

FIGHTING, BARGAINING, AND WAR TERMINATION
EXAMINING HOW BATTLEFIELD FACTORS AFFECT WHEN NEGOTIATIONS CAN
END INTERSTATE WARS

by

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Fighting, Bargaining, and War Termination: Examining How Battlefield Factors Affect When Negotiations Can End Interstate Wars

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Abstract

How do interstate wars end? I explore this question in my dissertation by developing the bargaining model of war (e.g. Fearon 1995, Powell 2006, Wagner 2000, Filson and Werner 2002 and others) to include a more detailed account of war processes. In particular, I examine how military strategy affects interstate bargaining and how this relates to war termination. Several significant developments emerge from this examination.

First, it becomes apparent that there are in fact two fundamentally different bargaining situations in interstate wars. Ground wars occur where the states attempt to take and hold territory and can achieve their objectives militarily. Bombardment wars occur when the states only inflict costs on their opponent through air or artillery bombardment, and must rely on their opponent voluntarily making concessions to achieve any changes to the status quo.

Second, examining war termination relative to the military situation at the end of the war shows that standard bargaining explanations fail to adequately explain the actual end of most wars. Wars typically end before credible commitment issues have been fully resolved. However, most wars do not appear to involve freely negotiated settlements, as war outcomes tend not to be intermediate to the two sides' war aims and tend not to involve one side making preemptive concessions before they have been militarily lost. I argue that in ground wars,

defensive advantages present commitment problems internal to the war, inhibiting war termination until one side has achieved their war aims. However, once one side, and particularly the stronger, has achieved their war aims, defensive advantages actually cement a war ending settlement.

Finally, bombardment wars must end with the revelation of private information, as the combatants cannot achieve their aims militarily. However, revealing this information is difficult, as individual engagements reveal very little information. Precipitating events may thus be necessary to prompt the end of bombardment wars. I empirically test these theories with originally coded data on military campaign outcomes. I supplement the quantitative analysis with multiple case studies, demonstrating that the hypothesized mechanism does occur.

Dedication

To my parents, Michael and Kathleen Beard

for all of their support

and

To all of those who have worked to make the world a more peaceful place

and have dreamt of a better future

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Table of Contents

INTRODUCTION	1
Why Study War Termination?	6
Existing Research into War Termination.....	7
Capabilities and Military Strategy	8
Domestic Politics and War Processes	9
Conclusion	11
Plan of the Dissertation.....	11
CHAPTER 1: BARGAINING AND WAR.....	13
Bargaining, War Initiation, and War Termination.....	13
The Rational Actor Assumption	15
The Costly War Assumption.....	16
Causes of War in the Bargaining Framework.....	17
War Termination in the Bargaining Framework.....	20
The Necessity of Including Military Factors in Models of War	21
Conclusion	22
Developing the Population of Wars	23
Temporal Scope	23
Interstate vs. Civil Wars.....	25
Multilateral Wars	27
Ground Wars vs. Bombardment Wars	29
The Population of Wars Examined.....	32

Conclusion	38
CHAPTER 2: EVALUATING INFORMATION, CREDIBLE	
COMMITMENTS, AND WAR TERMINATION.....	39
Information Revelation and War Termination.....	39
Previous Empirical Assessments	41
Testable Implications of the Information Revelation Explanation	43
Analysis.....	45
Credible Commitments and War Termination.....	49
Factors Leading to Credible Commitment Problems.....	50
Elimination of a Combatant	52
Changing cost-benefit functions	54
Strategic Territory	58
First-Strike Advantages	62
Analysis.....	65
Risk Acceptance and War Termination	66
Conclusion	67
CHAPTER 3: A THEORY OF WAR TERMINATION IN GROUND WARS	
Defensive and Offensive Advantages.....	71
Defensive Advantages	72
Offensive Advantages.....	75
Time Increases the Defensive Advantages	78
Defensive Advantages, Short-Term Commitment Problems, and When Wars End	80
Commitment Problems for an Attacker	81

Commitment Problems for the Defender	83
Enforcing Settlements Once One Side Has Achieved Their War Aims	85
Conclusion	89
Alternative Explanations for Why Information Revelation Does Not End Wars.....	90
Quick War Termination	91
Two-Sided Uncertainty.....	94
New Information.....	98
Conclusion	101
CHAPTER 4: GROUND WARS: QUANTITATIVE EMPIRICS	103
Data Structure: Campaigns as the Unit of Analysis	104
What are Campaigns?	104
Why Campaigns Rather than Other Units of Analysis?	106
Campaign Coding Rules	108
Hypotheses.....	110
Variables and Coding Rules.....	112
Methods.....	116
Results.....	117
Campaign Outcomes and War Termination	117
Relative Power and War Termination.....	122
Effect of Control Variables.....	127
Predictions for War Termination	128
Conclusion	131
CHAPTER 5: GROUND WARS: CASE STUDIES.....	134

