, and upgrading of priority trunk and major link Roads (with an approximate total length of 1,200km) to be selected from: (a) Modjo-Awash-Mille (463km in Oromia and Afar); (b) Woldiya-Adigrat-Zalambessa (412km in Amhara and Tigray); (c) Debremarkos-Gondar (439km in Amhara); (d) Awash-Kulubi-Dire Dawa-Harar (320km in Afar, Oromia, Dira-Dawa, and Hara); and (e) Alemgena-Hosaina-Sodo (328km in Oromia and SNNP) (World Bank 1997*c*). To help with RSDP implemen-

[7]The latter being previously known as the Regional Government Rural Roads Organizations

tation, the WB approved the Road Sector Development Program Support Project (RSDPSP), which included IDA credit of $309.2 million and ran from 1998 to 2003. The RSDPSP also supported the reestablishment to the ERA as an autonomous institution, rather than just an implementing agency, with its management accountable to a board (International Development Associaion 2009).

By the start of the RSDP in 1997, Ethiopia had a total road network of about 22,500km: 3,500km of those were paved, 8,000km were gravel main roads, and 11,000km were gravel or earth rural roads (World Bank 1997*c*). Few of these roads were in good condition: only 17% of asphalt roads, 21% of rural roads, and 22% of roads overall were rated in good condition. In fact, over 79% of land areas in Ethiopia were more than 5km from an all weather—the average distance to an all weather road was 21km (Ethiopian Roads Authority 2011). During this initial RSDP phase, there was success in regards to expansion—the road network increased by an average of about 4.2% annually (Environmental Protection Authority 2012). Ultimately, these investments increased road density by 80% from the initial lows of 21km of road per 1,000 square km and 0.43km of road per 1,000 people—which was still below the mean for Sub-Saharan African (10km and .61 respectively) (World Bank 1997*cb*; UNDP Emergencies Unit for Ethiopia 1999*c*). Moreover, over 8,709km of roads were constructed or rehabilitated during this time (International Development Associaion 2009; Ethiopian Roads Authority 2011; UNDP Emergencies Unit for Ethiopia 1998*a*).

Reconstruction policymakers recognized the severe infrastructural constraints faced by many in Ethiopia and road investments were expected to improve access to markets and the quality of services available to the rural population. Proponents of the RSDSP claimed the policy a success by improving trunk and regional rural road access to meet agricultural and economic development needs, building institutional capacity in public and private sectors for sustainable road development and maintenance, and

providing economic opportunities for the rural poor via employment and affordable transport services (International Development Associaion 2009; World Bank 1997*c*). Other direct benefits were seen through the reduction of vehicle operating costs that resulted from improved road conditions. As the roads selected for rehabilitation were located in zones of good agricultural potential or served as major import-export corridors, most of the savings accrued directly to truck operators providing trade and/or agricultural-related transport services. Indirect benefits were seen to have come from the increased involvement of the private sector, liberalizing of transport charges, and reforms in transport sector as a whole. It was argued that such benefits would then contribute over time to fostering economic growth and poverty alleviation countrywide through market integration/accessibility and the reduction in food marketing costs, especially for remote communities and the disadvantage poor that had been cut off from both regional market and relief services (World Bank 1997*b*).

Using the results from Chapter 3, I would expect conflict during this reconstruction period to begin in areas connected to Addis Ababa by infrastructure networks. As time continued though, I would also expect that conflict would then decrease in numbers and shift away from Addis Ababa and to the areas with low infrastructure density— the south and north regions of Ethiopia. In Figure 5.5, conflict events during this period are mapped in two year increments (Sundber, Lindgren, and Padskocimaite 2010; Sundberg and Melander 2013). The trend is indeed seen with conflict initially centered around the capital and the rift valley, which runs south from the capital. There is a decline in conflict events during the middle years of this period and conflict events start shifting towards the Somali and Tigray regions. There is an unexpected spike of conflict events during the final two years. While much of this conflict is where IST predicts—the disconnected areas in the south—there is still a number of conflict events in around the capital and in high infrastructure den-

Figure 5.5: Conflict Events From 1991-2000

Note: Panels go in time in order from left to right and moving down.
Each panel covers a two year period.
Conflict data comes from Sundberg et al. (2010) and Sundberg and Melander (2013).

sity areas. This conflict pattern is driven by another conflict (Ethiopian-Eritrean War) during the final years of this period. What is interesting is that even though

the Ethiopian-Eritrean War centered around the border to the north, many conflict events during this period occurred in the Somali region, which had low infrastructure density measures. This is also seen Chapter's 3 model miss predicts rate for this case at 33% of grid-years overall and the miss predicting (false-negatives) conflict rate at 10% of grid-years (predicts no conflict when there was conflict).

Reconstruction Success and Failures According to IST

Reconstruction success during this period was measured by project numbers (miles of road built or rehabilitated, MW of power produced, and number roof airports built or put on-line)..[8] By such measures, reconstruction would be seen as a success. In fact, Ethiopia's primary development objective during this reconstruction period was poverty reduction in addition to sustained GDP growth at a target of 7-8% annually (World Bank 1997*b*). Yet, I have argued throughout this dissertation that these are first order measures as they only capture success in the short term as seen by funding agencies and the political elite. By focusing the technological output, these indicators cannot capture any potential long-term consequences of these changes on political instability.

For example, the road from Debark to Jan Amora in Amhara, which was built in 1999 and made Jan Amora accessible for the first time by car, would be rated as successful if measured by the above indicators and did ultimately help with economic development and service delivery. Briefly, this new road increased NGO presence (from one to seven NGOs) and started a cascade of social improvements for the small village. Two new schools were constructed and student numbers increased from 4,000 to 10,000 (an increase in the schooling rate from 13 to 22%). This new road also

[8]For the ERA specifically, performance and success measures included: traffic flow, journey times, pavement roughness, maintenance expenditure, pavement loading, and road freight prices—similar measures were used in regards to other infrastructure types

meant that teachers no longer had to walk two days from Debark. Government service increased in general and became more reliable, with the number of public employees increasing from 200 to 300. A satellite telephone station for public use was built for the first time; households using family planning went from zero to 6% within two years; businesses improved and revenue from sales tax increased. This success though drew others from poorer areas in lowland areas—women and girls who came often resorted to prostitution to survive due to the lack of jobs, which ignited the spread of HIV in the area. Capacity building never followed the building of infrastructure; the new administrators were young and lacked experience—all seven new health centers financed by the WB and built by the Ethiopian Social Rehabilitation and Development Fund were operated by inexperienced locals below 25 years of age.[9]

On top of this, the new road also divided the Simien Mountains and thus threatened endangered wildlife–the nearby national park is a vital main economic drivers for the area and brought in tourism money and jobs. With greater access to the park, human population inside the park increased with more than 11,000 living there in 2002, and deforestation and illegal farming became rampant—old and depleted farming in the surrounding lowland areas made this virgin land more appealing. There were plans to reroute a 11.8km section of road around the park, but the needed ETB 17 million could not be found (UNDP Emergencies Unit for Ethiopia 2002*c*). Some might ask why a road was built through such a vulnerable area: it was the quickest path from Point A to Point B.

Such lack of sustainability and long-term consequences would not be captured by previous perspectives of infrastructure reconstruction nor first order politics. As

[9]I do not wish to state here that one should not use local resources in their reconstruction policies. I have argued the exact opposite throughout this dissertation. Yet, it is not enough to just build new infrastructure, let new service increase, and then leave. Long-term sustainability must be considered if the investment is going to grow in return, which requires training and capacity building.

described in Chapter 2, IST offers a unique and useful perspective to understand the consequences of infrastructure reconstruction policies and their future role in shaping political instability. In second order politics, success would not be tied to technological output. Successful infrastructure and reconstruction policies would be measured by long-term benefits and consequences to both individuals and the nation: growth national unity and cohesiveness, increased individual capabilities to better themselves, and strengthen infrastructure sustainability for years to come. As stated in Chapter 2, these are hard to capture as infrastructure and reconstruction have both direct and indirect effects on political instability. It is hard to conceptualize just how a project's job training actually effected political instability let alone the size of this influence. Though hard to measure, one can qualitatively see the effect, as seen below.

National Unity

In designing their post-Civil War reconstruction policies, IST-informed policies would require Ethiopia's political elite to comprehensively plan infrastructure provision to ensure that all regions in Ethiopia received the necessary public goods (first order measures) and that infrastructure projects were having positive long-term benefits (second order measures). Yet, Ethiopia's version of top-down ethnic-federalism inhibited such such national plans even though they had the power to act nation-

ally.[10]

The ERA was responsible for about 16,000km of federal roads while eight RROs were responsible for about 17,000km of rural roads (Ethiopian Roads Authority 2011). Though their responsibilities were essentially evenly split, the federal government still had a majority say. Money from the government's Road Fund were earmarked for specific, government selected, infrastructure programs—grant blocks came with no strings attached in principle, but still faced federal pressure. Moreover, when coordination was needed with neighboring regions, the federal level was in charge (Roeder and Rothchild 2005). Such a federal supremacy could be seen in Amhara in 1998. A particular zone wanted to shift more of their budget to road infrastructure over education, health, and agriculture programs while another wanted to build a sports stadium. In the end, they were 'persuaded' to change plans to match federal plans and guidelines (UNDP Emergencies Unit for Ethiopia 1999*d*). Furthermore, additional funds coming from international organizations (like the WB) also had to be channeled through the national government, who then decided how and where the funds were to be used—these decisions tended to be biased towards providing proportionally more funds to the regions EPRDF leadership resided in the north (UNDP Emergencies Unit for Ethiopia 1998*b*). Though this top-down decision structure might have helped prevent unnecessary projects and local corruption, the federal government maintained a rigid, project focus 'plan' for reconstruction at the cost of focusing

[10]Note, I do not wish to state here that all federalist systems inhibit such national plans. As described by Hale (2008), ethnicity is a heuristic to help individuals/groups reduce uncertainty and find those individuals/groups more likely to cooperate due to similar goals and shared histories. In short, ethnicity a mechanism that shapes threat perceptions. On the other hand, ethnic politics (thus Ethiopia's ethnic federalism) is a way to organize collective action to help in collective good delivery. Such an outcome was the intent behind Ethiopia's government structure. The preferred equilibrium between the political elite and the ethnic group is corporation, especially when economic benefits are present or the costs too great. Conflict can emerge in such situations when the political core is perceived by a group to be using exploitative strategies or a lacking in military capacity. In Ethiopia, the ethnic-based regions, being neglected by the political core and missing out on reconstruction benefits, saw their position fall and perceived the political core as trying to override their ethnicity—actions that their heuristic saw as threatening to their group.

on long-term consequences. This inflexibility to local needs and desires can create unexpected results, especially in ethnic empowered regions. Ultimately, the Ethiopian political elite did not have a comprehensive national plan even though they were attempting to increase their role and influence.

An example of this dichotomy between national plans and goals with local particularities and self-interest can be seen in the Afar region, which was (and still it is) one of the poorest and least developed regions in Ethiopia after years of neglect. Only at the end of this reconstruction period did infrastructure projects such as roads and administrative buildings really begin take hold. Afar's regional economy is polarized by the transit road connecting Addis Ababa to the Djibouti port, which cuts through the region. After its construction, this road created a 'truck-stop economy' in settlements such as Decioto, Logiya, Mille, Adaitou, Gewane, and Gadamaitou. Water facilities, commerce, and services are quasi-exclusively related to truck driver needs and not to the needs of the population, which need roads to schools and power access to their homes (UNDP Emergencies Unit for Ethiopia 2002*b*). In short, the desire by the political elite to connect the port to the capital overshadowed the need for national unity at the cost of ignoring Afar's particular needs. It is now the population within the Afar region, a region with high political grievances, who face the long-term consequences of this changed socio-technical system.[11]

Also overlooked during this reconstruction period was urban transport—the lack of productive infrastructure and maintenance that constrained urban growth (World Bank 2008*a*; Alonso 1968). While urbanization levels are generally low in Ethiopia, the urban growth rate seen in Ethiopia and Africa is high, which is only expected to grow following large future migrations to the cities from geographically disadvantaged regions (Becker, Hamer, and Morrison 1994; Gallup, Sachs, and Millinger 1999).

[11]See discussion of Ethiopia's second reconstruction period for more on the Afar region.

While only a minority of the Ethiopian population lived in urban centers, urban-based strategies do have their advantages, as areas with higher population densities and/or rapid population growth increase in value in conjunction with economic growth. Infrastructure provision in these areas is less costly with more concentrated benefits and increased returns are seen relative to urban size (Gallup, Sachs, and Millinger 1999; Bloom et al. 1998; Alonso 1968). Nonetheless, Ethiopian urban infrastructure, especially in Addis Ababa, lagged behind rural areas where the ERA focused. Such infrastructure fell into disrepair due to neglect, tax/funding policies, and weak political will power (Becker, Hamer, and Morrison 1994; World Bank 2008*a*).

Yet, the focus of international organizations and structural adjustment programs during the 1990s was on rural development and the rural poor—economic and "national" development translated into policy to mean rural development. In other words, the pendulum had swung the opposite direction in trying to avoid previous urban bias that had deprived rural areas. African cities were essentially ignored. Though one goal of these programs, especially in regards to import and export infrastructure, was to push back foreign capital in leu of local contracts, they actually resulted in exacerbating spatial development imbalances (Becker, Hamer, and Morrison 1994).

This is not to overshadow the reconstruction successes seen regionally and nationally in regards to integration. In the SNNPR, a new road (166km) was constructed that connected Soddo and Chida at a cost of ETB 255 million ($35 million). This road was heralded as both an economic investment and a means to integrate the state. Before this road, these were no major connections between Awassa (the regional capital) to the Bench Maji zone near the Sudanese border—one needed to travel through Addis Ababa and Jimma first (an 800km trip). This project involved the construction of 6 bridges—the Bailey Bridge, itself, is an 80 meter (m) bridge over the Omo river (UNDP Emergencies Unit for Ethiopia 1999*d*).

Individual Capabilities

As described earlier, the economic situation following the Civil War was dire. The reconstruction and infrastructure policies described above offered Ethiopia an opportunity to improve the economy directly and indirectly through local employment programs. In creating their plans, the Ethiopian government recognized this opportunity and highlighted how their infrastructure projects would increase local resources through the development and employment of local consultants and contractors and the promotion of joint ventures with international contractors. As a part of its planning, the ERA incorporated into its contracts for rural road improvements international and local design consultants, local contractors, and the increased use of labor-based technology for construction and maintenance (World Bank 1997*c*). Ultimately though, during its third party congress in January 1998, the EPRDF confirmed new polices on the participation of foreign investors in the telecommunications, hydroelectric power, and defense industry sectors (UNDP Emergencies Unit for Ethiopia 1998*b*).

Following this, a significant portion of reconstruction jobs created went to international contractors. The ERA provided employment for about 9,448 people in 2001 to 2002—2,373 of these being skilled jobs, 4,335 were local labor, and 5,113 were international contractors (only approximately 695 of these jobs went to women). When local jobs did appear with dam and road construction, the incentives swayed towards smaller commercial agriculture investment that only helped a minority of those in need. (World Bank 1997*b*). During the implementation of the RSDP in this first reconstruction period specifically, the use of international contractors was seen as a necessity due to a perceived low level of local capacity and experience. Thus, international contractors ended up being the major implementors of federal

road rehabilitation, upgrading, and construction projects and comprised 70% of total contracts—local contractors had 20% of the contracts and 10% were undertaken by force accounts (World Bank 2008*a*).

In the perspective of first order politics and measures, these international contracts were successful. In 1998, the Dawunt-Lalibela road provisionally opened after being handed over to the ERA by international contractors (the project was run by Berta Construction under the supervision of Roughton International). Out of 120.5km, 84km, 21 large to medium bridges, and 21 small bridges had been completed before the handover (UNDP Emergencies Unit for Ethiopia 1998*a*). Having had a smaller presence under the Derg, Chinese companies started earning many of these international contracts during this reconstruction period. In 1998, a $65 million, three year contract was signed by a Chinese company (Road and Bridge Corporation) to construct the Addis Ababa ring-road project. This same company built the 100km road between Woreta and Weldiya in Amhara (UNDP Emergencies Unit for Ethiopia 1998*a*). The China Road and Bridge Corporation and Korean Keangenan Enterprise Ltd. won an international bidding competition to construct a 221km highway from Awash to Harar via Dire Dawa and rehabilitate a 91km section of the same road between Hiran and Kulubi—this road is the main link between Addis Ababa to Dire Dawa and thus to the Djibouti port. This project was financed by an$76.7 million International Development Association loan (UNDP Emergencies Unit for Ethiopia 1999*c*).

During this reconstruction period, these first-order successes (increases in the road network) seemingly outweighed second order costs (the loss of employment opportunities). Many of those around and available to work on these reconstruction projects were outside the traditional labor force and/or making the transition into such employment—feelings of deprivation or grievances where not fully ignited.

Nonetheless, long-term, second order consequences of this international, specially Chinese, presence would come into play in the next reconstruction phase.

Sustainability

These reconstruction policies resulted in a substantial expansion and upgrade of Ethiopia's infrastructure network. This also required an expansion of maintenance and a focus on sustainability and infrastructure maintenance, which would allow for the initial investment to continue providing its technological and system benefits over time. In the RSDSP, two complementary dimensions of project sustainability were emphasized: investment sustainability and policy reforms. The first dimension required mobilizing and allocating resources effectively towards proper road network maintenance of both existing roads and those roads rehabilitated/built during the RSDP. The latter dimension was a recognition of needed institutional reforms and capacity building initiatives during project preparation and performance in order to maintain future capacity and maintenance policies once RSDP ended. Both of these sustainability dimensions also required sustaining government commitment to sector reforms, itself, and the involvement of all stakeholders. As such, the RSDSP was to include, with international assistance, technical assistance to all key planning and implementing entities and ultimately support project implementation and capacity building for sustainability. A multi-annual maintenance plan reflected this commitment (World Bank 1997*c*).[12] These programs did help improve both the planning for and actual sustainability of road infrastructure.

Sustainability though requires more than a focus on infrastructure (i.e. the road network) and related government departments (i.e. the Ethiopian Transportation

[12]Yet, mechanized and manual routine maintenance works were also regularly contracted out to international entities (World Bank 1997*c*).

Agency). Supporting systems (economic, social, political, and environmental) must also support the socio-technical system as they are also required of he infrastructure pass the test of time. The Ethiopian Transportation Agency (ETA) was in charge of setting freight rates, which included the Addis Ababa-Assab route that was vital to the coffee-based economy. Yet, return loads freight rates depended on volume and type. With the shortage of export goods and the Ethiopian Freight Transport Corporation transportation monopoly, private trucks had travel empty from Addis to Assab even though there was coffee to be transported in Addis (Mwase 2003). Such economic policies reduced economic growth while hindering future investment. Additionally, the reconstruction policies during this period often did not consider environment sustainability. While new infrastructure in previously inaccessible areas made more land available to cultivate at a higher yield, they also often had adverse environmental effects (World Bank 1997*c*). In regards to power production, over 90% of the energy consumed in Ethiopia in 1998 came from biomass fuels and was primarily used for cooking, which resulted in massive deforestation and soil erosion (Solomon 1998). The focus on hydropower plants during this reconstruction period did not fully address how power was being used at the local level—low price incentives could not change a long social history of how households prepared food (Environmental Protection Authority 2012). This meant that investments took longer to be returned and that the potential benefits of national unity and capacity building could not fully take hold to combat political instability risks.

Table 5.1: fsQCA Solution Membership Scores for First Ethiopian Case

AID*POORQUALITY	UNEMPLOYMENT*POORQUALITY	aid*poorquality*PERIPHERIES	Political Instability
0.40	0.00	0.06	0.64

Note: CAPS represents membership while lowercase represents non-membership.

In regards to Chapter 4's fsQCA results, this first case of Ethiopian reconstruction is consistently a most deviant case for coverage across all three solution configurations (listed in Table 5.1). Though Ethiopia during this time had membership in political instability, none of the predicted condition configurations are present. Ethiopia's membership score for the first configuration (AID*POORQUALITY), which was the closest to having membership, was driven by the existence of other aid focuses during this reconstruction period—specifically on continued drought conditions and famine relief, as Ethiopia was still recovering from a 1983-1985 famine.[13] This necessary aid divergence meant that less aid was available for infrastructure reconstruction and longterm investments. Less available funds meant that projects faced pressure to reduce their costs, which increased incentives to use international contractors. In regards to the second configuration (UNEMPLOYMENT*POORQUALITY), Ethiopia actually had a low *reported* unemployment number during this reconstruction period (low compared to other developing nations). Much of the population were pastoralists and/or subsistence farmers and outside the traditional labour force being measured by this statistic. This fact became an issue later, as the country began liberalizing, arable land shrank, and these very same people began turning to the formal economy (see next reconstruction period). This low reported unemployment membership also masked Ethiopia's high membership in poor infrastructure quality. Thirdly, although there was this regional dichotomy in regards to infrastructure levels , Ethiopia is not explained by the third configuration (unemployment*aid*poorquality*PERIPHERIES). Ethiopia not only had cut off peripheries, it also had other reconstruction conditions shown to be affiliated with political in-

[13] A recent report found that much of the relief aid during this famine went through the government, became part of Mengistu's counter-insurgency plans, and ultimately prolonged his reign. Moreover, a good portion of this aid that was supposed to go towards emergency food allocation actually went straight to the TPLF to buy weapons in their fights against the Derg (Plaut 2010).

stability: high unemployment, poor quality infrastructure, and reconstruction aid discrepancies. In other words, reconstruction induced political instability was not just a factor of peripheral and broken identities.

What would have IST-informed reconstruction policies looked like in Ethiopia during this reconstruction period? In regards to hydropower infrastructure, a large portion of Ethiopia's water resources are found in rural areas and small power plants (less than 40MW) rather than the government large power plants are best suited to harness this power and provide affordable energy for the development of rural areas. The construction of such smaller power plants do a lot more than just increase the number of power plants and access to power. These smaller power plants spread out throughout rural Ethiopia would encourage the establishment of government offices and associated services in remote areas and provide employment opportunities in rural areas from from the power plant construction/operation, itself, and from the new industries that would rise around the plants. This would then help absorb those transiting into the modern labor force though training and employment in addition to being better suited to help households transition to formal power sources (Solomon 1998)—that is if the local population were used as the workforce to build the infrastructure. Yet, such plans require a significant level of government energy and cost for relatively little electric power gain and maintaining these plants in remote areas discourage their construction.

Ethiopian-Eritrea War

During the Ethiopian Civil War, a common enemy united future foes: the EPRDF and Eritrean People's Liberation Front (EPLF).[14] The EPLF and EPRDF received

[14]The EPLF was founded when the Eritrean Liberation Front (ELF) split— the ELF itself was founded in the 1960s by Muslims in reaction to fears of Ethiopian annexation. The EPLF platform resolved around nationalism, independence, and socialism.

support and supplies from Sudan during their uprising. In return, the groups also turned a blind eye or even actively supported groups in Sudan through their shared border (Prendergast and Duffield 1999). After the Civil War and Eritrea's de-facto independence, the EPLF was to set up an autonomous transitional government in Eritrea. Meanwhile, Ethiopia's young democracy status made the county more vulnerable to civil violence as ethnic groups fight for national self-determinism and weak institutions were unable to constructively transform grievances—both self-determinism goals and political grievances were present in the Eritrean territory. Nonetheless, the border between Ethiopia and Eritrea was a not a major sources of grievance up to this point.

This all changed though when the Eritrean people voted for independence in a 1993 UN-supported referendum. Not long after, Eritrea declared its independence and gained international recognition. With disagreement occurring over where the border should lay, a border committee was set up in November 1997. The main areas of tension along the Ethiopian side of the 1,000km boarder included: 1) Badme and Shiraro, in the western boarder area between the Tekeze and Mereb rivers (Western Zone of Tigray Region), 2) Tsarona, Zalambessa and Alitena in the central boarder section (Eastern Zone of Tigray Region) near the main road leading to the Eritrean capital of Asmara; and 3) Bure in the eastern boarder section (Zone I of the Afar region) on the main road to the Red Sea Port of Assab (Mussa 2003).

In part due to the lack of a border agreement, President Isaias Afeweki of Eritrea politically calculated that Badme could be annexed. Yet, Badme was also part of Tigray, which many in the ruling regime in Addis called home. Pressure from the public and within the political elite led to Ethiopia responding militarily to Eritrea's actions and igniting war. The resulting Ethiopian-Eritrean war, which ran from May 1998 to June 2000, resulting in tens of thousands of deaths and both sides being

accused of human rights abuses.

During the conflict though, infrastructure played a key role in how the war progressed and was fought. The Ethiopian-Eritrean conflict has been called Africa's first high-tech war, as the two nations employed jet aircraft, artillery, and armor—Ethiopia often used these jets to attack airport infrastructure in Asmara as a form of retaliation. Such a description though does not paint a complete picture of conflict on the ground with waves of foot solders attempting to win a few miles of disputed land at a time. Infrastructure conditions along the borders regions were poor leading up to the war and the military was not immune to these conditions. As such, ground conflict would essentially stop during some months, as rainy season turned trenches and supply roads into mud, which prolonged the devastating war (Maykuth 1999).

The Algiers Agreement ended the war and created a 25km wide Temporary Security Zone (TSZ) within Eritrea, which was to be patrolled by the UN. A meeting of the Eritrea-Ethiopia Boundary Commission, which was established under the Algiers Agreement, did eventually agree in April 2002 on where the border should be—concessions were made on both sides. In the end, this commission decided that the disputed territory of Badme, which originally sparked the war, does belong to Eritrea and the Hague later found that Eritrea had broken international law by invading Ethiopia. Though dissatisfied with the commission's results, Ethiopia did eventually accepted the ruling in principle. Yet, Ethiopia did not fully retreat and occupied a significant portion of Eritrean territory. Some Ethiopian troops were withdrawn in December 2005 along with the UN withdrawing its peacekeepers. This hint of peace though was broken when both boycotted a November 2006 meeting of the border commission and remobilized troops along the border. The border remains contested and grew to include the Eritrean-Djibouti border in 2008. As of the writing of this dissertation, this area is still under Ethiopian occupation.

When the war ended, hundreds of thousands were displaced. The most war-affected regions with the highest percentage of Internally Displaced People (IDPs) located in Tigray and Afar, while some deportees from Eritrea also went to reside in urban areas of Amhara. While the rehabilitation of deportees after the war did include household assistance, humanitarian mine clearance, and rehabilitation/maintenance of road infrastructure, it did not include employment or other longer-term capability building programs (Mussa 2003). Nonetheless, IDPs from the war started returning home in stages starting around June 2000 with most having returned by 2002. Those that did return home faced a significant threat from mines used during the war in addition to lost/damaged property and decline in land production (UNDP Emergencies Unit for Ethiopia 2002*a*).

Notwithstanding, there were already high numbers of IDPs in Ethiopia before the war. Drought conditions in the North in 1999/2000 led to increased numbers of IDPs and humanitarian assistance as entire families left their villages and food insecurity grew. In April 1999, there were over 315,936 IDPs from 8 wordas in Tigray itself (not including the 1,000 people from Zala Ambessa who gathered around Bahti, a valley northeast of Adigrat). These IDPs from rural areas, whether from drought or war, left with limited personal belongings and lost their means of livelihood. IDPs from urban centers, who were often self-employed private/government employees, fared no better as they too lost their houses and other livelihood means (UNDP Emergencies Unit for Ethiopia 2002*a*).

Assistance to IDPs went though the World Bank (WB) financed Ethiopian Recovery Program (ERP), where over ETB 157.8 million ($18.6 million) was allocated for social rehabilitation and reconstruction work, excluding work in Zala Ambessa (UNDP Emergencies Unit for Ethiopia 2002*a*). Yet, delivery of this aid was not simple funds were not used to its full potential. In North and South Gondar, most of the

population faced high levels of food insecurity—many, if not most, were dependent on food aid. Exacerbating this was an uncontrolled population growth of both humans and cattle, which forced residents to move higher into the mountains and into nature. Food aid in Gondar was hindered, though, by the fact that areas were often inaccessible by truck or by even foot when rivers are swollen and roads destroyed by rain and landslides during the rainy season. Although donkeys transported much of the load, many carried the heavy sacks of aid on their shoulders. People without pack animals had to pay over 50% of their grain load to owners of donkeys for transport, which deprived the most vulnerable of their food rations (UNDP Emergencies Unit for Ethiopia 2002*c*).

Though the war did initially hurt the Ethiopian economy, it strengthened those in power. Between 2004 to 2009, Ethiopia had one of the quickest growing economies in the world with an average annual economic growth rate of 4.8% in the 2000s as compared to .5% in the previous decade and reconstruction period. Nonetheless, GDP per capita remained one of the lowest in the world (Foster and Morella 2011; UNDP Emergencies Unit for Ethiopia 2002*a*). Lost business due to the loss of the Eritrean trade market (especially for livestock and petty trade), high transport costs of regional trade, and poor road networks became major challenges in the north and hindered economic prospects following the war. The Sudanese economy and Port of Sudan were the best options to improve trade, yet few commercial market opportunities could be created in Sudan. Fixing such economic hurdles would require road rehabilitation to help open markets and facilitate purchase and transport to areas in the north, which were in chronic need of the goods and trade. The road connecting Humera to Shiraro helped with this once it was updated, but did not solve all infrastructure related problems in the area (UNDP Emergencies Unit for Ethiopia 2002*a*).

Regardless, Ethiopian-Eritrean War was not the only conflict occurring during

this time. During the war, Eritrea supported the Oromo Liberation Front (OLF) and ONLF in Ethiopia who were fighting for independence of Oromia and Ogaden respectively. Residents in these areas generally saw money being spent on new jet fighters and weaponry from Russia rather than being spent on neglected infrastructure in their regions, which still had low levels of good quality infrastructure as compared to the rest of Ethiopia (Keneally 2000). These disputed regions in the south were awarded to Ethiopia by the British in 1954 and has since been the cause of two wars between Ethiopia and neighboring Somalia.[15] This support did not go unnoticed and Ethiopia retaliated by supporting groups in Eritrea (specifically the Eritrean Islamic Jihad) and Sudan (the Eritrean Islamic Salvation) who then attacked along the Eritrea-Sudan border. A report by Ethiopia's National Intelligence and Security Service and the Federal Police Anti-terror Task Force described how Eritrean's terror network's plan of action and strategies were targeted at wreaking havoc via orchestrated terror attacks on hotels, main roads, government officials, and institutions in Addis Ababa and throughout Ethiopia. Eritrea, the report claimed, used as instruments of its plans he OLF, ONLF, Ethiopian Patriotic Front, and other Coalition for Unity and Democracy groups (BBC Worldwide Monitoring 2007*a*). The ONLF were also involved in fighting between Eritrean-backed Islamists in Somalia who are fighting against the Ethiopian-backed interim government (Penketh and Bloomfield 2007).

Conflict also occurred in the north (Afar region) during this reconstruction period. Drought conditions and scarce sources worsened relations between Afar and Issa pastoralists who fought in early 2002 and were motivated by territorial claims—the Issa

[15]The ONLF was formed after Ethiopia crushed Somali troops trying to regain areas populated by nomadic ethnic Somalis in 1977 to 1978 and they have been fighting Ethiopia for independence since 1984. The Ethiopian government accuses it of being associated with al-Qaida, but the ONLF denies this claim.

wanted control over the Awash-Logiya road and gain access to Awash River along with wanting revenge over the Boromodaitou battle that pushed them to the east of the road behind the hills (UNDP Emergencies Unit for Ethiopia 2002*b*). Clashes and conflict surrounding natural and infrastructure resources continued between several tribes and ethnic groups in and around Afar Region, which further hampered a critical drought emergency situation. These conflict and security threats led to the closure for UN personnel (and thus aid) of the main road from the Djibouti Port to Addis Ababa that crossed through the Afar region in 2003 (UNDP Emergencies Unit for Ethiopia 2003*c*). The closure of this single road posed a threat to both the political elite in Addis and the rest of Ethiopia as neither aid nor goods could make it to and from the port. In 2007, the Afar Revolutionary Democratic Union (ARDUF) rebels were said to be responsible for the kidnapping of five Europeans and eight local guides. The rebels eventually surrendered and reportedly told a Sudanese agency that, "[They] were hired by Eritrean government to make attacks on Ethiopian forces, people, and infrastructures, since the Ethiopia-Eritrea war broke out" (BBC Worldwide Monitoring 2007*c*). In other words, dissidents recognized that they can include attacks on infrastructure to their strategic plans as a way to achieve their long-term goal (here: secession). By attacking infrastructure, they would diminish the ability of the central state to control them and violently remove a symbol of federal power. This goes against the role of infrastructure in first-order conflict where infrastructure increases dissidents' capability by helping with the mobilization of resources and support. Though mobilization would help with short-term goals (winning battles), more is needed to achieve a group's long-term goals.

In summary, Ethiopia's federal government was pulled in many directions: protecting itself from an international threat that laid across the border, attempting to quell a regional separatist conflict, and addressing the surge of IDPs all while trying

to develop its infrastructure networks and economy. This resulted in spreading thin the government's capacity to create new or alter existing infrastructure policies based on experiences in the previous reconstruction period.

Second Ethiopian Case Reconstruction Policies (2002-2008)

The reconstruction period following the Ethiopian-Eritrean War included many war-specific reconstruction programs. The WB approved two credits totaling $400.6 million to assist the Ethiopian government's post-war ERP. In addition to helping address the immediate needs of about 620,000 war-affected people, parts of the ERP were allocated to go towards the reconstruction/rehabilitation of road and power supply infrastructure in conflict-affected areas that were destroyed during the war to help restart the economy. (World Bank 2000; UNDP Emergencies Unit for Ethiopia 2002*a*; Mussa 2003). Yet, not all war affected areas were met with immediate assistance. Reconstruction of Zala Ambessa, which lays on the Ethiopian border, and surrounding area near the border did not start right away, as such reconstruction depended on the outcome of the border commission. In fact, it was in doubt in 2002 whether administrative structures (to include the woreda administration buildings and high school) would be reconstructed here in favor of moving the administrative center further south away from the disputed border (UNDP Emergencies Unit for Ethiopia 2002*a*).

Such reconstruction policies occurred congruently with other infrastructure policies, many of which were continued from the previous reconstruction period. In fact, between 2003 to 2008, about 52% of Agricultural and Rural Development's total expenditure was directed towards infrastructure and productivity programs. Ultimately, infrastructure spending, which progressively became more a federal responsibility, increased every year during this second reconstruction period (World Bank 2008*b*).