1973 Arab-Israeli War	136
Conflict Overview.....	136
Information and Commitment Problems	141
Presence of Defensive Advantages.....	145
Defensive Advantages as Barriers to War Termination	148
Golan Heights Front.....	148
Sinai Front.....	151
Defensive Advantages and the Ending of the War	155
Conclusion	156
Iran-Iraq War	157
Conflict Overview.....	158
Information and Commitment Problems	160
Presence of Defensive Advantages.....	163
Defensive Advantages as Barriers to War Termination	165
Defensive Advantages and the Ending of the War	169
Conclusion	170
Gulf War	171
Conflict Overview.....	171
Information Revelation and Commitment Problems	174
Presence of Defensive Advantages.....	177
Defensive Advantages as Barriers to War Termination	178
Defensive Advantages and the Ending of the War	181
Conclusion	182

Conclusion	183
CHAPTER 6: A THEORY OF WAR INITIATION AND TERMINATION IN	
BOMBARDMENT WARS	187
A Basic Model of Compellence	189
Infinite Horizon Solutions.....	192
Conclusion and Implications.....	195
Causes of Bombardment Wars.....	196
Rejected Explanations.....	196
Equilibrium Selection	198
Screening/Signaling in a Concessions Equilibria	201
Screening/Signaling in the No-Concessions Equilibrium.....	203
Summary and Comparison.....	205
How Would Bombardment Wars End?	206
Bombardment Wars End When Information is Revealed.....	206
Information Revelation in Bombardment Wars May Require	
Precipitating Events	208
Conclusion	210
CHAPTER 7: BOMBARDMENT WARS: CASE STUDIES	
Theoretical Expectations.....	214
Basic Empirical Findings.....	217
1 st and 2 nd Taiwan Straits Crises	219
Conflict Overview.....	219
Causes of the Wars.....	222

Why the Wars Ended	227
Conclusion	231
Kosovo War	232
Conflict Overview.....	232
Causes of the War	235
Why the War Ended.....	238
Conclusion	241
Egyptian-Israeli War of Attrition.....	242
Conflict Overview.....	242
Causes of the War	244
Why the War Ended.....	249
Conclusion	253
Vietnam War Air Campaigns.....	253
Conflict Overview.....	254
Causes of the Air Campaigns.....	256
Why the Air Campaigns Ended	261
Conclusion	265
Gulf War Air Campaign.....	266
Conflict Overview.....	267
Causes of the Air Campaign	268
Why the Air Campaign Escalated to a Ground War.....	271
Conclusion	275
Conclusion	276

CONCLUSION.....	281
Summary of Findings.....	281
Implications for Conflict Research.....	287
Implications for Research on Conflict Termination.....	287
Implications for Conflict Research More Broadly.....	290
BIBLIOGRAPHY.....	292
APPENDIX A: FORMAL MODEL OF DEFENSIVE ADVANTAGES IN	
GROUND WARS.....	304
The Model.....	305
Model Solution.....	309
Discussion.....	314
APPENDIX B: NOTES ON INCORRECTLY PREDICTED CASES	
FROM CHAPTER 4.....	318
War is Predicted to End, but Continues.....	318
War is Predicted to Continue, but Ends.....	322

List of Tables

Table 1.1: List of Wars	33
Table 2.1: Results for Preemptive and Intermediate Bargains	48
Table 2.2: Results for Credible Commitment Types	65
Table 2.3: Results for Information and Commitment Explanations	68
Table 4.1: Campaign Outcomes and War Termination	118
Table 4.2: Logit Results Relating Campaign Outcomes to War Termination	120
Table 4.3: Logit Results Relating Campaign Outcomes, Power and War Termination	122
Table 4.4: War Termination for Local Victories by Attacker’s Military Expenditures Advantage	124
Table 4.5: War Termination for Local Victories by Attacker’s CINC Advantage	125
Table 4.6: War Termination for Local Victories by Attacker’s Military Personnel Advantage	125
Table 4.7: Predicted vs. Actual War Termination, Based on Mil. Expenditure	129
Table 4.8: Predicted vs. Actual War Termination, Based on CINC	129
Table 4.9: Predicted vs. Actual War Termination, Based on Mil. Personnel	129
Table 4.10: Modified Predictions vs. Actual War Termination, Based on Mil. Expenditure	131
Table 7.1: List of Bombardment Wars	219

List of Figures

Figure 4.1: Number of Campaigns Until War Ends	110
Figure 6.1: The Basic Compellence Model	191
Figure A.1: Simplified Ground War Game Tree	307
Figure A.2: The Range Where A Attacks Immediately in Both Rounds.....	315

Introduction

When and why do wars end? A quick overview of wars would seem to suggest wide variation in both the length and outcome of different wars. The 1967 Arab-Israeli War lasted six days and ended with Israel's overwhelming defeat of the Arab armies. The Football War between Honduras and El Salvador was similarly short, but ended in a stalemate and return to the pre-war status quo. In contrast, World War II lasted six years and the Iran-Iraq War lasted eight. Again, these conflicts had varying outcomes, with World War II resulting in the complete defeat of the Axis powers, while the Iran-Iraq War simply returned to the pre-war status quo.¹

In this dissertation, I will examine why wars seem to end at some periods and not others. In particular, I will examine how the process and outcomes of fighting on the battlefield prevents war termination at some times, but enables it at others. It seems obvious that military factors that affect the outcome of battles and campaigns would have a substantial influence on political decisions on when to begin and end wars. However, previous explanations have largely omitted military factors from their analyses. By including military factors more explicitly, I provide additional insight into why states decide to settle a conflict at some times, but not others.