Railways

The Ethiopian Railway Corporation was established in November 2007 as a subsidiary of the Ministry of Transport & Communications. With profits nonexistent, the ERC was entirely dependent on external assistance, which also made it prone to a stream of international contractors. Nevertheless, railway rehabilitation programs were rare during this reconstruction period. In 2003, a grant for EUR 40 million, which was later increased to EUR 50 million in 2006 to reflect higher fuel and steel prices, was prepared by the European Commission for the rehabilitation of the Djibouti-Ethiopia Railway—work funded by this program was still in progress in 2009 after delayed concession talks (Railway Gazette 2007 2009). In 2006, an Ethiopia and South African company signed an agreement to work on sections of the line that deteriorated during the Ogaden War from 1977 to 1978. Though it was supposed to start in 2007, work had not been executed by 2008 (Hadera 2006). Operating trains were few in number, carrying fruit and vegetables, coffee and livestock for export, and returning with construction materials. (Railway Gazette 2009).

Airports

The number of domestic and international takeoffs of air carriers registered in the country in 2009 more than doubled from 1990 to 44,154 flights (World Bank 2012). With Ethiopian Airlines' success, the Ethiopian Airports Enterprise (EAE) was established early in this reconstruction period in 2003. EAE objectives included the construction, maintenance, and administering of good quality airports (Federal Democratic Republic of Ethiopia 2003). It was the first independent, legal entity to run the delivery of Ethiopian airport service. Even though the EAE acts independently with it's own CEO, it is also under the jurisdiction of the federal government—thus, air-

port infrastructure management falls under the Ministry of Transport (New African 2011). This is in light of Ethiopian Airlines' independence from the government. In conjunction with these mixed market-based policies for public Ethiopian airport infrastructure, the government was also focusing on building it's own airports to support their military operations against rebels rather than using civilian infrastructure that would disrupt services, which is also seen a common military necessity in conflict zones. In 2007, the government frantically built a new military airfield in Gewane (in the Afar region), which is about 50km off the road to Addis Ababa and was well positioned to help with conflict along the Eritrean border and rebel activity in the south-east regions (BBC Worldwide Monitoring 2007*b*). Though this divergent policy limited potential funds for public airport infrastructure, this also ensured that the funds used were directed towards the public needs and not the military's need.

Power Plants

The aim of the ERP in regards to power infrastructure was to rehabilitate and reconstruct damaged power supply facilities in towns within the war affected areas, specifically in Zalambessa, Adigrat, Bure, and Mekel'le. This involved the reconstruction and rehabilitation of 65km of 15 kilovolts (kV) line, 27km of 0.4kV line, and 6km of street lights in addition to replacing 29 pieces of 50 kilo volte-amprey (kVA) and 63kVA transformers, two pieces of 450 kilowatt (KW) diesel generators, and 550 single phase customer connections. The power rehabilitation work at Adigrat, Bure, and Mekel'le was completed by 2003. Nonetheless, these power rehabilitation projects involved only the *replacement* of power poles and distribution lines along the *existing* transmission routes (Mussa 2003). Other power plant construction sites were disrupted during the war, but these restarted once the conflict ended, including the aforementioned Tis Abay II power station (Environmental Protection Authority

2012). Not to long after the war's end though, Ethiopia suffered a severe drought in 2003, which reduced reservoir levels and forced sudden and severe power rationing in Addis Ababa and the surrounding area that lasted for six months.

Access to power, in general, remained a significant problem in Ethiopia—21.5% of Ethiopian firms in 2006 identified electricity as a major hinderance to their business as compared to 48.1% of firms in Sub-Saharan Africa overall (International Finance Corporation 2006). There were an average of 5.1 power outages in a typical month, which resulted in a drop of .9% in sales. During this reconstruction period, the EEPCO undertook an aggressive five-year plan, the Universal Electrification Access Program (UEAP), to bring electricity to 50% of the population by extending the grid to a total of 6,000 rural towns and villages by 2010. The UEAP was supported by two WB loans, $133.4 million was approved in June 2006 and $130 was million approved in July 2007. At the start of the program in 2005, EEPCO had 700,000 customers in 470 towns. EEPCO reported that by 2007 it had electrified an additional 758 towns and villages and that access rates increased from 15% to 22%. Access though here refers to having power infrastructure nearby and not necessarily getting the electricity service to one's residence (Hathaway 2008).

Four hydropower plants were under construction during this time: Tekeze (20MW capacity and completed in 2009), Gilgel Gibe II (420MW capacity and completed in 2010), Tana-Beles (460 MW capacity and completed in 2010), and Fincha-Amerti Nesh (97MW and completed in 2012)—all four were large-scale hydro projects as compared to the MSHD focus in the previous reconstruction period (Environmental Protection Authority 2012). These construction projects though faced many delays and setbacks. For instance, the Gilgel Gibe I plant, which began construction in 2005, was supposed to be completed by 2007, but construction was slowed after engineering problems occurred due to inadequate studies during the planning phase.

The final stages were then rushed for a 2010 completion date—right before the May 2010 election. Two weeks after opening, a tunnel collapsed and further hampered power services (Gadaa 2010).

Even with the aforementioned shortages, a large portion of new power supply was earmarked for surplus and regional export under the claim that there was a lack of capacity by the domestic market to absorb the new supply. By the end of this reconstruction period, access to electricity remained low—only 2% of rural residents had access as compared to 86% of urban residents. Moreover, with the energy sector 85% hydropower and growing, Ethiopia remained extremely vulnerable to drought (Hathaway 2008).

Roads

The ERP also included a program to rapidly rehabilitate and restore destroyed or damaged road infrastructure in war affected areas, rehabilitate critical road sections and bridges that suffered serious damage due to an increase in heavy traffic and/or due to the diversion of traffic from the original import/export route to new routes, rehabilitate roads to ensure operational efficiency in the implementation of relief program activities and in the flow of imported humanitarian cargo in selected chronically affected drought areas, and carry out emergency heavy maintenance of priority roads whose improvement was slowed down by the war leading to further deterioration of large sections (Mussa 2003). Just like with power infrastructure, the key here is that the ERP only addressed *existing* road infrastructure.

The Ethiopian-Eritrean War also hampered the implementation of the RSDP, itself, and caused costs to overrun due to mobilization problems, higher fuel costs, and the closure of Addis-Assab freight route that resulted in Ethiopia shifting its primary trade port from Assab to Djibouti (Mwase 2003). For instance, construction

on the Modjo-Awash-Arba road faced quantity underestimation amounting to 17% of the contract. Rapid deterioration in sections of the road between design overlay and actual construction led to changes in road design. Nonetheless, a WB Project Appraisal rated the outcome of the RSDP through 2007 as satisfactory in regards to creating a good foundation for future phases and programs; rates of return were higher than anticipated by about 26-35%; and, the risk to development outcome was rated low to negligible based on the measured performance and continued support of many development partners—the weighted average percentage of works completed (in financial terms) was 94.3% (World Bank 2008*a*).

During this second reconstruction period, there were two more RSDP phases: RSDP II (2003-2007) and RSDP III (2007-2010). These additional road development programs were needed even after success of the first phase—11.8% of firms in Ethiopia still identified transportation as a major hurdle to their business in 2006 as compared to 23.9% of firms in Sub-Saharan Africa (International Finance Corporation 2006). RSDP II had a budget of ETB 15,985.8 million (with ETB 18,112.8 distributed) and planned for 8,486km of work (12,006km were carried out). In 2007, 64% of asphalt roads were rated in good condition as compared to 46% of rural roads were (49% of roads overall were in good condition). 68% of areas in Ethiopia were still more than 5km from an all weather road with an average distance to an all weather road being 13km. With good condition federal and regional roads outweighing the proportion of fair and poor condition roads, the rural population did have better access to resources and opportunities in the form of markets, health services, lighter transport burdens, and more employment opportunities (Ethiopian Roads Authority 2011; International Development Associaion 2009).

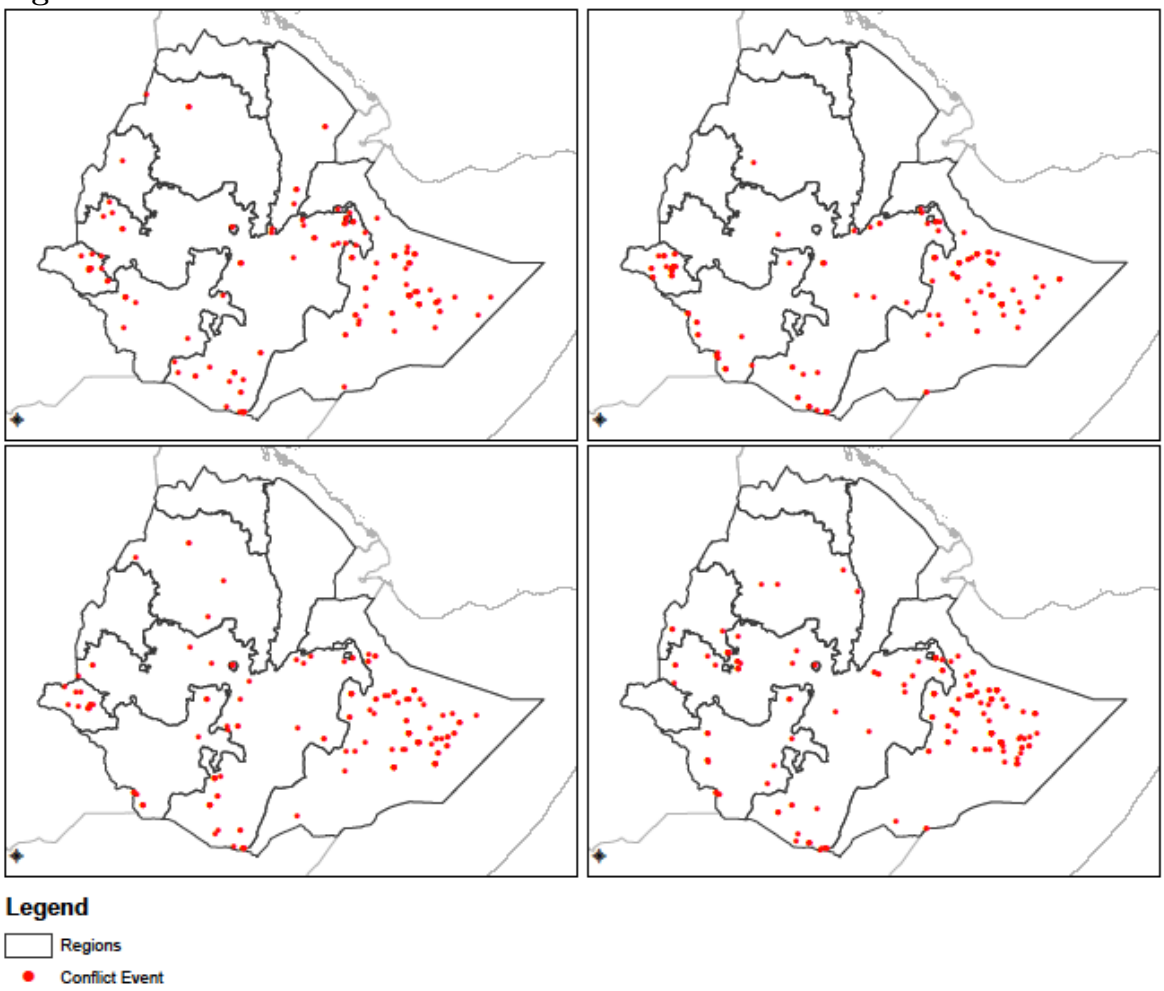
In the latter few years of this reconstruction period, Ethiopia allocated about 3% of its GDP to road investments. Though this is one of the highest rates in Africa,

absolute values of this investment ($5 per capita annually) was remained comparable to other east African counties and most of this investment went towards rehabilitating and updating existing trunk roads and not necessarily expanding access the network (Foster and Morella 2011). At the end of 2006, the overall road network comprised of 39,477km of roads—19,313km of which were federal roads. Despite the strong road policy efforts, Ethiopia still had one of the lowest road densities in Africa (36 km per 1,000 square km in 2006, compared to the African average of 60 km per 1,000 km) (World Bank 2008*a*). With other transport infrastructure (like railways) in poor conditions, about 95% of Ethiopia's passenger and freight traffic depended the road system and private sector transport fleets accounting for over 74% of commercial vehicles in 2003. Most importantly, Ethiopia's road network was commonly the only means of access to rural communities (Mwase 2003).

Looking at the conflict events during this reconstruction period seen in Figure 5.6, the expected pattern of conflict is not seen.[16] Seen instead, conflict numbers and location remains relatively constant—centered around the Somali, Gambela, and South Oromia regions with a few conflict events around the capital and well-connected areas. Nonetheless, the overall miss-prediction rate of Chapter 3's model improves as compared to the previous case with a miss-prediction rate of 10% while never miss-predicting conflict. This over-prediction of conflict appears in the early years in regards to the high number of existing conflict events in the disconnected south. This pattern could be the result of this second reconstruction period following consecutively after the first reconstruction period. In other words, conflict events could not shift towards to disconnected areas, because the conflict was already there. Nonetheless, this reconstruction period reenforced the conflict zone, which then hardened grievances in

[16]See Chapter 3 for an explanation on why this second Ethiopian reconstruction case is truncated at 2008 and does not cover all ten post-conflict years.

Figure 5.6: Conflict Events From 2001-2008



Note: Panels go in time in order from left to right and moving down.
Each panel covers a two year period.
Conflict data comes from Sundberg et al. (2010) and Sundberg and Melander (2013).

the area and decreased the capability/incentive to construct infrastructure in the low infrastructure density southern regions.

Reconstruction Success and Failures According to IST

The consequences seen during the second reconstruction period were often the results of previous decisions and reenforced throughout this later reconstruction period. As described below, there were instances of learning, but recognition does not auto-

matically lead to changed or improved policy with differing outcomes. Nonetheless, the dire urgency for this reconstruction was evident early in the second reconstruction period. In 2003, there was a critical food shortage and nutritional situation in SNNPR and Omo River Valley as crop fields dried up, water ran short, malaria outbreaks occurred, and severe cattle diseases spread throughout these regions. Yet, the most affected kebeles were also inaccessible by road. Aid providers, like Doctors Without Borders, needed to build their own feeder roads to access the worst affected populations, which slowed aid delivery and was not always an available option (UNDP Emergencies Unit for Ethiopia 2003*a*).

National Unity

During this reconstruction period, infrastructure spending increasingly and steadily became a federal responsibility—the federal share reached 72% on average in the last five years of this reconstruction period as compared to only 45% per year in the preceding reconstruction period. Federal investment in infrastructure during this time focused on large scale projects seen as containing national significance (e.g., construction of major roads and hydropower plants), whereas regional governments financed small-scale infrastructure (e.g. rural roads, rural water supply and small-scale irrigation). Though the federal government was in charge of building the infrastructure, it then transferred this new infrastructure to the regions for management and operations (World Bank 2008*b*).

There was reconstruction success regionally with this top down approach, which

helped reduce political instability risks in regards to increasing national unity.[17] During the start of this reconstruction period, many active primary road rehabilitation/construction projects existed in the Somali region and on the main arteries to SNNP. The ERA (with WB help) worked on the road between Harar and Shilable while work on a road between Dire Dawa and Harar was given to a Chinese company. This steady improvement of road access and the opportunities such reconstruction brought to the development of SNNP was seen in a positive light. Before this, potential development had been seen here in futuristic terms and something that happened in other areas. This road policy brought with it the promise of future government investment to an historically ignored area (UNDP Emergencies Unit for Ethiopia 2001).

This regionally-driven development also occurred in ONLF controlled regions in the south and east. By the end of the reconstruction period, federal block grants distributed down to local level administrations and woredas sharply increased development in this area. For example, the Gursum woreda in the Oromia Region had built ten basic alternative schools, three junior and primary school, two veterinary clinics, a health post and a farmer's training centre, and 45km of roads while also electrifying two towns and providing wireless telephone services to 14 rural kebeles. Moreover, in the Somali Region capital, Jijiga, the airport has been tarmacked and a university built (BBC Worldwide Monitoring 2008). Nonetheless, this development did not reduce regionally-based ethnic grievances. The ONLF still saw Ethiopian reconstruction as continuing their plight against the Ethiopian government and fought

[17]By 2009 and the end of this reconstruction period, existing classified regional rural roads totaled by region: Tigray (1,404km), Afar (1,053km), Amhara (2,996km), Oromia (8,123 km), Somali (2,097km), SNNP (7,343 km), Benishangul-Gumz (1,590km) Gambela (846km), and Dire Dawa (188km). Existing of community roads (administered by Woreda offices) totaled by region: Tigray (6,083km), Afar (3,193km), Amhara (22,480km), Oromia (32,215km), Somali (1,351km), SNNP (15,628km), Benishangul-Gumz (3,948km) Gambela (489km), and Dire Dawa (380km) (Ethiopian Roads Authority 2011).

against any federal attempts to incorporate them. In other words, their support could not be bought through infrastructure provision and they already viewed themselves as different enough as not to be incorporated into Ethiopian society, which they viewed as foreign.

It was not enough though to be more connected with the political core, which is not a sufficient condition for political instability as seen in Chapter 4. ONLF's grievances and separate identity were reenforced especially in regards to *how* these reconstruction projects were completed. The China Petroleum & Chemical Corp. (Sinopec) was operating in the Ogaden region of eastern Ethiopia, which was the scene of a protracted civil war between the government and secessionist ethnic Somalis. Chinese companies were seen as willing to go to places where nobody else would go for political or stability reasons (Knowlton 2007). A condition, though, of many Chinese conducted reconstitution projects was access to Ethiopian oil fields, and the oil they extracted went straight back to China and not on domestic market (or even international market) where local need was high. In other words, Ethiopia and oil rich areas in the south and east lost potential profit and financial resources due to hess infrastructure and reconstruction contracts.

The presence of these international workers alongside national attempts to integrate the regions led to continued conflict. A 2007 attack on an Abole oil exploration site in southeastern Ethiopia killed 74 Chinese and Ethiopia workers. The ONLF claimed responsibility for the attack, saying the dead Chinese workers were caught in the crossfire during their assault on Ethiopian soldiers guarding the facility. In addition to this well publicized attack, there have been other attacks on oil and telecommunication workers. Separatist Somalis have told the Ethiopian government not to invest in the area and warned foreign oil and gas companies to stay out of the region as long as the Ogaden people are "denied their rights to self-determination"

(Penketh and Bloomfield 2007; Knowlton 2007).[18]

Following this, the ONLF has assassinated or attempted assassination on government officials and clan elders who opposed them, attacked commercial vehicles, placed land mines on roads, destroyed civilian vehicles, burned villages, and perpetrated other attempts to dispute development in the region. The Ethiopian government attempted to explain away these attacks by claiming that the Ogaden only constitute a third of the Somali Regional State's population (BBC Worldwide Monitoring 2008). Moreover, Prime Minister Meles Zenawi has also stated that, "Such an outrage, the cold-blooded murder of people who were building roads and engaged in other development activities, is a measure of the level of barbarity involved" (Knowlton 2007). Following substantial security operations in early 2008, ONLF activities dropped dramatically, but still had the capacity for small-scale attacks on civilians and villages.

Individual Capabilities

International actors rated as satisfactory the achievement of the RSDP's goal to provide economic opportunity to the rural poor through increased employment in rural road works and more affordable means of transport and services.Yet, only about 7,400 additional people were employed during an average period of 40 months spread over ten contracts in the early part of this reconstruction period—of these jobs, approximately 40% were skilled. Moreover, the number of women employed (14) was still low (UNDP Emergencies Unit for Ethiopia 2002*a*).

The use of international workers during this reconstruction period was explained

[18]This phenomena is not limited to Ethiopia. Chinese companies have invested hundreds of millions of dollars in projects across Africa (to include Angola, Kenya, Sudan, and Zimbabwe) and have built or committed themselves to build railroads, roads, refineries, hospitals and communication networks (Knowlton 2007). While many African leaders are willing to take Chinese money, the population in these ares are often resentful and accuse China of being modern colonialists (Penketh and Bloomfield 2007).

away again by pointing to the lack of training and experience. Yet, the strategy for rural reconstruction did include government, private sector and donors joining together and working with the local communities to build rural infrastructure and provide basic socio-economic services. This was recognized as creating an enabling environment with empowerment and capacity-building at the local level (Ethiopian Roads Authority 2011). From 1995 to 2010, a wide range of training programs for sector professionals were created by ERA training centers in Alemgena (7,244 trainees) and Ginchi and Chancho (8,387 trainees) (Ethiopian Roads Authority 2011). Though data on employment and construction was widely collected and those collecting this data recognized that such employment might have multiplier effects on the local economy, no attempt was made to measure potential secondary benefits resulting from greater income, skills earned, and improved service access on national unity (UNDP Emergencies Unit for Ethiopia 2002*a*).

Nonetheless, these employment and training indicators could have been much higher. Chinese workers were still being imported to build roads, pipelines, and other infrastructure projects at the expense of the local workforce—as seen in the previous section (Penketh and Bloomfield 2007). These workers often worked and lived separately from the Ethiopian people, which further exacerbated negative feelings towards them and the perception that outsiders were taking away Ethiopian jobs.

Sustainability

Development objectives for infrastructure programs were broad—this was true even after objectives were tightened up in the later phases based on the experiences in the previous reconstruction period. For example, specific mention is made in RSDP II of environmental and social sustainability and more focus placed on developing the capacity and increasing the participation of domestic consultants and contractors in

addition to addressing development issues down to the woreda and community level (World Bank 2008*a*). Yet, much of this remained on paper only with no changes to improve sustainability seen on the ground in this later reconstruction period.

Ethiopia's power infrastructure particularly faced a lack of sustainability planning. Hydropower policies made during this time continued to ignore the most pressing energy concerns of the population—for example, the need for alternative cooking fuel and lighting in rural areas. Money was diverted from solving these issues to building new dams. Traditional biomass, which accounts for 95% of Ethiopia's energy consumption also hurt the Ethiopian environment—only 7% of Ethiopia's original forestland remains and the country loses an estimated one billion tons of topsoil every year. Much of the deforestation was due to expansion of crop and grazing lands in addition to the wood-based energy consumption—approximately 85% of the population participates in the agricultural sector in the form of rural, small-scale farms, which accounts for nearly half of Ethiopia's GDP and 90% of its exports. The results of this deforestation has been rapid soil degradation, massive erosion, and sedimentation that have reduced water levels in rivers, underground aquifers, and dams. All of which lead to reduced power hydropower production (Hathaway 2008).

Such lack of sustainability in infrastructure networks remained a problem throughout this second reconstruction period. In regards to road infrastructure, funds for road safety from the Road Fund overwhelmingly focused on road maintenance and not to altering social conditions that threaten sustainability—only 1.14% was allocated towards road safety, which remains a critical issue in Ethiopia and requires investment in road control technology and surface technology. Power cuts, which averaged about 15 hours twice a week, were estimated to cost the economy 15% of the daily GDP or $200 million in annual productivity, due mostly to reduced outputs of industries by up to 40%. Moreover, new hydropower plants were at increased risks of lost produc-

tion due to continued drought conditions and lost revenue from increased hydropower exports (Hathaway 2008).

To combat negative consequences of their policies or other extreme situations, Ethiopia has a history of resorting to resettlement programs. Programs that were unsustainable over time. Communities negatively affected by dams (both host communities and downstream users) were often not consulted, given little consideration, and typically did not receive adequate compensation or resettlement packages (Hathaway 2008).

Early in 2003, the government and the Ministry of Rural Development Amhara Region created a voluntary resettlement program to deal with food insecurity by relocating people from all zones of the Amhara region (except West Gojam) to the North Gondar Zone woredas of Metamme, Quara, and Tach Armacheho.[19] Integration packages in the form of food aid and agricultural tools, to include an ox and three hectares of land per family, were to be provided to the settlers. These settlers though faced inadequate infrastructure and social services at the new resettlement sites. In one site, there was only one primary school, few inadequate water sources, and no health care centers. Between Gondar and Sudan, there was a relatively good road with 30 kilometers of this road—from Shehedi (Metemma town) to a junction—being all-weather. But, the road from the junction to resettlement villages (about 10km) was a only dry-weather only road, which means the resettlement village was cut off from aid, economy, and services during the rainy season (UNDP Emergencies Unit

[19]From January 28 to 30. 2011, a few weeks before the new resettlement program was to begin, a joint workshop was organized by the Ethiopian Society of Sociologists, Social Workers and Anthropologists and the United Nations Emergencies Unit for Ethiopia, entitled: 'Settlement and Resettlement in Ethiopia: Population Displacement, Pastoralist Sedentarisation and Peace Making.' The workshop presented the findings of a wide range of complex socio-economic, cultural, environmental, institutional and political implications of resettlement carried out in the 1980s. The findings indicating that if successful resettlement are to be carried out in the future, they should be based on careful, gradual planning with voluntary participation (UNDP Emergencies Unit for Ethiopia 2003*b*). As such, Ethiopia was aware of the potential consequence and necessary investment required for their policies.

for Ethiopia 2003*b*). The UN recognized that the Ethiopian government did not have capability to fulfill infrastructure needs in resettlement sites.

Table 5.2: fsQCA Solution Membership Scores for Second Ethiopian Case

AID*POORQUALITY	UNEMPLOYMENT*POORQUALITY	aid*poorquality*PERIPHERIES	Political Instability
0.50	0.66	0.06	0.78

Note: CAPS represents membership while lowercase represents non-membership.

With the second reconstruction period, Ethiopia went from the most deviant case to a mixed case: two conditions showed Ethiopia as a typical case with the predicted reconstruction conditions and resulting political instability and one configuration showed Ethiopia as a most deviant case for overage by lacking certain conditions while still having political instability—see Table 5.2 for these membership scores. This latter configuration (unemployment*aid*poorquality*PERIPHERIES) remained at the same membership score from the previous reconstruction period. In short, regions in Ethiopia remained disconnected from the political core, while still having other reconstruction conditions that led to increased grievances. Secondly, Ethiopia's unemployment numbers began effecting Ethiopia's instability levels—as seen in the second configuration (UNEMPLOYMENT*POORQUALITY). This increased membership in high unemployment does not mean, in Ethiopia's case, that many people lost their jobs—more people had entered into the traditional workforce as their means of livelihood ended (due to drought and reduced of arable and fertile land) and more perceived opportunities existed in part due liberalization and reconstruction projects. Yet, this was only a perception as reconstruction jobs often went to international contractors and liberalization did not bring the promised economic growth in labor intensive areas. This higher membership score also unmasked the effect of Ethiopia's poor quality membership score. Finally, continued drought and

famine conditions increased the number of people effected and the discrepancy in the type of post-conflict aid received, as seen in the increased membership in the first configuration (AID*POORQUALITY). Nevertheless, short-term relief came at the cost of long-term investment into reducing future political instability risks.

This second reconstruction period was filled with unfulfilled recognition of needed policies. After failed resettlement programs, Ethiopia stablished in 2005 the Productive Safety Net Program (PSNP) that included a public works program to employ affected populations during difficult times in the building of roads and other infrastructure in exchange for cash payments.[20] The PSNP attempted to fundamentally alter the in-kind transfers scheme financed through emergency-based appeals to more predictable cash transfer schemes in exchange for small-scale productive public works. The longterm goals of the PSNP was to improve access to agricultural land through voluntary resettlement, rebuild eroded assets, raising the productivity of traditional agricultural activities, and promotion income diversification among food-insecure households (World Bank 2008*b*).

The Ethiopian Rural Travel and Transport Program (ERTTP), a component of the RSDP, was launched in 2001 and was driven by rural communities at the grass-roots level. The ERTTP focused on developing and implementing policies to improve access to social and economic centers. Solutions embodied in the ERTTP strategy included both transport and non-transport interventions: the improvement of access through the development of road infrastructure and improvement of mobility by increasing the availability of affordable transport. This was to be done though an emphasis on constructing low cost roads, footpaths, trails, and providing other infrastructure that would reduce the burden of travel and transport. A pilot program was conducted in

[20]The program also distributed free food to orphans, the elderly, the disabled, and others who cannot work.

eight woredas; key lessons learned from this program included: the technology choice for implementation (predominantly labour-based operations), maintenance arrangements for the completed roads, and capacity building assistance to both the regional Road Authorities and Woreda road desks. The pilot program was later expanded to include preparation of over 130 Woreda Integrated Development Plans and the construction of a series of trail bridges (Ethiopian Roads Authority 2011).

Such programs offered the opportunity to address many of the reconstruction failures mentioned during this and the previous reconstruction period. Yet, these were the exception rather than the norm and implementing them at a national level seemed to be outside the capacity of the Ethiopian government.

Conclusion

To prevent system collapse and reconstruction failure, it is of vital importance to understand why infrastructure and reconstruction induced political instability can occur. This chapter attempted do just this by addressing why infrastructure and reconstruction conditions have lead to political instability previously. Ethiopia's political elite held a deterministic viewpoint of infrastructure and did not fully appreciate how their reconstruction could be strategically used to support their long-term goals. I show in this Chapter just how various infrastructure and reconstruction decisions in Ethiopia eventually added up to promote political instability and far spread consequences in the future. This case study is not perfect. I relied heavily on United Nation and World Banks program reports, the text of the policies themselves, and news articles about events during that time period. Missing here is the perspectives from the actual contractors or others constructing the infrastructure and the population at large when they received infrastructure goods. Nonetheless, this case study provided a unique perspective into this portion of Ethiopian history.

Nonetheless, conflict in Ethiopia qualitatively followed the hypothesized pattern. As time passed, conflict moved into the region with the least amount of infrastructure and thus cut off from the political center. Where and how infrastructure and reconstruction was provided in Ethiopia has bolstered a physical and socially learned psychological separation between the Somali region and the central state. Viewing Ethiopia as an occupying force, secessionist rebel groups continue to fight for an independent state in the east and south (Marcus 2002; Hagmann and Korf 2012). Rebels adapted their policies to deny public good allocation, which prevents a unified system and identity while increasing political instability. This tactical choice is the result of learning how to manipulate public good provision.[21] At the same time though, the Ethiopian government also prevented aid organizations from having free access to the region claiming they are supporting rebel groups in the area (Hagmann and Korf 2012). Even without such intervention, development projects face difficulties providing services to the Somali region due to poor infrastructure (Abdullahi 2007).

Ultimately though, the urgent need of a formalized overall transport master plan was recognized during this reconstruction period. A 1995 Bank Transport Sector Memorandum, which was a major component of the RSDP, covered the expansion of the international airport, the rehabilitation of the Addis-Djibouti railway, and the need for inland container depots. Yet, the linkages between such initiatives were lacking and thus the consequences of such reconstruction as a whole remained unclear (World Bank 2008*a*).

From 2000 to 2011, infrastructure contributed .6% to Ethiopia's annual per capita GDP growth. In fact, if Ethiopia increased its infrastructure endowment level on par with other middle-income African countries, annual growth can be increased by another 3% points. Yet as of 2006, there was a $3.5 billion gap annually between

[21] See Cunnhingham and Weidmann (2007, p. 9-11) for more discussion on this topic.

available funds and what was actually needed. Moreover, Ethiopia's infrastructure system is relatively inefficient—an estimated $.5 billion (or 3.4% of GDP) is lost annually by various inefficiencies in infrastructure operations or spending—the single largest cause of this loss relates to under-maintenance of infrastructure assets. In 2011, about 26% of Ethiopia's infrastructure were in need of rehabilitation. For road infrastructure, under-maintenance leads to additional capital spending of $263 million (2.1% of GDP). Timely maintenance can prevent rapid deterioration of assets while reducing the massive rehabilitation backlogs. Additionally, inefficiencies in the power sector itself total 0.66% of GDP and under-collection of revenue (particularly with regard to power tariffs and fuel levies) accounts for $44 million per year, while distribution losses (mainly in the power sector) contribute a further $33 million per year (Foster and Morella 2011).

By 2020, Ethiopia will need to double its 2011 road capacity (Foster and Morella 2011). Only 20% of Ethiopia's rural population lived within 2km of an all-weather road by 2011 (with 76% of Ethiopia's population living in rural areas). Yet, connecting this disperse population via an all-weather road network within 2km would require tripling the road network (Foster and Morella 2011). Nevertheless, maintenance and pricing policies would not fully eliminate the funding gap. To move out of this current infrastructure deficit, an annual expenditure of $5.1 billion over a decade is needed, which is beyond Ethiopia's capacity and more than 40% of its GDP. Additionally, this figures does not include the possible increased cost of provision that IST recommends as needed (job training and continued maintenance). Some argue that the focus on infrastructure has led to failing in other areas, specially education and health (Environmental Protection Authority 2012). Thus, agreeing on and/or receiving necessary funds would be difficult and require convincing others of infrastructure's role in improving other development sectors—a task IST can help with.

Nevertheless, in the creation of national infrastructure plans in Ethiopia and around the world, there is a focus on how policymakers must decide between attempting to equalize investment and benefits across regions and sectors to how much growth in national product would be surrendered for a given amount of equity (Alonso 1968). Such a prospective though is limited within first order thinking and does not address the impact of society's use of and dependency on infrastructure networks, the consequences of which transcend measures of economic growth. Thus, the potential cost of these technical configurations failing (especially in regards to political crises and social upheaval) cannot be considered in such a mindset. Consequently, reconstruction policy that is an extension of political strategy must appreciate society's dependency on infrastructure networks and the pervasive consequences of failure, which requires a long-term, second order perspective.

Chapter 6

NO MORE AD-HOCRACIES: POLICY RECOMMENDATIONS FOR FUTURE RECONSTRUCTION OPERATIONS

In light of recent post-conflict reconstruction policy failures, this dissertation has attempted to answer two broad questions. *Why are current reconstruction efforts failing to reduce political instability or even, in some cases, increasing it?* And, *how can reconstruction efforts be organized to do better?* Existing literature could provide limited answers. As described in Chapter 1, they have failed to see the unique complexities behind infrastructure as a public good: they view infrastructure as a capability rather than part of a ever-changing system that shapes political stability and instability; agency is limited to be linear and in the short term while learning (direct and indirect) is outside its scope; and their prescribed solutions revolve around preventing structural misallocation of public goods rather than incorporating normative ideals such as political stability. A new theory was needed that incorporated infrastructure's long-term qualities and role in shaping society along side the normative goal of political stability.