The first insight is that there are in fact two distinct forms of interstate war, depending on the strategies chosen by the combatants. Most wars involve ground combat to take and hold territory, either to directly achieve the goals of the combatants or as a means of achieving other goals, such as regime change. In these wars, it is possible for one of the combatants to directly militarily impose an outcome to the war. In essence, it is possible to actually win the war on the battlefield. However, other wars take place largely through air or artillery bombardment. In

¹ See Sarkees and Wayman 2010

each of these wars, the bombardment cannot directly change the status quo. Any changes to the status quo must be made voluntarily, and essentially it is impossible for either side to “win” militarily. This distinction sets up two fundamentally different bargaining scenarios. In ground wars, negotiations and decisions about war and peace take place in the shadow of a possible military victory. In bombardment war, political negotiations are almost completely divorced from the actual military conflict. Thus, these two types of wars need to be studied separately.

Next, examining the battlefield situation and other factors at the end of the war makes it possible to evaluate existing rationalist explanations for war termination. The basic bargaining model of war suggests that wars should end when the causes of the war are removed. Wars could be caused either by private information that obscures a negotiated settlement or by the inability of either side to credibly commit to a settlement that changes their bargaining power. Thus, wars would be expected to end either when the private information is revealed or when commitment problems are resolved. Each of these explanations would create certain predictions for when the war would end relative to the battlefield outcome and other factors.

The information revelation explanation would predict that wars should end in a truly negotiated settlement. This settlement would typically involve changes from the military status quo at the time. However, most settlements in fact represent the military situation at the end of the war, with minor changes at most. We should also expect some bargain intermediate between the two sides war aims, as each side makes concessions to avoid future war costs. However, the final outcome of most wars matches one side’s war aims. Thus, it appears that information revelation does not adequately explain war termination.

The resolution of long-term commitment problems as an explanation for war termination can be evaluated by identifying how commitment problems would actually be resolved by the

war. These possibilities include one side conquering the other, imposing regime change, or acquiring strategic territory. Each of these does appear to occur in some cases. However, combined they still only explain a minority of wars. Most wars do not end with the resolution of long-term commitment problems, likely because they were not caused by commitment problems in the first-place. There is thus a discrepancy between the basic bargaining model explanation for war termination, which suggests that combat should fairly quickly reveal information leading to a truly negotiated settlement, and the empirical evidence that suggests that this rarely happens.

For both ground wars and bombardment wars, examining the actual military fighting can help explain this discrepancy. In ground wars, defensive advantages pose a barrier to war termination until one side, and often the stronger side, has achieved their war aims. It has long been recognized that it is easier to defend than attack, but that defending cannot achieve changes to the status quo. In addition, these defensive advantages are likely to increase the longer that the defender holds their position, as they can construct field fortifications, clear fields of fire, and otherwise improve the defensive potential of the position. This poses two short-term commitment problems within the war. States that still wish to change the status quo have incentives to attack quickly rather than attempt to negotiate a war ending settlement, and thus allowing their opponent to fortify their position. Once a position has been established, defenders have incentives to maintain the position, rather than make concessions that would force them to move away from their prepared position. Each of these barriers can make it rational to continue fighting rather than seek or agree to a war ending settlement, even as the settlement would avoid future costs of fighting.

However, these barriers are reduced once one side, and particularly the stronger side has achieved their war aims. Once one side has achieved their war aims, they would become

satisfied with the situation on the ground. A negotiated settlement merely needs to ratify the current position. Thus, the side that achieves their war aims no longer has any incentives to attack immediately, as they have no reason to fear that the other side preparing their position would reduce the possible gains from a settlement or war. In addition, defenders would no longer be expected to vacate a prepared position, and thus also no longer have incentives to refuse a settlement. The side that has not achieved their war aims may wish to counterattack, and thus would have incentives to attack rather than allow the satisfied side to fortify their position. However, if the satisfied side enjoys military superiority, an attack would likely fail, and thus the weaker side would likely agree to end the war, rather than mount a futile attempt to reverse the military outcome. In addition, defensive advantages would reinforce the status quo, making the satisfied side even more willing to accept the position, and the weaker side even more reluctant to continue a futile war.

Bombardment wars present additional difficulties in resolving the discrepancy, as bombardment cannot directly achieve anything, and any changes must be made voluntarily. This means that the only plausible explanation for how bombardment wars end is information revelation. However, bombardment wars also generally fail to fully meet the predictions of information revelation as a cause of war termination. In fact, several of bombardment wars peter-out with no changes to the status quo being made.