I developed such a theoretical framework, Infrastructure Stability Theory (IST), in Chapter 2. I argued that there are two types of infrastructure politics: first and second order politics. In first order politics, infrastructure is a material capability, where actors and politics are concerned with immediate intent and adaptation and conflict is driven by *short-term* goals and retaliation. With many actors acting within this short-term perspective, overstatements on the power of infrastructure (in terms of technological fixes and jumps) are unsurprising. In second order politics though, the focus shifts to a *long-term* perspective on the politics surrounding infrastructure

and its socio-technical system. In these systems, the interaction of infrastructure, power structures, and the public over time leads to political instability, and conflict is driven by long-standing grievances and group identity. In short, agency is given to society (and thus politics) while acknowledging technology's push in specific directions (Fritsch 2011). This long-term conceptualization and system-level model of infrastructure's role in political instability has been missing from previous theories, which focuses on the short-term and, I argue, first order politics.

Briefly put, first order politics and exiting literature largely predicts that conflict risks will spike after infrastructure provision and the initial phases of reconstruction. Such conflict occurs in subnational/local areas where there was already a history of conflict between groups, there was high political distrust in the central government, and/or there was a latent dissident group. When infrastructure is newly provided in these areas, new conflict can be sparked based on: the intermingling of groups with a violent history, dissidents reacting defensively to perceived repression, and groups taking advantage of their increased capacity to mobilize support and resources. Nonetheless, I argue that second order politics offers the *potential* for a drop in conflict. Infrastructure can connect areas physically to the political core, national economy, and national identity in these socio-technical systems. If national infrastructure is dispersed throughout the country, distant areas from the political core are no longer distant, the influence of the political core will not decay across large territories, and the risk of conflict driven by second-order politics drops. As such, accounting for second-order politics in reconstruction policies will create an inverted-U shape of conflict risks. With this inverted-U conflict risk, conflict is inevitable. However, if policymakers acknowledge and plan for the initial conflict outburst and forecasts are accounted for during the planning process, conflict risks will fall over time.

Yet, second order politics can trigger conflict coming as a result of the clash between the long-term goals of the state with the long-term goals of a group. Given that states recovering from conflict are also commonly composed of a diverse set of people (ethnically and religiously) across a large area, the risk of political grievance and/or potential separatist feelings remain high if left unattended (Fearon and Laitin 2003). This is especially true when such diversity is geographically reinforced. If peripheries are cut off from the political core by a lack of infrastructure, the control and influence of the political elite will decay in these areas. Such cut off peripheries are prone to having feelings of psychological separation, which increase grievances, resentment, and mobilization against the political core (Olzak 1983). Moreover, active rebels would have a place to hide (Fearon and Laitin 2003). As such, the aforementioned inverted U relationship, where conflict risks eventually drops, will not occur.

To illustrate the need for IST and the existence of IST's novel second order politics and varying long-term consequences of infrastructure, in Chapter 3 I presented a geospatial-temporal study on a sample set of 33 post conflict cases where reconstruction was needed. The unit of analysis for this study was not the case but rather the PRIO-GRID (Tollefsen, Strand, and Buhaug 2012). By doing this, I was able to set this analysis out by accounting for varying levels of infrastructure access at the subnational level. This required creating density and presence measures for four types of national infrastructure: roads, railroads, airports, and power plants. This longitudinal model allowed me: to connect place, time, and attributes (Paul et al. 2005), see how levels of different types of infrastructure influences political stability, and test the existence of IST's novel second order politics. Supporting these results of the longitudinal analysis were vignettes on Chad and Sri Lanka.

The results of the GLMM in Chapter 3 show that *merely having infrastructure is not enough to eliminate conflict risks associated with having infrastructure over*

time. In short, infrastructure's long-term influence after a conflict cannot not be overlooked. Taking account of this influences requires the incorporation of a long-term perspective and infrastructure's role in shaping a population. With infrastructure's inverted U relationship to conflict and general drop of conflict risks with infrastructure access as time passes, policymakers must then convince constituents and funding agencies to continue investing in infrastructure throughout turbulent times and initial spikes of conflict. At the same time though, different types of national infrastructure have different influences on conflict risks during post-conflict reconstruction. While each infrastructure type has its own effects based on how it is used, its history, and where the infrastructure is typically built, each is necessary and all are components of reconstruction policy as a whole. When considered together, one can truly begin to appreciate the role of infrastructure post-conflict and the difficulties faced in creating good and comprehensive reconstruction policy.

Nevertheless, it was not enough to show the existence of second order politics; also needed was an understanding of just <u>*how*</u> second order politics leads to political instability. Chapter 4 did just this by analyzing IST's necessary and sufficient conditions by way of a fuzzy set qualitative comparative analysis (fsQCA) (Schneider and Wagemann 2012; Rihoux 2008; Ragin 2008). The focus here was theory evaluation and see whether the hypothesized causal mechanisms were supported by case knowledge and data (Schneider and Wagemann 2012). In other words, finding common policy outcomes that are associated with political instability.

As described in Chapters 2 and 4, the socio-technical system surrounding infrastructure must also give capability-building benefits to the local population and be sustainable across time—in addition to directly connecting peripheries to the political core and national identity via infrastructure. In second order politics, power is delivered to society at large via capability building benefits—benefits that increase

individual capabilities that allow individuals to better themselves and their families and thus boost real, sustainable freedom (Sen 1999). If the local population does not see the full potential benefits from the creation of the infrastructure, grievances against the state and those doing the reconstruction would then increase. At the same time, infrastructure's benefits are not self-reinforcing and the initial investment must be continuously re-provided in order to maintain infrastructure benefits (Sen 1999). Poor quality infrastructure is just one characteristic of an unsustained infrastructure brought about by the lack of investment and up-keep that puts a system at risk of failing. In the long-term, poor-quality infrastructure erodes beyond usability and increases political instability risk by increasing system uncertainty.

Following this, I describe in this chapter how four reconstruction conditions (cut off peripheries, reconstruction aid discrepancies, high unemployment during reconstruction, and poor infrastructure quality) explain political instability as an outcome—or how infrastructure and reconstruction lead to political instability. Independently, having cut off peripheries did not meet the requirements to be a necessary condition of political instability, though it is part of two disjunctive sufficient configurations. In other words, cases with political instability are also likely to have cut off peripheries. Nonetheless, this condition also appeared in the final solution for political instability sufficiency: no aid discrepancies and no poor quality infrastructure and cut off peripheries. The cases explained by this configuration did not need additional reconstruction based grievances to motivate opposition forces as peripheral nationalism grew unchecked. In fact, there was evidence that the political elite in these case have attempted to provided infrastructure in a comprehensive and sustainable manner. Yet, this relatively good infrastructure system meant that rebel groups were better able to conduct their attacks against the political elite. This result matches what was seen in Chapter 3 where the model marginally fits better in areas with no preexisting

political grievances. In both, costs of having high grievances can be mitigated by having access national infrastructure.[1]

The two other configurations in Chapter 4's results demonstrated how reconstruction conditions can feed into feelings of deprivation, both relative and absolute. With the first configuration (high unemployment and poor quality infrastructure), both high unemployment and poor quality infrastructure feed into feelings that an individual and/or group is not receiving all the potential benefits of infrastructure reconstruction in regards to capability-building and long-term sustainability. In comparison, the second configuration (aid discrepancies and poor quality infrastructure) demonstrated how reconstruction can also feed into feelings of absolute deprivation where little if any new infrastructure provision was being done and the infrastructure that did exist was of bad quality. These feelings of deprivation lead individuals to be recruited into social movements and political violence against the political regime as they fight for what they view as rightfully theirs (Gurr 1970).

Projecting policy outcomes requires information about *why* things (infrastructure, politics, conflict, society, etc.) look and work the way they do on the ground in an actual case. This called for a case study approach(Fritsch 2011). As such, Chapter 5 included a qualitative case study into IST's causal mechanisms via process tracing in Ethiopia—this case was chosen based on the results of the previous two chapters. Ethiopia experienced two back to back reconstruction periods during during this time: following the Civil War from 1991 to 2001 and following the Ethiopian-Eritrean War from 2001 to 2008. I cover both reconstruction periods in Chapter 5, which allowed

[1]This result holds true for major roads when considering different infrastructure types. But, the opposite is seen with power proximity where high levels of power proximity in areas of high grievances actually experience higher conflict risks. As explained in Chapter 3, the divergent result of power plants are a result of where this infrastructure is being placed and how power is being used. With high grievances, these power plants become bigger symbols and targets of political power. At the ams time, power plants give both potential and active rebels increase capability to act on their grievances.

to be track policy changes and resulting consequences in a most-similar situation.

During the first reconstruction period, infrastructure and reconstruction responsibilities were essentially evenly split between the federal government and regions, but the federal government still had a majority say. Though this top-down decision structure might have helped prevent unnecessary projects and local corruption, this inflexibility to local needs and desires also opened the door to unexpected results and infrastructure miss-provision, especially in ethnicly empowered regions. As time passed into the second reconstruction period, infrastructure spending increasingly and steadily became a federal responsibility. Just because reconstruction and infrastructure were federal responsibilities does not mean that they operated with a national plan that considered both the big, national picture and the small, local pictures. Federal investment in infrastructure during this period focused on large scale projects the contained perceived national significance (e.g., construction of major roads and hydropower plants), which meant that regional governments financed small-scale infrastructure (e.g. rural roads, rural water supply and small-scale irrigation). This project level focus ultimately resulted in uneven reconstruction. Ethiopia's version of top-down ethnic-federalism inhibited national plans required for an infrastructure network that connects all area together and to the political core.

The use of international contractors was seen as a necessity during the first reconstruction period due to a perceived low level of local capacity and experience. First order successes seen in increased project numbers and budget/aid allocation seemingly outweighed second order costs (the loss of employment opportunities). Many of those around and available to work on reconstruction projects were outside the traditional labor force and/or making the transition into such employment—feelings of deprivation or grievances where not fully ignited. Nonetheless, these long-term, second order risks in the form of lost employment and capability-building opportuni-

ties would eventually effect Ethiopia's political instability. During Ethiopia's second reconstruction period, international contractors (especially those from Chinese companies) remained the major implementors of federal rehabilitation, upgrading, and construction projects even as large numbers of able and willing locals were available (World Bank 2008*a*). The presence of these international workers alongside national attempts to integrate the regions led to increased political instability, especially in the southern portion of Ethiopia which was essentially cut off from political core and national identity due to a lack of infrastructure.

In both reconstruction periods, Ethiopia's infrastructure network was of general poor quality—though large strides had been made in the various reconstruction programs. Sustainability requires more then a focus on infrastructure; the system around infrastructure must also support long-term sustainability. Though the federal government was in charge of building the infrastructure, it then transferred this new infrastructure to the regions for management and operation (World Bank 2008*b*). Profit-generating infrastructures never had a profit during this time and relied on government funds and aid, both of which were not sustainable. On top of this, Ethiopia has a history of resorting to resettlement programs when infrastructure projects had large negative effects the population—programs that were unsustainable over time. This lack of sustainability planning meant that investments took longer to be returned and that the potential benefits of national unity and capacity building could not fully take hold in order to combat political instability risks.

Conflict in Ethiopia generally follows the hypothesized pattern. As time passed, conflict moved into the regions with the least amount of infrastructure and thus cut off from the political center. Where and how infrastructure and reconstruction was provided in Ethiopia has bolstered a physical and socially learned psychological separation between the southern areas and the central state. Viewing Ethiopia as an

occupying force, secessionist rebel groups continue to fight for an independent state in the east and south (Marcus 2002; Hagmann and Korf 2012).

To sum up, this dissertation has shown through these three separate but complementary methods that infrastructure's role in society over time cannot be overlooked as it has previously. Infrastructure is more than just a technology. It is part of a dynamic system where infrastructure, power structures, and the public continuously interact and become dependent on each other. Infrastructure failure in this system results in in political crises and social upheaval that spread far beyond the infrastructure networks themselves. By incorporating a long-term perspective, IST allows for existing research to be updated to better capture the consequences of infrastructure and reconstruction and new theories become possible using IST as a foundation. Ultimately though, IST provides key insight into how reconstruction can become an extension of political strategy to achieve long-term goals.

Iraq Reconstruction Success and Failures

The ultimate goal of this dissertation was to provide policy recommendations for future stabilization and reconstruction operations (SROs). These operations provide a combination of security, reconstruction, relief, and development services to unstable, fragile, or failing states—such operations commonly follow a major and/or drawn out conflict (Office of the Special Inspector General for Iraq Reconstruction 2013). The new theory on the relationship between infrastructure and political instability presented and evaluated here provides useful input into the redesign of reconstruction policies that unintentionally increase political instability risks. As discussed in Chapters 1 and 2, Iraqi reconstruction failures highlight the importance of this dissertation and related research when creating improved post-conflict reconstruction policies.

The remaining portion of this final chapter brings together the results discussed

above to form such policy recommendations. To ensure my policy recommendations match what occurred in Iraq and are placed within current policy debates and predicaments, I interviewed the Special Inspector for Iraqi Reconstruction, Stuart Bowen, Jr. During this in-person interview, we discussed the policy implications of my results and lessons learned (some of which were not in any of SIGIR reports) and potential plans, policies, and institutions for future post-conflict SROs.

Although I have been describing Iraqi reconstruction as a policy failure, the success stories in Iraq should should not be overlooked. After Hussain's removal from power, the US and others did make large gains in rehabilitating and building new infrastructure, which was in general disrepair and collapse. During the 1980s, the average electricity produced from Iraq's power plants increased from about 1,200MW to 3,100MW and generally kept pace with the population's rising demand. Yet, airstrikes during the 1991 Gulf War damaged Iraq's power infrastructure and caused a drop in production to under 2,200MW. Repairs did eventually boost average production to more than 3,600MW by 2002, but this was still not enough to meet the country's demand. The 2003 invasion, postwar looting, and insurgent sabotage drove production levels down to a new low of 711MW produced in mid-April 2003. In July 2003, the CPA set a goal to increase generating capacity to 4,000MW by October 2003 (this benchmark was later increased to 4,400), 5,000MW by January 2004, 7,000MW by 2005, and to 14,000MW by 2009. Thermal plants provided most of Iraq's electricity pre-invasion, but US investment focused on providing combustion-turbine power, which was seen as more technologically advanced and easier to construct—this new source was the main power producer by 2008. Although power infrastructure did expand production and access, a promised level of 6,000MW was not sustainably reached until 2009. Although total electricity supply more than doubled from 2004 to 2012, demand increased at an even faster pace mainly due to the modernization of

infrastructure across the board, a flood of energy-consuming products following the removal of sanctions, and ineffective enforcement of electricity fees. Power outages were common (7.6 hours on average per a day) and most households (9 out of 10) supplemented their power supplies with backyard or neighborhood generators instead of relying on the public grid. This was more than just an inconvenience. When high temperatures hit in June 2010 in southern Iraq, shortages of electricity and potable water spurred violent protest and forced the Minister of Electricity to resign (Office of the Special Inspector General for Iraq Reconstruction 2009, 2013).

During the 1970s and 1980s, Iraq's political elite invested heavily in its transportation infrastructure. Before the 1991 Gulf War invasion, Iraq had two international and three domestic airports, more than 40,000 km of roads, and almost 2,500km of rail lines. Nonetheless, much of this was damaged and left under-maintained due to the Gulf War, neglect, international sanctions, 2003 invasion, and post-war looting. The UN and WB estimated that transportation and communication sectors would require over $3.38 billion of investment to bring back to needed levels. For instance, UN sanctions prevented Iraqi Airways from resuming commercial service between 1991 to 2000. When the coalition invaded, no Iraqi airport could support commercial air operations due to the lack of support systems—airports were primarily used by coalition forces during the reconstruction period. Commercial flights with Iraqi Airlines did eventually start up again in limited areas by August 2004. In regards to rail infrastructure, the US spent about $200 million to provide railroad equipment and rehabilitate more than 200 rail stations (Office of the Special Inspector General for Iraq Reconstruction 2013). Ultimately though, nearly 40% of all transportation funding went to improve Iraq's network of roads and bridges in over 1,500 projects (Office of the Special Inspector General for Iraq Reconstruction 2009 2013).

These project numbers, though, do not and can not tell the full story of Iraqi

reconstruction policy as long-term, second order successes or failures are not captured. This is epitomized in how different actors viewed infrastructure policy success in Iraq. According to General Petraeus, there were colossal benefits to Iraq—as seen in the above description. Yet, Iraqis themselves saw limited positive or even tangible effects of the overall rebuilding effort when compared to the amount spent. This is not surprising. Compared to a bridge over the Euphrates River in Fallujah that remained a symbol of the British program in 1920, a water treatment plant by US in the same area serves less people and was more expensive—not a good symbol for a successful American program.

As mentioned in Chapters 1 and 2, there was no coherent, unified goal for Iraqi reconstruction. One of the earliest pre-war planning documents came from the Office for Reconstruction and Humanitarian Assistance (ORHA), which was established two months before the Iraq invasion in 2003 and directed by a retired Army Lieutenant General.[2] ORHA's *A Unified Mission Plan for Post-Hostilities Iraq* defined the desired end state in Iraq as "a stable Iraq, with its territorial integrity intact, and a broad-based government that renounces WMD development and use, and no longer supports terrorism or threatens its neighbors." How infrastructure was addressed in this early phase is telling: infrastructure was assumed to be "damaged but not completely destroyed. Sufficient infrastructure [would] exist at the end of hostilities—buildings, roads, transportation, communications—to support initial reconstruction and humanitarian activities" (Office for Reconstruction and Humanitarian Assistance 2003; Office of the Special Inspector General for Iraq Reconstruction 2013).

In subsequent Iraq planning documents, the status of infrastructure became more realistic, but the focus remained on the technology itself. USAID's 2003 *Vision for Post-Conflict Iraq* did not set a desired end state or overarching goal beyond the

[2]ORHA was the precursor for the CPA.

claim that reconstruction should restore facilitates back to improved pre-war levels and that returning to pre-Iran-Iraq War infrastructure levels would take years. Each sector (health, water and sanitation, electricity, transportation, telecommunication, and agriculture/rural development) had its own goal based on services provided and a series of milestones ranging from 60 days to 18 months after the fall of Saddam (US Agnecy for International Development 2003; Office of the Special Inspector General for Iraq Reconstruction 2013). These though were based merely on project numbers and services provided. They did not address the connections between infrastructure to potential long-term effects separate from the technology (i.e job training).

In comparison, a CPA's 2003 working document, *Achieving the Vision*, defined the desired end state as a "unified and stable, democratic Iraq that provides effective and representative government for the Iraqi people, is underpinned by new and protected freedoms and a growing market economy; is able to defend itself but no longer poses a threat to its neighbors or international security." The strategies to achieve this goal focused on security, essential serves , economy, and governance (Office of the Special Inspector General for Iraq Reconstruction 2013; Coalition Provisional Authority 2003, pg. 5-6). Rebuilding this infrastructure, the CPA recognized, would help revive the economy, energize the infrastructure, improve well-being, and garner local support for the Coalition. Same as before, CPA's strategies and reconstruction policy focused on restoring infrastructure services only and infrastructure was viewed merely as a technological fix rather than part of a larger Iraqi system.

This translated in early reconstruction phases into an emphasis on large capital projects. Almost $1.64 billion (66%) of Iraqi Relief and Reconstruction Fund (IRRF) appropriation was spent on large projects: $1.1 billion spent by USAID and $518 million spent by Defense. In mid 2004, a worsening security situation led the new US Ambassador to Iraq, John Negroponte, to determined that $3 billion of reconstruction

funds should be reprogrammed to address the worsening security specifically. Following this, the CPA's large civic infrastructure strategy shifted towards improving military forces under the belief that rule-of-law needed the immediate and substantial aid over large reconstruction projects. Yet, US policy could not ignore the terrible infrastructure condition in Iraq. Thus, the role of the Commander's Emergency Response Program (CERP)[3] morphed from a tool for tactical commander to finance quick-impact projects into a program that funded larger projects—transforming the military into 'USAID in uniform' (Office of the Special Inspector General for Iraq Reconstruction 2013).

Taken together, the rationale behind US post-invasion assistance focused on securing and stabilizing a new democracy in Iraq and helping their economy grow—rehabilitating and providing infrastructure was deemed necessary but separate from US' main strategic goals. A senior official was reported to have said that the "invasion seemed to have occurred just as the condition of the entire infrastructure teetered on the edge of the cliff of disaster" (Office of the Special Inspector General for Iraq Reconstruction 2013, p. 75). This problem was fixed by way of first-order solutions: money and technology—as seen above. Coupled with a laissez-faire attitude toward the spending of US tax dollars in Iraq, occurrences of waste and fraud were common. For instance, after $10,000 was requested for a small school refurbishment project, US authorities insisted on giving the project $70,000, which only resulted in waste and the promotion of local corruptive practices. This limited and short-sighted perspective becomes apparent when looking at the status of the reconstruction conditions discussed and examined in this dissertation.

[3]CERP funds came from the DOD budget and was set aside for military commanders to use in conducting rebuilding and reconstruction during the Iraq and Afghanistan Wars.

National Unity

Iraq's borders are a relic of WWI. Within Iraq's borders lay geographically concentrated ethnic groups—the Kurds in the north, Shi'ite in the south, and Sunni in the middle. The history between these three runs deep and is filled with grievances and conflict. This history increases the need to have infrastructure's socio-technical system to incorporate all areas together and to Baghdad. Nonetheless, the US looked at reconstruction as if they were occurring in a vacuum according to an Iraqi official. The Kurdistan region received less than 3% of all reconstruction dollars spent in Iraq—Erbil, the capital of the Kurdistan region, was little more than a transit point between Baghdad and Turkey. Moreover, the Kurdistan Regional Government (KRG) was not included in any high-level meetings during reconstruction planning. Yet, the KRG was able to do what other regions were not and direct and completed their own infrastructure projects. Audits showed Kurdish-directed projects were often in good order and used local resources. After considering the fact that the north was more secure than other areas in Iraq, this divergence of project outcome demonstrates the difference between using money to fix a problem and involving local input, which will be discussed more below (Office of the Special Inspector General for Iraq Reconstruction 2009 2013).

Local Benefits

When planning the reconstruction program, the US failed to sufficiently consult with Iraqi authorities. Without the knowledge of what Iraq needed, US officials turned to shell companies or international contractors. Though shell companies would use local subcontractors, these contractors were often ill-informed themselves or received a project based on corruptive/patronage practices—practices which would only county

through the life of the project (Office of the Special Inspector General for Iraq Reconstruction 2013). On the international side, the USAID was primary construction manager of US and Iraqi funded construction projects. Yet, USAID did not exist then as it did in the 1990s; it had become more a contracting agency (Bowen 2014). Much focus has been placed on contract problems in Iraq. A few of these included: poor quality-control programs, ineffective quality-assurance programs, and a lack of sufficient in-country contracting officer representatives (Office of the Special Inspector General for Iraq Reconstruction 2013). Besides such regulation problems, there were high turnover rates within these contracts that pushed back completion dates and increased budgets. State Department and USAID employees did not sign up to go to conflict zone and they were able to say no and/or leave when things went wrong, which happened often.

It did not go unnoticed that projects worked when Iraqis were included. From May 2003 through September 2012, the US obligated $2.45 billion and spent $2.27 billion to increase Iraq's capacity for governance through targeted capacity-development programs and projects (Office of the Special Inspector General for Iraq Reconstruction 2013). In May 2006, USAID collaborated with the US military to establish a 4-year Community Stabilization Program (CSP) to support the military's counterinsurgency in strategic cities by creating initiatives that would reduce incentives for violence by at-risk youth. generate employment, rehabilitate infrastructure, and stimulate local businesses. Operating in 17 insurgency-affected cities, CSP directly employed more than 47,000 on a long-term bases, provided vocational training to more than 41,000, helped place more than 9,900 vocational training graduates into apprenticeship programs, approved a total of $77.4 million in grants to more than 10,250 business owners, and enrolled nearly 339,000 Iraqi youth in soccer, arts, and

life skills programs.[4] Yet, when SIGIR audited the CSP, it was unable to find direct links between CSP and reductions in violence in the cities they operated in and could not substantiate CSP's claims regarding employment generated by the program. At the same time, SIGIR's reported on evidence to the fact that potentially millions of dollars in CSP fund had been diverted to insurgents (Office of the Special Inspector General for Iraq Reconstruction 2013).

The CPA eventually moved away from its previous infrastructure heavy plans to Iraqi-driven ones focused on increasing self capacity through trail and error(Office of the Special Inspector General for Iraq Reconstruction 2009). In 2006, a spike in insurgent attacks began to directly effect and target local citizens. In what was termed the "Anbar Awakening," some Sunni leaders sought out cooperation with coalition forces. Multi-National Corps-Iraq began to award CERP contracts to employ Sunnies—one of the best perceived of these programs was the Sons of Iraq Project. The Sons of Iraq program used $370 million in CERP funds to employ about 10,000 Sunni insurgents and some Shia militia, to effectively remove them from the battle ground. Even with its success, SIGIR's final report described this program as being far from transparent (Office of the Special Inspector General for Iraq Reconstruction 2013).

Sustainability

One of the key differences between the Marshall Plan and Iraq reconstruction was that the former was loan-based while the latter was more grant based. It was President Bush who insisted on a no strings attached approach towards the funding of Iraqi reconstruction over loans. A large justification behind this decision was a

[4]The CSP was not the only type of program that attempted to incorporate the local population. Military commanders used CERP funds to support a renewed 'clear, hold, and build' program and promote quick-impact, high-visibility projects aimed at reducing the high level of unemployment among young, non-skilled Iraqis and improve local perception of the Coalition. At the same time, these Iraqi-oriented reconstruction programs would also help increase the economic potential of local towns and villages (Office of the Special Inspector General for Iraq Reconstruction 2013).

pre-war assumption that revenues from the sale of Iraq's high petroleum riches would finance the country's reconstruction. To ensure this, US reconstruction policymakers prioritized as critical the rapid post-invasion restoration of Iraq's oil sector in order to achieve the Coalition's strategic goals. Yet, this was not an easy task. Between 2003 to 2007, there were more than 400 attacks on pipelines, refineries, and workers in addition to both the perceived and actual mismanagement of oil wealth created by corruption, smuggling, and diversion. This was not unique to oil-sector reconstruction; corruption and poor security impeded reconstruction progress across the board. Infrastructure security activities, themselves, totaled almost $670 million with 55% of this supporting the Sons of Iraq program. Looking back, some have argued that US reconstruction policies unintentionally fostered a 'triangle of political patronage' with political parties, government officials, and sectarian groups (Office of the Special Inspector General for Iraq Reconstruction 2013).

The lack of financial planning and corruption along with a heavy initial focus on larger project hurt not only project numbers (first order measure), but also sustainability (second order measure). While there were success stories in regards to reconstruction project numbers, Iraqi, and some US, reconstruction actors pointed to unwanted projects and equipment that was too sophisticated for the Iraqis or of very poor quality. Moreover, audits found inadequately designed projects, which were poorly constructed and unsustainable. For example on October 6, 2003, Iraq surpassed its goal and produced more than 4,500MW of electricity, but the grid was fragile and could not handle this increase in electricity, which resulted in more power failures. It was not just about technical in sustainability. Iraq had neither technical knowledge nor motivation to carry out maintenance required after US left in 2011. Yet, SIGIR's primary auditing questions did not address this aspect of projects. Initial questions asked included: was the project properly designed, was an adequate

quality-control program in place, and was sustainability considered and planned for? It was only later that an additional question was added on whether the completed project was operating as intended and the Iraqis were sustaining it through effective operations and maintenance. This lack of sustainability planning was blamed on a perceived launch a large number of programs across wide areas and sectors rather than devote resources to a finite number of worthy and well-focused projects (Office of the Special Inspector General for Iraq Reconstruction 2013).

As has been shown here, Iraq reconstruction contains both success and failure stories. Provincial Reconstruction Teams (PRTs), which first operated in Afghanistan and included military officers, diplomats, and other reconstruction experts. PRTs are perceived as the most innovative reconstruction actors on the ground. There were relatively small units with large political and economic goals. PRTs' missions included increasing governmental capacity to deliver essential services, extending the control of the Iraqi government to all areas within their borders, and increasing stability before the coalition left. These units worked with Iraqi Provincial Reconstruction Development Councils, which were groups of local officials and community leaders in the 15 southern provinces whom were empowered to make decisions about local reconstruction projects.

Successful PRTs approached problems in a holistic manner, requiring military and civilian members to integrate strategies and cultures, which helped PRTs achieve leverage with local leaders and increase the probability of success for their projects. Besides helping provide critical infrastructure, PRT-led projects served as training grounds in program and project management for local government officials for both governance and capacity (Office of the Special Inspector General for Iraq Reconstruction 2013). Yet, PRT success in Iraq depended on the accident of who the person picked to lead the team—often this person had little to no experience.

Lesson Learned

As Bowen himself stated, "We want to reduce chance and control outcomes better" (Bowen 2014). Using its experience and knowledge, SIGIR provided seven final lesson learned from Iraq—see Table 6.1 (Office of the Special Inspector General for Iraq Reconstruction 2013). These lessons were to elicit policy change and be the basis on which future reconstruction policies would be made.

Table 6.1: SIGIR's Lessons Learned

1.	Create an integrated civilian military office to plan, execute, and be accountable for contingency rebuilding actives during stabilization and reconstruction operations.
2.	Begin rebuilding only after establishing sufficient security, and focus first on small programs and projects.
3.	Ensure full host-country engagement in program and project selection, securing commitments to share costs (possibly through loans) and agreements to sustain completed projects after their transfer.
4.	Establish uniform contracting, personnel, and information management systems that all SRO participants use.
5.	Require robust oversight of SRO activities from the operation's inception.
6.	Preserve and refine programs developed in Iraq, like the Commander's Emergency Response Program and the Provincial Reconstruction Team program, that produced success when used judiciously.
7.	Plan in advance, plan comprehensively and in an integrated fashion, and have backup plans ready to go.

Evident in these seven lessons is the need to ensure comprehensive and deep understanding of the host-country in regards to society, culture, governance, and institutions. In short, reconstruction actors should know how not to alienate populations. This requires planning, balancing between US national security interests and the interest of the host nation, and engagement. All three of which were weak within Iraqi reconstruction policies—a symptom of the shift of strategy in 2003 from liberate and leave to occupy and rebuild. Deferring to and fully engaging with host authorities was then seen as a way to prevent unwanted or unneeded projects from being con-

structed while also proving local buy-in to increase sustainability and decrease waste. Moreover, in reaction to seeing projects fall into disrepair after handover, there was a feeling that reconstruction should not build above a country's capacity (Office of the Special Inspector General for Iraq Reconstruction 2013).

Yet, some questioned the ability to incorporate these lessons at a large scale and argue that a modest approach with local projects, rather than a national approach with large projects, is best. Through small and medium projects, self-esteem could be regained, basic needs would still have been met, and national stability created—all while potentially reducing fraud, waste, and abuse as compared to large projects. As the same time, the security situation should play a larger role in shaping reconstruction decision: the more unstable the situation, the smaller the project should be. Though limited projects during unstable times can have counterinsurgency effects, they must be sized to the situation and targeted to meet local needs (Office of the Special Inspector General for Iraq Reconstruction 2013).

A common thread in the reasoning behind these lessons was the prevention of waste, fraud, and abuse. Waste was seen as the result of poor planning, security, constant rotation of US personnel, and weak controls; in short, abuse is bad management (Bowen 2014). Ultimately, the US does not know all of what we built. Yet, this focus on waste limited resulting recommendations to be concerned with are reforming the reconstruction *provision* only—how to manage contractors, how to plan unified reconstruction efforts, and how to prevent waste and fraud (see: Office of the Special Inspector General for Iraq Reconstruction 2006*ab* 2007 2009 2011 2013).

United States Office of Contingency Operations

A lesson is not learned until incorporated into policies, practices, and regulations/laws. Bowen and others have been advocating for the creation of an integrated

civilian-military office to plan, execute, and be accountable for contingency rebuilding actives during SROs: the United States Office of Contingency Operations (USOCO). USOCO was designed to provide unity and clarity about who would be ultimately responsible during reconstruction operations. Yet, USOCO is essentially an agency of managers; the planning ultimately is about working with contractors who are going to be the execution (Office of the Special Inspector General for Iraq Reconstruction 2013). USOCO would work with contractors and say: if X, you will be doing Y. The money to do this is guaranteed if/when USOCO is deployed, but you, the contractor, will need to do your own planning beforehand. A key aspect of USOCO is that fact it would be its own agency. "By putting it in one of the three most effected agencies, then you buy the biases of that agency" (Bowen 2014).[5] As an independent agency, these contractors and officials would be signed up under USOCO specifically and would know beforehand what they have signed up for and what the job entailed (Bowen 2014).[6]

USOCO directly addresses the first lesson provided by SIGIR (Figure 6.1) that focuses on line of command and clarity about who is responsible for planning reconstruction operations. According to Bowen, one of the core weakness of US reconstruction policy for both Iraq and future operations is that no one is in charge of planning in how to engage in these situations. "You built the airplane in flight. We developed the organization from scratch after the mission began. And that is impossible, because you haven't addressed contacting issues for example or oversight issues or IT or personnel issues—all which made the CPA's mission impossible" (Bowen 2014). The trifecta of involved bureaucracies (DOD, USAID, State) meant that no one gov-

[5]Yet, not all are in agreement that this should be an independent agency. Some think it should be in the State Department while other think it should be placed under DOD.

[6]In Iraq, it was common to see contractors and other reconstruction actors leave or refuse to go. They never took an oath to give their life to their country and many did not want to take the risk. USOCO would stay in places even after local embassies closed.

ernment office had enough authority in Iraq to lead reconstruction and planning by adhocracy, which led to constant personnel turnover and waste (Office of the Special Inspector General for Iraq Reconstruction 2013).

As described by Bowen, FEMA makes a good parallel for OSOCO—foreign, fragile, and failed states are infrequent international disaster zones. How does the US respond to infrequent domestic disaster zones domestically? US policy is to plan in advance with a civil-military mindset across jurisdictions. Not only does this promote planning, but such a structure also creates is a line of command—we know who is responsible and who to reprimand when things go bad (Mike Brown was duly relieved after the disastrous Katrina response). With such plan, there would already be a contingency reconstruction plan and fund, contractors would have already been engaged with, and responsibilities assigned (Bowen 2014).

USOCO has been introduced twice, but has failed both times—the political environment has not been conducive to such a large change as USOCO. Essentially, nothing has really changed in regards to SROs and the US is back to having parallel paths of planning and eventual paths of operations—the same situation that brought waste, shortfall, and missed goals in Iraq. "We are the best house builder in the world, but we don't have the tools or the training, resources, planning, the blueprint to build that house. So it doesn't get built well and it falls down" (Bowen 2014).