To understand how bombardment wars end, it is necessary to develop a theory for why they begin, which has rarely been studied. To do this, I develop a formal model of compellence. This model reveals that there is always an equilibrium where the target state never makes concessions, which in turn makes carrying out bombardment threats irrational, and so bombardment would never occur. This equilibrium may coexist with equilibria where

bombardment threats are successful at inducing the target to make concessions. In this second (concessions) equilibria type war can be caused by uncertainty and private information about the relative costs of bombardment to the two sides, and would thus end when the bombardment reveals information about these costs. In the first (no-concessions) equilibrium, I suggest that war could occur as attempt to signal or screen for whether a revisionist state has a credible threat for a ground war. In some cases, the revisionist might not know whether trying to militarily seize their objective is worth it, while in others the target may not believe the revisionist's war threats. Carrying out bombardment to reveal this information may be cheaper than launching a ground war to reveal it. Accordingly, in these cases the bombardment would end either when the revisionist realizes a ground attack would be too costly and gives up, or the target realizes a ground attack is likely and makes concessions to stave off full-scale war.

While this might explain why many bombardment wars end without any changes to the status quo, it does not explain why it takes considerable time for the bombardment to cease without concessions or for the target to make concessions to end the bombardment. Traditionally, we would expect bombardment to reveal this information relatively quickly. I suggest that the very thing that makes bombardment attractive – its relatively low cost, also makes it relatively ineffective at revealing information. Individual bombardment actions, such as single sorties or a day of artillery barrages, have relatively low marginal costs, as they incur limited casualties or other damage on either side. As signals must be costly to effectively convey information, the low marginal costs of bombardment make it relatively difficult to reveal information. It becomes unclear how much bombardment is needed to prevent bluffing, and no clear indication when one side or the other should give up. Thus, I believe that ending bombardment wars often requires some precipitating event. This is some event, perhaps a

particularly costly attack, diplomatic meeting, domestic deadline, etc., that forces leaders to confront the information that has been revealed and make a decision whether to continue the war or not.

I evaluate these arguments using a mixture of statistical and qualitative evidence. To evaluate the theory of ground wars, I use originally coded data on military campaigns to show that wars tend to end when and only when the stronger side has achieved their war aims or the equivalent on the battlefield. The results are consistent with my theoretical expectations. I further support the argument by conducting case studies on the 1973 Arab-Israeli War, the Iran-Iraq War, and the 1991 Gulf War to illustrate the theoretical mechanisms. There are not enough bombardment wars to make any statistical analysis of this second type of conflict valid. I thus conduct case studies of each of the bombardment wars, determining which equilibria they are in and why the war occurs, and then why the war ends. The available empirical evidence is consistent with my theoretical explanations for both ground and punishment wars.

Why Study War Termination?

In 1971, Fred Ikle (1971, 1) noted that scholars had largely neglected the study of how wars end, especially in comparison to the significant attention paid to why wars occur. Since then, additional research has been conducted into both the duration of wars and the processes of war termination. However, nearly fifty years later, war termination is still relatively understudied compared to the causes of war and other elements of international conflict, at least regarding interstate war. Despite this relative lack of attention, there are clear reasons that a studying war termination is valuable.

First, war termination is part of international conflict, and is thus inherently interesting. The second reason to study war termination is that why wars end is likely related to other aspects of international conflict. As Geoffrey Blainey noted, the causes of war should logically be related to the causes of peace (1973, viii-ix, 3-4). Others, including Wagner (2000) have echoed this observation. The continuation of war is actively or passively a decision to keep fighting. Thus, wars should continue for causes similar to why they begin. Similarly, the decision to end a war is analogous to a decision not to begin fighting in the first place. Thus, wars would logically be expected to continue when the initial causes of the war remain, and end when those causes are removed. While the actual processes are likely significantly more complicated, we can still expect that increased knowledge of how wars end would also provide insights into why they begin and other aspects of international conflict.

Third, understanding war termination may have important policy implications. In addition to knowing how to prevent wars, it would be nice to have insights that would help bring ongoing wars to an end. Studying war termination may help policy makers understand what they can do to induce combatants to settle a conflict. Similarly, understanding the dynamics of war may show when a conflict is ripe for a diplomatic settlement, and when pushing for one would be useless or counterproductive. Even if research does not succeed in helping policy-makers end wars sooner, understanding when a war is likely to end would help target aid and reconstruction efforts at the right place and time to make the best use of these resources.

Existing Research into War Termination

Despite the value in understanding war termination, it is relatively understudied, at least at the interstate level. In contrast to the limited amount of work on war termination, there is a

vast body of literature studying the causes of war. These include studies of the effect regime type and other domestic factors (e.g. Rousseau et al 1996; Rosato 2003; Mansfield and Snyder 1995; Weeks 2008), relative capabilities (e.g. Bremmer 1992; Geller 1993; Wayman 1996; Moul 2003; Reed 2003; Hwang 2010), alliances (e.g. Leeds 2003a, 2003b; Leeds and Savun 2007, Fang, Johnson, and Leeds 2014; Smith 1995; Weitsman 2003, 2004; Henke 2017), international organizations (e.g. Chapman 2009; Allee and Huth 2006; Tir and Stinnett 2012), and type of dispute (e.g. Senese 2005; Tir 2005; Owsiak and Ryder 2013) on whether a war begins. There is also quite a bit of work on when and why civil wars end, exploring the effects of hurting stalemates (Zartman 1989), commitment problems posed by disarmament (Walter 1997; Fearon 2004), and the effect of peacekeeping and other international organizations (Fortna 2008; Hultman, Kathman, and Shannon 2013; Tir and Karreth 2018) among other factors. In contrast, while some research exists, there is substantially less emphasis on why wars end. In addition to work using the bargaining model of conflict discussed in the next chapter, existing research can be divided into two categories: work comparing basic material factors, such as power to war termination, and work looking at how domestic politics influences war termination.

Capabilities and Military Strategy

The first set of factors to examine would be how the basic material relationship between the states would affect war termination.

Several papers have examined whether wars between equivalently powerful opponents last longer or if a significant difference in power prolongs wars. Bennett and Stam (1996) find that wars between imbalanced opponents are generally shorter. Henderson and Bayer (2013) seem to find a similar effect that wars fought by powerful states are shorter. However, Chan

(2003) and Ramsay (2008) find no clear effect of the power ratio on war duration. In addition, the bargaining framework would suggest that there would be no logical relationship, as the effect of power imbalances on war duration would depend on other factors, such as the relative war aims or resolve of the combatants, or how power imbalances affect uncertainty about power or resolve.

Terrain and the offense-defense balance also have unclear effects. Bennett and Stam (1996) find that rougher terrain generally prolongs wars, but that the effect depends on the strategies chosen by the combatants. While likely true, the effect of terrain is also likely contingent on a number of other factors, including the war aims of the parties, the geographical scope of the conflict, and the state of military technology. Similarly, the offense-defense balance seems to have unclear effects. While Adams (2005) does find that offense dominance is associated with states being conquered, Nilsson (2012) does not find any clear relationship between offense-dominance and war duration.

Each of these variables would logically have effects on war duration and termination. There is some support for each, although the general conclusions are mixed. However, it should also be noted that these material variables are blunt measures. While they may say something about war duration, they do little to illuminate the political processes determining why and how a war ends at a certain point.

Domestic Politics and War Processes

In addition to looking at basic material factors, previous research has also suggested that domestic politics may affect how wars end. Building off of the well-known findings of the democratic peace (e.g. Rummel, 1983; Oneal and Russett, 1997), these works seek to determine

whether there is also a relationship between democracy, war duration and outcomes. Several major findings come out of this research program.

The first finding is that democracies are more likely to win the wars they fight. This may be partially due to democracies being more selective of which wars they enter into (Bueno de Mesquita et al, 2004; Slantchev, 2004; Bennett and Stam, 1998), although democratic targets also appear more likely to win (Reiter and Stam, 1998). However, Bennett and Stam (1998) and Filson and Werner (2004) find that the advantage democracies have declines over time, and so democracies may be more willing to settle for a draw the longer the war lasts. In contrast, Goemans (2000) finds that leaders of mixed regimes are more likely to fall after a defeat, and so these leaders are likely to continue losing wars in the slim hopes of victory rather than settle for a moderate loss.

To explain these findings, Bueno de Mesquita et al (2004) posit that democracies are likely to try harder to win, as victory represents a public good and the costs of war are shared broadly rather than concentrated among regime supporters. However, they are specifically focused on economic costs, and Gartner (2008) finds that citizens in democracies are less likely to support a war as casualties rise. Accordingly, Reiter and Meek (1998) find that democracies are more likely to choose maneuver strategies which would reduce casualties, and Horowitz, Simpson and Stam (2011) find that democracies do tend to suffer lower casualties. However, they do appear willing to sustain high casualties when the stakes are high, such as in existential wars (Horowitz, Simpson, and Stam, 2011).

While this research suggests that wars involving democracies may end differently than wars between non-democracies, they do not give a coherent picture of how such wars would end. In particular, the findings of both casualty aversion, selection of easy wars and possibly military

effectiveness make it difficult to know whether democracies are more likely to compromise in ending wars or not.

Conclusion

While there does exist research into war duration and termination, this is relatively limited compared to the vast body of work on war initiation. In addition, this research has yet to cumulate into any generally recognized understandings of how wars end. Material factors, such as power, may give a general sense of how long a war lasts, but provide little explanation of the mechanisms of war termination. While domestic politics might provide a clearer explanation of the mechanisms, current research has not come to any firm conclusions regarding how domestic politics impacts war termination.