Policy Recommendations

Table 6.2: Policy Recommendations

1.	Set a whole-of-reconstruction goal early.
2.	Dedicate diverse resources.
3.	Do not discount future benefits in reaction to immediate costs.
4.	View infrastructure as both a technology and part of a system.
5.	Plan nationally; execute locally.

Progress has ben made in regards to reconstruction policy, but in small incremental steps (Szayna et al. 2009). The largest step, creation of USOCO, would be essential in improved reconstruction policy. Yet, I argue that current policy changes and even USOCO justifications are limited within a first order perspective. The focus remains on the prevention of waste/fraud and using infrastructure as a technical fix for problems rather than addressing how reconstruction and infrastructure can be used as a tool to achieve strategic goals. Using the results from the previous chapters and the reframing of Iraqi reconstruction, I provide some key policy recommendations for future reconstruction policies—see Table 6.2.

It would have been easy to state here instead that reconstruction must connect all areas, use local resources, and plan for sustainability. As shown in Ethiopia and Iraq though, these conditions were being thought about at varying levels of government. Often though, they were placed within first order contexts and their long-term (second order) benefits restricted. Moreover, such recommendations risk assuming deterministic outcomes from infrastructure. Infrastructure and reconstruction conditions have both independent effects on political instability and contingent effects where these conditions interact with historical, social, political, and local conditions that also effect political instability. By following the recommendations listed here, a second order perspective and resulting choices would not be forced. They'd be appearing naturally, remain flexible to local contexts, and by comprehensive.

Set a whole-of-reconstruction goal for early: Before plans are made, policymakers (both international and domestic) need to identify what their goal is across sectors and actors. Is the goal political stability? Is the goal the building of emergency infrastructure? Is the goal merely economic? This is imperative as infrastructure constructed with the goal of lower conflict risks will look and be built differently than

infrastructure based of economics/aid. The former will be in places that might increase costs and would not necessarily use the"lowest bid contractor," which would be impressive for the latter goal. This whole-of-reconstruction goal complements current whole-of-government policy approaches in civil-military debates. A whole-of-government goal would then help the included agencies and actors create short and long-term metrics and benchmarks to ensure progress is occurring before it is too late. This is not always easy as misunderstandings are frequent between military and civilian agencies (Szayna et al. 2009). In this dissertation, I have argued for a goal of lower political instability risks, as such a stability-focused goal also allows for growth and success in many different areas. Less political instability would allow the government to repair itself to become stable, functioning legitimate, and accountable by freeing up valuable resources and providing a safer environment for all concerned (Davis et al. 2009). Though not the ultimate focus, the economy would also indirectly and directly benefit: highways, bridges, communication systems, and other infrastructure are essential to the profitable and efficient private sector production and distribution of goods and services (Akramov 2006). The best economics post-conflict is heavily political and social—all of which reconstruction policies are a part of (Davis et al. 2009).

Dedicate diverse resources: As stated by Bowen, "Money won't do it alone.. That simply flooding the zone with cash not only doesn't solve it but it makes things worse" (Bowen 2014). I would amend this though: neither money or technological fixes will do it alone. As shown throughout this dissertation, merely having infrastructure does not guarantee reduced political instability. Reconstruction policies should contain diverse and deep strategies and tools. Yet, no one organization has all the skills and knowledge needed. The military might have the logistical and security resources, but they lack the skill depth seen on the civilian side—diverse actors offer complemen-

tary capability and supplementary capacity (Szayna et al. 2009). This means having a wide range of actors: contractors, engineers, policymakers, local leaders and representatives, economists, and military officials. At the same time, local actors will provide the needed politics, social, and historical contexts at both the subnational and national level. This ensures that would was being built was actually needed and who would or would not benefit from different types of policy. Yes, this would reduce waste. But most importantly, this will provide the buy-in many US policymakers are calling for in regards to time and knowledge invested. Such diverse actors will also help free up the military to do their mission, which will results in increased security for more reconstruction projects to occur. Reconstruction is ultimately an incredibly diversified 'untraditional tool' to shape soft issues and ultimate military/political goals (Szayna et al. 2009).

Do not discount future benefits in reaction to immediate costs: This dissertation has shown that infrastructure provision and reconstruction might inevitably lead to an increase of short-term conflict. Initial violence around infrastructure provision should not dictate reconstruction nor should it deter aid and reconstruction actors. International reconstruction does not happen within a non-failed state (Office of the Special Inspector General for Iraq Reconstruction 2013; Bowen 2014; Szayna et al. 2009). Reconstruction should not be limited to 'green zones' only; the areas with the highest infrastructure areas (the periphery) are also commonly the area with higher conflict. These are also areas that have the most to gain when receiving infrastructure provision. If infrastructure's long-term effects and the socio-technical system are accounted for during the planning and implementation process, then the very same infrastructure could also lead to lower future conflict and (financial, political, and social) investment returns. At the same time, immediate benefits should

not outweigh long-term costs. Research has shown that the quality of governance will not only impact the selection of new infrastructure projects, but will also affect the rate of return that a country gets from its infrastructure (Tanzi and Davoodi 1998). This requires a parallel focus on good governance programs. In fact, reconstruction projects can service as training grounds for such governance programs—as seen in Iraqi PRTs. Removing first-order blinders and maintaining such a long-term perspective will not be easy. Nevertheless, keeping the blinders on and being overly ignorant of the long-term consequences of infrastructure and reconstruction policies will only doom future operations.

View infrastructure as both a technology and part of a system: Infrastructure are essential national technologies. Moreover, when there is sufficient infrastructure, focus can shift from expansion and playing catch-up to upkeep and renovation (Ecola et al. 2014). With it's technological focus, first-order politics and metrics are important in future reconstruction policies in order to build up infrastructure networks. When thinking about infrastructure as a technology, the focus is on direct effects and technological advances. Nonetheless, reconstruction policymakers should not assume that a certain level of infrastructure will directly lead to economic benefits and thus lower conflict risks over time. With it's system-level focus, second order politics and metrics are necessary and helpful to help create virtuous, reinforcing against political instability, which often do not occur automatically (Davis et al. 2009). When thinking about infrastructure as part of a system, the focus is on the connections between infrastructure, power, and society over time and infrastructure becomes an available tool to shape long-term goals and outcomes. This ultimately requires shifting during reconstruction projects from measuring success by project numbers and money spent to metrics that capture changes in achieving long-term

goals. In other words, a project's significance should be measured by more than just services rendered, but also the long-term effects on capabilities, stability, conflict risks, and the economy just to name a few.

Plan nationally; execute locally: Infrastructure is incredibly local in its construction and use. Policymakers and reconstruction actors must understand the attitudes, beliefs, and moods of local population to prepare for short-term consequence and plan for long-term benefits (Larson et al. 2001). At the same time, this local focus will increase essential degree of trust and cooperation while shaping out group vs. in group perceptions (Davis et al. 2009). Nonetheless, what is local is inherently national. Future reconstruction operations cannot ignore context-driven national plans. Without a national plan that is specific to that country, patronage decisions are likely to come into play that would result in disconnected peripheries and feelings of deprivation. National plans would consider all parts of the state's geography and society. Not only will this provide capability building benefits, this would provide a type of buy-in. By building their own local infrastructure, the local population will be more likely to have positive perceptions of the provider and be interested in its long-term sustainability. Ultimately, one cannot just assume that their efforts are being received as expected without an understanding of local and national contexts and engagement of both. This must come with a recognition that direct connections between local projects to national instability and national projects to local conflict can be hard if not nearly impossible in the present. This should not be the metric that such programs are rated as successful. Such policy evaluations need to broaden their scope and timeframe to fully capture the connections between infrastructure and reconstruction to long-term political instability.

Conclusion

Populations around the world are not just dependent on infrastructure networks and systems, they are embedded and structure around infrastructure's technical configurations. When these networks and systems collapse or are destroyed, like they did in Iraq, the consequences spread beyond the infrastructure and into all corners of society. As such, policymakers must be prepared to both prevent such collapse and have a political strategy ready when such collapse does occur. By pinpointing the conditions that increase political instability, it becomes possible to see exactly how reconstruction can be an extension of political strategy. These conditions are not inescapable. As such, policymakers and the political elite have the ability to shape potential outcomes and reduce the risk of future failure.

Changes in reconstruction policy face significant hurdles; policymakers often claim that we are never going to do that (reconstruction of a another's infrastructure) again, that policies infringe on jurisdictions, and/or that it is a waste of money because why should we fund people that are never going to be deployed? At the same time, it is not hard to admit that what happened in Iraq should not be repeated. Yet, reacting to this by not planning dooms the US to do it again; SROs have been going on since the 1980s.[7] "Willful amnesia is almost criminal, because that is what that is. You didn't forget it by accident. You forgot it by desire and intent and that is strategically short sighted" (Bowen 2014). There is too much at stake to improvise and current US reconstruction policy is not that much more advanced than where it was during Iraq.

Today's policymakers need to recognize that they are setting the stage (literally) for future reconstruction operations. As these operations occur during chaotic

[7]These operations have just been smaller...if one can call the SRO in the Balkans small.

periods, between the end of a full blown conflict and the implementation of development, policymakers should want to create a virtuous cycle between reconstruction and political stability (Davis et al. 2009)—something that this dissertation helps with. "[Reconstruction] is not a Marshall Strategy. It is not a diplomat strategy. And it is not a development strategy. It is a political strategy. And it requires defense, development, and diplomacy. But, it also requires planning" (Bowen 2014)—this has been the 'Hard Lesson' to learn. The world views the US with a limiting perspective: that of self-interested military power. To change this, US foreign policy in regards to engagement needs to evolve. Reconstruction and infrastructure can be improved to become a part of US strategy and USOCO is a vital step in improved reconstruction policy. But, it needs to be more than just a managing agency—it needs to set goals and policy. This dissertation sets the stage for addressing how this can be done and how US post-conflict infrastructure reconstruction policy can begin to create the desired end state: peace and prosperity.