Plan of the Dissertation

The dissertation will be broadly organized into three parts. Chapters 1 and 2 create a foundation for the more detailed examination of how war processes affect war termination. Chapter 1 discusses the underlying theoretical framework of the dissertation. This includes describing the bargaining model of war and justifying its assumptions. The chapter then proceeds to frame the population of wars as interstate wars since 1918. Finally, Chapter 1 discusses and justifies the division of this population into ground and bombardment wars. Chapter 2 then proceeds to test the basic bargaining model explanations for war termination. It shows that neither information revelation nor the resolution of commitment problems adequately explains war termination.

Chapter 3 through Chapter 5 develop and test the theoretical argument for ground wars. Chapter 3 develops the theoretical argument, first showing the existence of defensive advantages and that they can be expected to increase over time. I then describe how these defensive advantages pose a short-term commitment problem preventing war termination, and how this barrier ceases to exist when the stronger side has achieved their war aims, allowing for the war to end. Chapter 4 then tests this argument using data on campaign outcomes, showing that wars tend to end when and only when the one side has achieved their war aims. There is also tentative evidence that war termination is more likely when it is the stronger side that has achieved their war aims, consistent with the theory. Chapter 5 then illustrates the theoretical mechanisms using case studies of the 1973 Arab-Israeli War, the Iran-Iraq War, and the 1991 Gulf War.

Chapter 6 and Chapter 7 then develop and test the argument regarding bombardment wars. Chapter 6 develops the theoretical argument. It first presents the basic compellence model. Using this, I then develop explanations for why bombardment wars end. Finally, I argue that they will end when the relevant information has been revealed by bombardment, but that this may require precipitating events to actually prompt a decision to end the war. Chapter 7 evaluates this argument using case studies of the bombardment wars, including the 1st and 2nd Taiwan Straits Crises, the Egyptian-Israeli War of Attrition, the Kosovo War, the Vietnam War air campaigns, and the Gulf War air campaign.

Chapter 1

Bargaining and War

In this chapter, I will lay the foundation for the remainder of my dissertation analyses. First, I will review the bargaining model of war. While I will later challenge some conventional outputs from the bargaining model, I will be working within this bargaining framework throughout the dissertation. Thus, a close examination of the bargaining framework, and especially its major assumptions, is necessary. I will also discuss how the bargaining model fails to incorporate military factors.

Second, I will begin elaborating on the bargaining process to frame the remainder of the paper and develop the population of wars studied. I will look at how interstate and civil wars are likely different, and justify confining my study to the former. In addition, I justify focusing on wars since 1918, as these relatively modern wars are likely to differ significantly from those in the 18th and 19th century. Finally, I will show that what I call ground wars must be examined separately from what I label bombardment wars. The population of wars thus generated is listed towards the end of the chapter.

Bargaining, War Initiation, and War Termination

The bargaining model of conflict has emerged as a popular model for explaining war. Bargaining models seek to explain why wars can occur despite being costly.

The core of the bargaining framework is views war as fundamentally an instrumental process to achieve some objective. It assumes that the two potential combatants have a dispute over some scarce good, such that only one side can possess a given portion of the good at a time.

In other words, the more of the good that the first state possesses, the less of the good the second possesses. Goods under dispute can range from territory, to policy issues, to the government or even existence of one of the actors. The actors then use negotiations or combat to achieve the most favorable distribution of the good.²

Bargaining models make two fundamental assumptions. First, they assume that all relevant actors are rational. Bargaining models thus do not consider fundamentally emotional or psychological explanations for war. Second, bargaining models assume that war is on net costly (see Fearon 1995). In other words, the combatants do not benefit from fighting except as the outcome of combat increases their control over the good or issue under dispute. Thus, bargaining models do not consider explanations where the combatants find some intrinsic value or meaning in fighting. Combined, these two explanations also eliminate any explanations based fundamentally on domestic politics.

Where these assumptions hold, war occurs only under three conditions. First, war can occur when the parties have private information about their relative power or resolve. Second, war can occur when they cannot credibly commit to implement a negotiated settlement. Finally, war can occur if the two sides combined are sufficiently net risk acceptant.³

In the remainder of this section, I will first examine and defend the major assumptions of the bargaining model. I will then proceed to discuss how the assumptions lead to the bargaining model's conclusions about the causes of war, and the implications for war termination.

² Reiter (2003) has a good overview of the bargaining model. See also Fearon (1995) and Powell (2006), among others.

³ This could occur if both parties are risk acceptant, or if the risk acceptance of one party is enough larger than the risk aversion of the other.

The Rational Actor Assumption

The first critical assumption that bargaining models make is that all relevant actors are rational. Thus, all actors have clear objectives, and choose the actions that will maximize their expected utility. This assumption largely excludes explanations based on psychological or emotional factors.