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APPENDIX A

RAW DATA MAPS

Figure A.1: Railroad Density for Sample

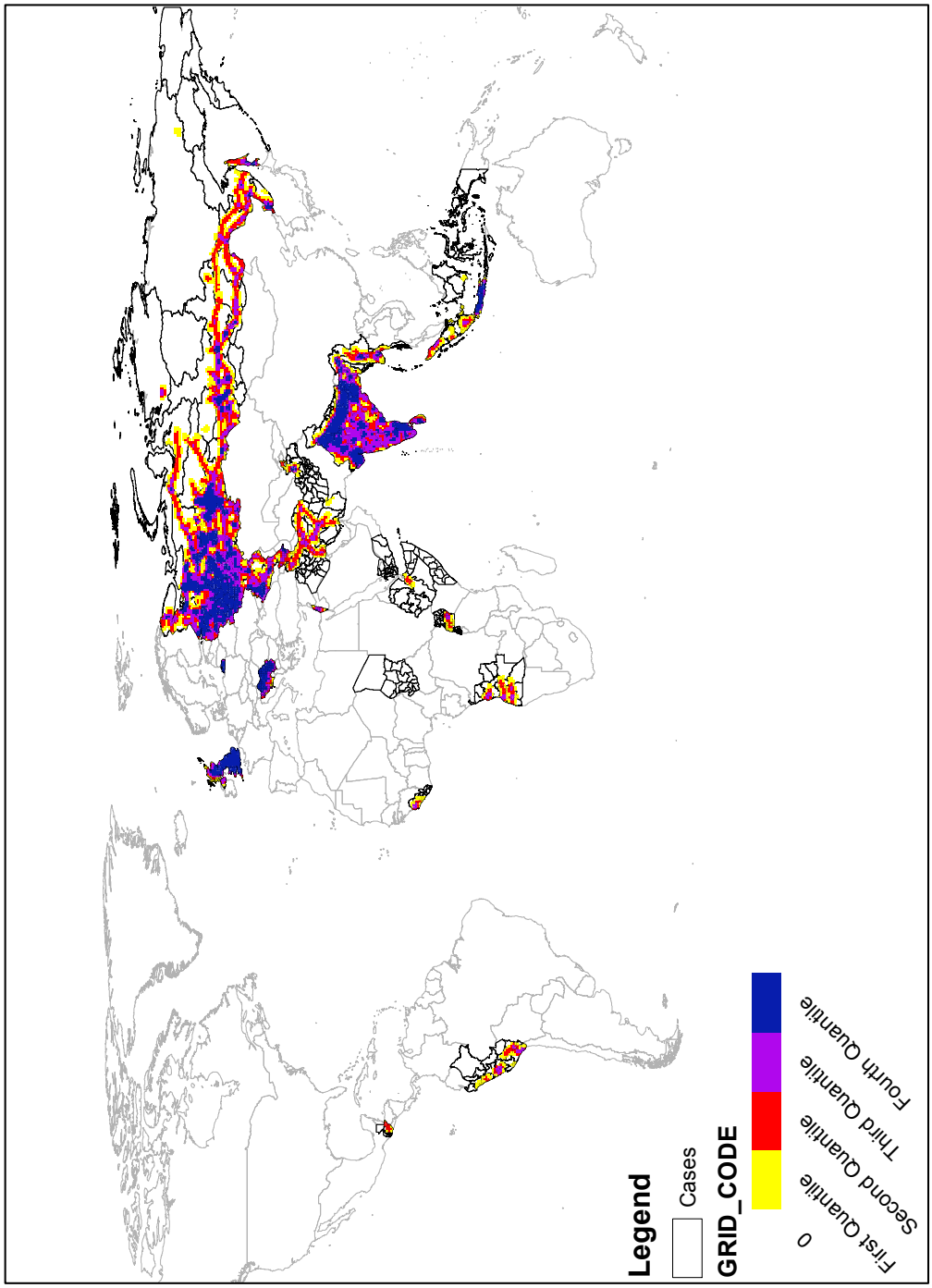


Figure A.2: Major Road Density for Sample

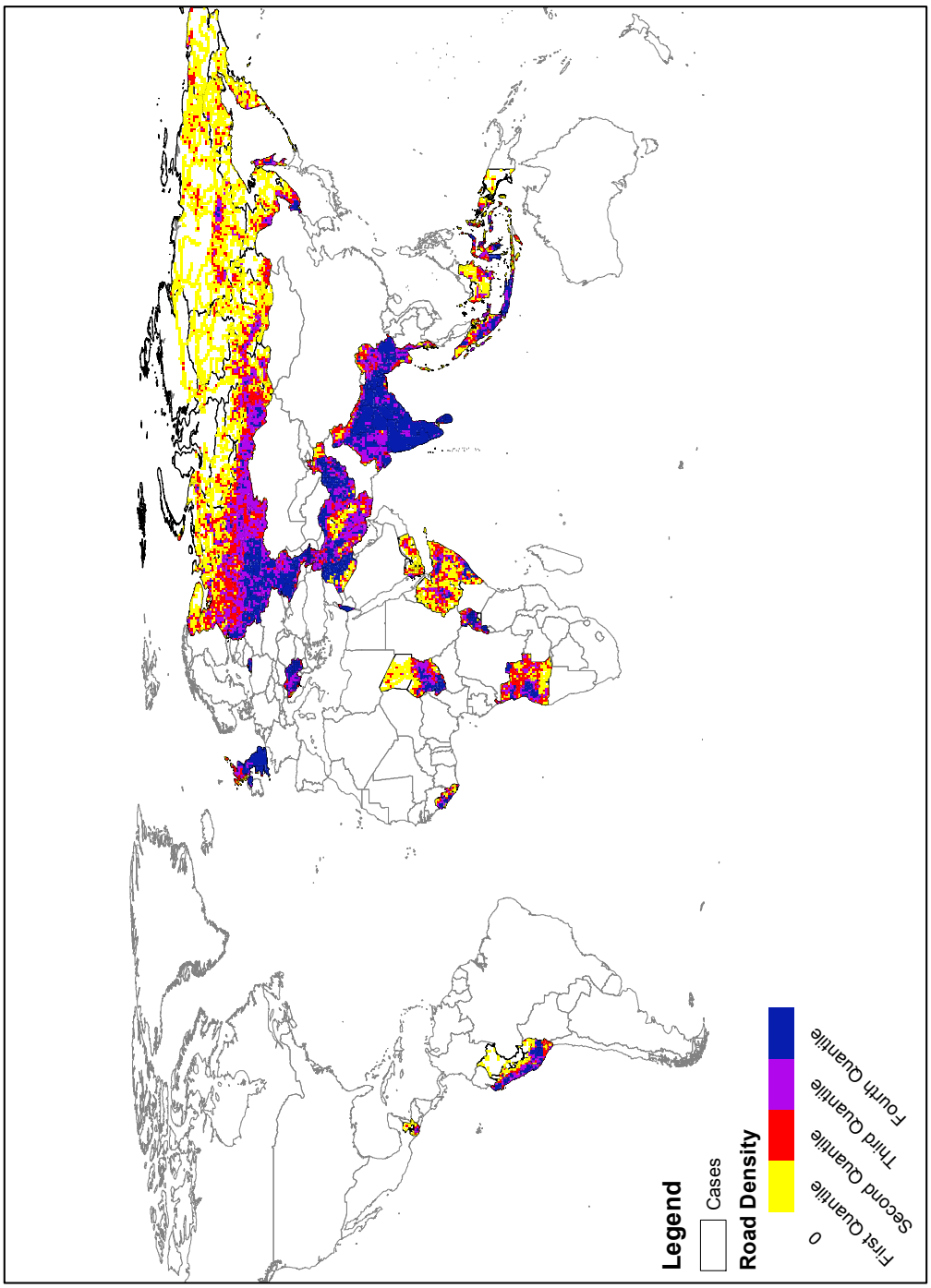


Figure A.3: Airport Density for Sample

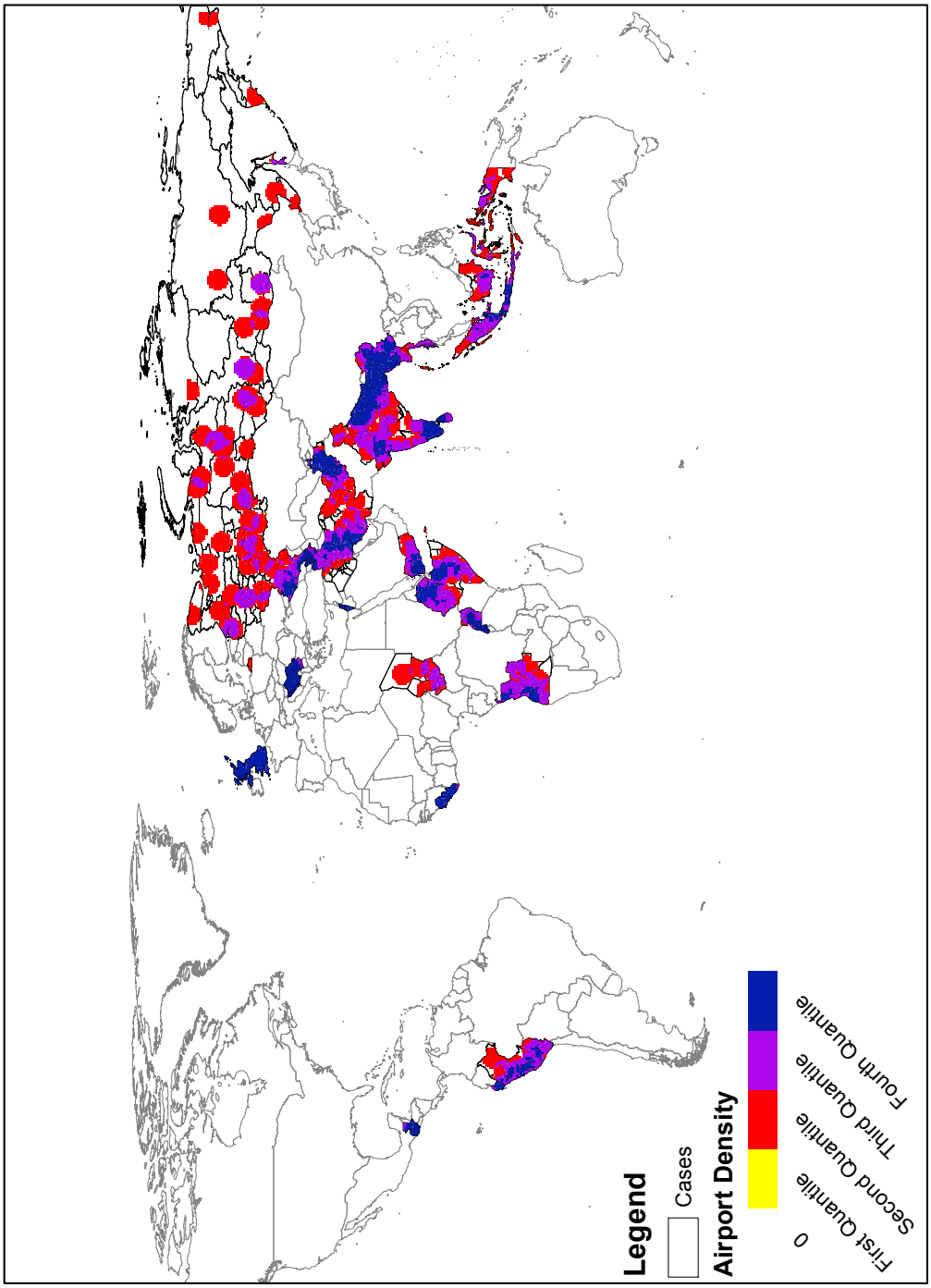
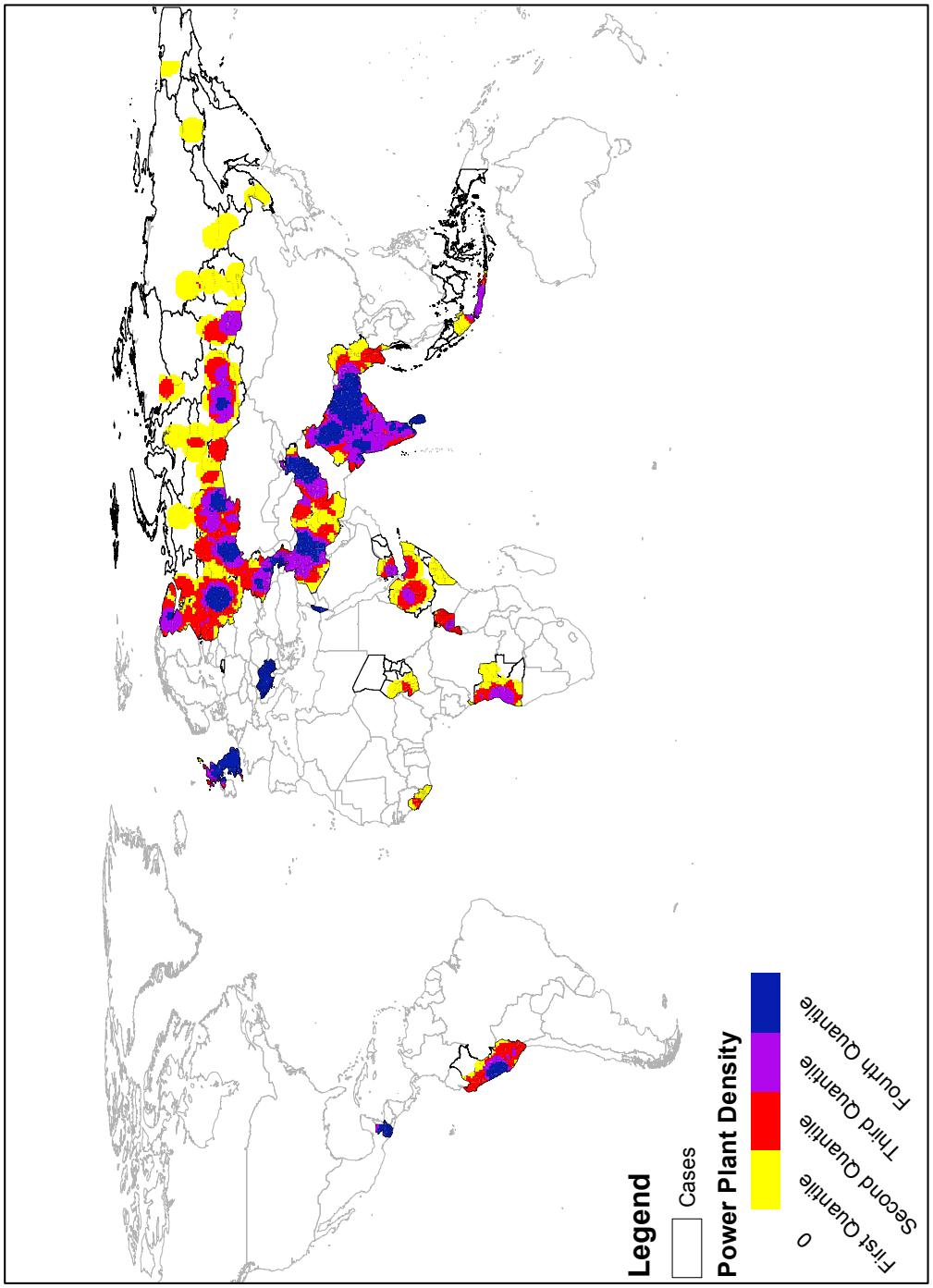


Figure A.4: Power Plant Density for Sample



APPENDIX B

RAW FUZZY SET DATA

Table B.1: Fuzzy Set Data

Location	Unemployment	Aid	Peripheries	PoorQuality	Instability
AF	1	0.45	0.8	0.99	1.00
AO	1	0.75	1	01	0.51
AZ	0.315	0.35	0.4	0.68	0.53
BS	0	0	0.2	0.85	0.42
BA	1	0.05	0	0.358	0.43
TD	0.65	0	0.25	0.98	0.67
HE	0	0.65	0.8	0.13	0.11
ET 1	0.66	0.5	0.6	0.94	0.78
ET 2	0	0.4	1	0.94	0.64
GT	0	0.3	0.6	0.61	0.48
IN 1	0	0.15	0	0.69	0.57
IN 2	0	0.25	0.6	0.59	0.52
ID 1	0	0	1	0.78	0.58
ID 2	0	0.3	1	0.61	0.45
IR	0	0.9	1	0.22	0.44
IQ 1	0.9	0	0.8	0.68	1.00
IQ 2	0.65	0.75	1	0.57	0.95
IQ 3	0.65	0.45	0.8	0.56	0.92
IL	0.088	0.54	1	0.11	0.54
LR	1	0.4	1	0.88	1.00
MM	0	0.75	1	1	0.72
NP	1	0.45	1	0.67	0.73
PE	0	0.4	0.2	0.71	0.53
RU	0.165	0.4	1	0.19	0.69
RW	1	0.75	0.2	0.89	0.59
RS	0.425	0.5	0.5	0.284	0.34
SL	0	0.65	0	0.90	0.43
SO	1	0.55	1	0.99	1.00
SK	0	0.35	1	0.32	0.69
TJ	0.635	0.8	1	0.52	0.85
UG	0	0	1	0.86	0.56
UK	0.015	0.55	0	0	0.00
YE	0.075	0.2	1	0.94	0.64

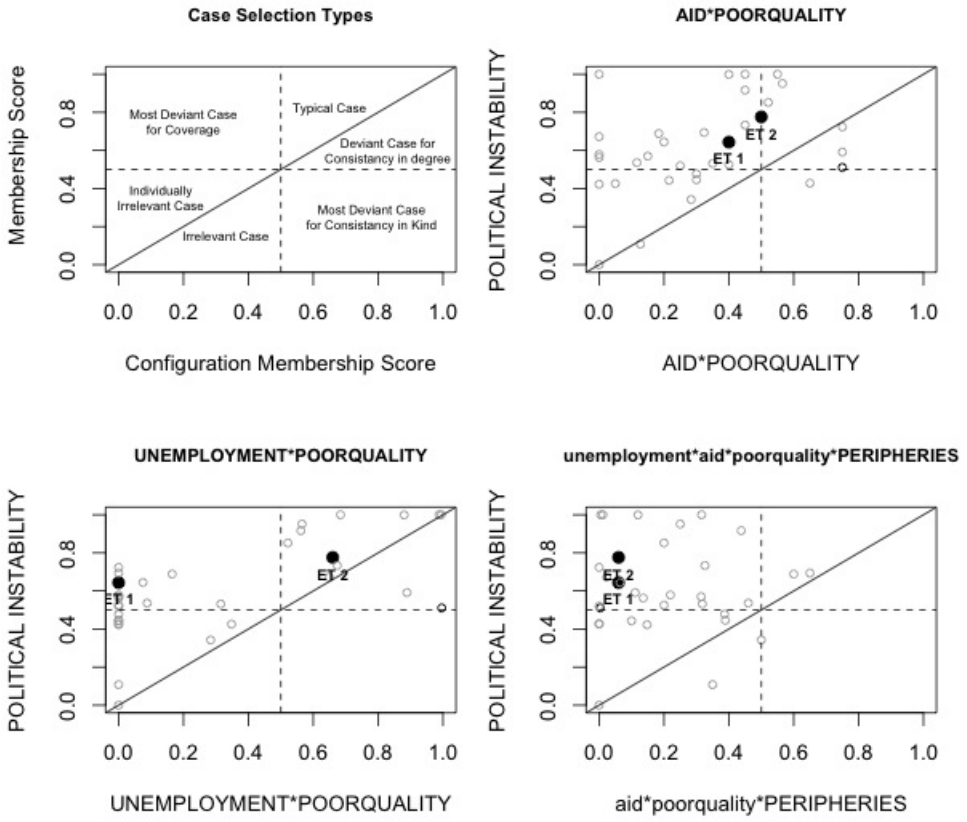
Note: Scores are rounded to the nearest hundredth.
Table is provided per the recommendation of Schneider and Wagemann (2010*b*).

APPENDIX C

CASE STUDY SELECTION

Chapter 5 is comprised of a case study of post-conflict reconstruction. This Appendix describes the steps taken that ultimately led to the decision to further investigate Ethiopia. As alluded this chapter's introduction, the goals of this case studies are to: (1) provide a narration of both IST and the relationship between infrastructure and reconstruction to political instability and (2) find potential mitigating factors in this relationship and possible missing variables/conditions. To address these goals, a typical case, which has membership for both condition/independent variables and outcome/dependent variable, is useful when trying to provide a narrative and detangle causal mechanisms. Cases where causal mechanisms should be easily visible act as an 'easy case' to test IST (Schneider and Wagemann 2012). I recognize that choosing a typical case to examine does risk breaking the "choosing on the dependent variable" rule common in social science research. While case selection bias can be an issue for small-N studies, I reduced this risk by basing my selection off the medium-N, multivariate analyses found in Chapter 3's geospatial longitudinal analysis and Chapter 4's fsQCA (Collier, Mahoney, and Seawright 2004).

Figure C.1: Plotting of Cases in Intermediate Solution



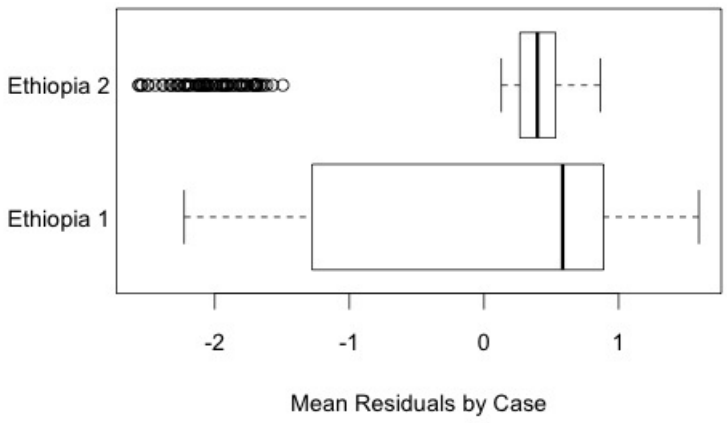
Note: Top-left plot from Schneider and Rohlfing (2013).
CAPS represents membership while lowercase represents non-membership.

To begin with, the cases can be categorized by plotting fsQCA membership scores—the top left panel of Figure C.1 depicts the type/category of case based

on plotting location. All membership scores from Chapter 4's final solution are plotted here. As can be seen, there were no cases that meet the requirements to be a fully typical case in all three configurations. Nevertheless, Ethiopia stands out as a unique typical case. In the first Ethiopian case, which covers the years from 1991 to 2001 following the fall of the Derg, Ethiopia is a deviant case by not having membership in any of the three configurations while still having membership in political instability (0.64). In the second Ethiopian case though, which covers from 2001 to 2008 following the Eritrean-Ethiopian War, Ethiopia moves into being a mostly typical case with membership in two of three configurations while also having increased membership in instability (0.78). Though other cases have similar membership scores, Ethiopia is unique in that it has two substantively different cases in the population. When treated together, Ethiopia offers the opportunity to examine the temporal process behind infrastructure and reconstruction induced political instability.

Though not a typical case, the first Ethiopian reconstruction period following their Civil War does offer some benefits when allayed. Choosing then a deviant case, an anomaly that is different in outcome membership/dependent variable yet minimally different in regards to input memberships/independent variables, provides the maximum amount of leverage (Schneider and Wagemann 2012). The second goal of this case study is to find potential mitigating factors in IST relationships and possible missing variables/conditions, which requires a case that IST does not seemingly fit.

Figure C.2: Residuals for Cases



With this potential case in mind, I went back to Chapter 3's results to see how well the geo-spatial longitudinal model does predicting the Ethiopian cases. To begin with, the model overall miss predicts in the first Ethiopian case 33% of the grid-years while miss predicting conflict only 10% of the grid-years (the model predicts no-conflict when there was in fact conflict). However, this improves for the second Ethiopian case, which has an overall miss prediction rate of 10% while never miss predicting conflict. Such improvement is not surprising as the second Ethiopian case also becomes a typical qualitative case. These model prediction rates become more clear when taking into consideration they residuals. In Figure C.2 where residuals are plotted by case, the model seems to expect over-predict conflict in a subset of

grids in the second Ethiopian case (seen in the number of outlier residuals to the left of the box). This effect was not as drastic previously in the first Ethiopian case. In summary, a cases study on both Ethiopian reconstruction periods will help pinpoint where this error is coming from and better elucidate geographical areas where the model and IST is weak (seen as outliers).

When these two reconstruction periods are placed side by side, the causal mechanisms connecting reconstruction and political instability will be brought to life. The additional knowledge would provide better insight into the types of reconstruction policy that would better decrease political instability risks.