Obviously, the rationality assumption excludes fundamentally emotional reactions as a cause of war. Assuming that states or armed groups go to war in outbursts of anger or hatred without clearly evaluating the costs and benefits clearly does not meet the criteria that states choose the action that best achieves their objectives. At the same time, the rationality assumption does not entirely assume away emotional effects. Emotional effects are consistent with the rationality assumption as long as they can be factored into an actor's cost-benefit calculations. Thus, the good under dispute may be desired for emotional reasons, such as an emotional attachment to a piece of territory. Similarly, some of the costs of conflict may be emotional rather than purely physical.

Second, the rationality assumption means that bargaining models largely exclude explanations based on psychological factors. While it is clear that psychology would play a factor in decisions about war, it is less clear how to develop a theory based on psychological factors. In addition, in some circumstances psychological factors could be included in the bargaining model. If psychological factors largely work through affecting perceptions of costs, benefits, or similar factors, adjustments to these parameters could be factored into the bargaining framework. For instance, Butler (2007) has developed a model based on prospect theory. His model analyzed how the actors' perception of being in the domain of gains or losses changes their risk acceptance, and thus the possibility of war.

The Costly War Assumption

The second major assumption is that war is on net costly. The assumption that war is costly is relatively intuitive, but still open to criticism. The assumption of costly war means that any benefits of war that apply specifically to a single combatant are less than the costs to that combatant. In other words, the only way the combatants can potentially benefit from war is by winning and gaining control of the disputed issue. In addition, gaining the benefits through negotiations would be preferred to gaining the same outcome through war. By definition, wars involve significant death and destruction, apparently imposing high costs on the combatants. In addition, wars may also impose significant economic costs through lost trade or other economic disruption. Finally, they may diminish the value of the disputed issue, for instance by destroying some of the disputed territory. Thus, it is fairly clear that war is costly in material terms.

However, non-material costs and benefits must also be included in determining whether war is costly. Non-material factors could create either benefits or costs for the combatants. For instance, a combatant may have a normative aversion to war that would create costs of fighting in addition to any material costs. Conversely, a combatant could see normative or psychological benefits to fighting that did not depend on the outcome of the conflict. For example, it may see fighting for the cause as conveying honor or see giving up without a fight as disgraceful (e.g. Dolan, 2015). The addition of non-material costs and benefits raises the possibility that the combatants may see war as non-costly or even a net positive, whether or not they expect to emerge victorious. However, despite the possibility of war being non-costly, in most cases we can expect that war is in fact costly.

Note that combined, the rationality and costly war assumptions likely also eliminate explanations based on domestic politics. If all domestic actors are rational, and see war as

costly, then each domestic actor would have some peace settlement that they would prefer to war. They would thus be expected to support such a settlement rather than supporting war. Accordingly, the government would not have any domestic political incentive to choose war over a negotiated settlement. Note that this is true even if the benefits of achieving a favorable outcome and the costs of war are distributed unevenly. Some have argued that elites gaining most of the benefits of a favorable outcome while war costs are concentrated among the population could incentivize war. However, this would not be sufficient if the elites have some war costs, as there would still be some settlement that they would support. Thus, unevenly distributed costs can only narrow, but not eliminate, the war range as long as all domestic actors are rational and perceive at least some war costs. In most cases even dictators that can insulate themselves from a majority of war costs would find war costly, as they run at least some risk of being deposed if the war ends up badly.

Overall, the unitary, rational actor and costly war assumptions are a reasonable starting point. Relaxing these assumptions could create allow for fuller or additional explanations for war. However, these assumptions seem to be relatively reasonable for most cases, and thus should serve as the foundation for initial theoretical development. I will therefore accept both the unitary, rational actor and costly war assumptions for the duration of this project.

Causes of War in the Bargaining Framework

Making these two assumptions creates a fundamental puzzle in explaining war. Given that war is costly, there should always exist an agreement that both sides prefer to war. Why then do states fight rather than reach a mutually preferable bargain? Bargaining models have

developed three major categories of explanations: the existence of private information about capabilities or resolve, credible commitment issues, or net risk tolerance.

The first major rationalist explanation for war is the existence of private information about relative capabilities or resolve. Because such information may affect either the potential military outcome or bargaining power prior to war, each side has incentives not to reveal its private information and won't trust any information revealed by its adversary. This may in turn prevent the combatants from recognizing or agreeing on a war avoiding or war terminating bargain. War may occur in order to settle the issue and / or reveal the private information, allowing a bargain to be struck. (Fearon 1995)

The second major cause of rationalist war is the inability of either of the combatants to credibly commit to implement a war avoiding bargain. If an issue under dispute will affect the relative bargaining leverage of the combatants, then the side that gains the disputed object will be able to demand more in the future. Assuming the issue is indivisible, both combatants may prefer war to a negotiated settlement in order to gain these future advantages. Issues that could affect bargaining leverage include things that affect their ability to win a war (such as strategic territory) or things that affect their cost-benefit calculations (such as regime type). Commitment problems can be exacerbated by other changes of power. (Fearon 1995; Powell 2004b, 2006; Wolford 2012; Beard 2018 WP)

Commitment problems can also occur due to the bargaining process itself. If the issue under dispute is indivisible, there is still a probabilistic bargain that both sides prefer to war. In other words, they could agree to some less costly mechanism, such as arbitration, that would decide the issue with similar probabilities of fighting. However, the actors cannot commit to implement the bargain if they lose the probabilistic mechanism (see Powell, 2006). In addition,

first-strike advantages can create power shifts if one of the combatants even attempts to bargain, possibly causing war (see Beard and Strayhorn 2018).

A third possible explanation for rationalist war is if the combatants combined are sufficiently risk acceptant.⁴ When a state is risk acceptant, it would prefer gambles that give large gains over relatively high probabilities of lesser gains when both outcomes have the same expected value. Thus, a combatant that is relatively risk acceptant would demand greater concessions to avoid war than one that is relatively risk averse. This narrows the bargaining range. If the net risk acceptance is high enough the bargaining range may be eliminated, making war inevitable.⁵ Potentially, war could occur even if one state is risk averse as long as the other is sufficiently more risk acceptant than the first is risk averse. Butler (2007) formally demonstrates that risk acceptance can lead to war, arguing that prospect theory and the reaction to perceived gains or losses can lead to risk acceptance (see also Levy, 1997). Interestingly, Fearon (1995) assumes that states are not risk acceptant, arguing that it is unlikely that many leaders are in fact risk acceptant. However, there are at least a few cases where leaders are plausibly risk-acceptant, including Hitler and Saddam Hussein. Thus, we should still consider risk acceptance as a potential cause of war.

⁴ What would matter is the total risk acceptance of the two sides. So, if one side is modestly risk averse, but the other is very risk acceptant, they would on net be modestly risk acceptant.

⁵ Powell (2006) shows that there should still be a non-costly lottery (e.g. arbitration) that the combatants could theoretically agree to even if they are risk acceptant. If the non-costly lottery has the same probable outcomes as war both sides would prefer the non-costly lottery to paying the costs of war. However, given the anarchic nature of the international system, the combatants would be unable to credibly commit to implementing the outcome of the non-costly lottery. Accordingly, arbitration or other non-costly lotteries would not often represent a viable alternative, and so risk acceptance would remain a potential cause of war.

War Termination in the Bargaining Framework.

In turn, the causes of war also suggest the causes of war termination. Notably, within the bargaining framework, war termination is symmetric to war initiation (see Wagner 2000; Filson and Werner 2002). Given that any previous costs of war are sunk costs, they should not factor into the combatants' decision making. Thus, at any point in the war, the decisions on whether to keep fighting or reach a bargain are identical to the decision on whether to fight or bargain in the first place. If the combatants had perfect information, there should always exist a war ending bargain that both combatants prefer to continued war. Thus, wars only continue if the combatants have private information about their relative capabilities or resolve, are unable to credibly commit to a war ending bargain, or are risk acceptant. Wars would thus end when all private information has been revealed and all commitment problems have been resolved. (see Wagner 2000; Filson and Werner 2002; Reiter 2009).

Wars caused by net risk acceptance would likely be resolved in the same way as commitment problems. As risk acceptance is wholly a factor of each individual state, it could only be changed through changing the leadership of one state to be more risk averse. Risk acceptance could also be neutralized through changing the relative power balance, such that even a risk acceptant state no longer believes it has a sufficient chance of winning. These methods of resolving risk acceptance are identical to those in which commitment problems are solved.

While the existence of any information or credible commitment issues in the midst of war could be sufficient to cause continued fighting, it is most likely that continued fighting occurs when the problems that began the war still exist. Thus, if the existence of private information led to war instead of a bargain, the war would continue as long as the information remained private and end once it was revealed. Similarly, if war was due to the combatants having difficulty

credibly committing to a war avoiding bargain, the conflict would continue until the credible commitment issues were resolved. Theories of war termination would thus look first at how war processes might lead to the resolution of informational or credible commitment issues.

The Necessity of Including Military Factors in Models of War

One weakness in the bargaining framework is that it largely excludes military factors. Clausewitz noted that “War is politics with the intermixing of other means (1984).” These other means are what make war distinct from other forms of political activity. Within the bargaining framework, negotiations take place in the shadow of potential combat, and would be affected by what happens in the fighting. For instance, changing the probability of capturing something on the battlefield would change which negotiated settlements are possible. Similarly, changing the costs each side suffers from fighting in terms of casualties and economic damage would widen or narrow the bargaining range. As I will describe below, whether combat could even capture the disputed good has a significant effect on the bargaining environment. Each of these factors would in turn be determined by military factors such as the capabilities of different armed forces, the impact of terrain and strategy, the ability to support and replace deployed forces, and other factors.

However, formal models of war termination have almost entirely failed to substantially incorporate military factors into their explanations, and have included only highly abstract accounts of the war. Some models merely model the war as a single costly lottery, where one side wins with some probability π and the other wins with probability $1-\pi$ (e.g. Fearon 1995, Powell 2004b, 2006). Other models do disaggregate the war into multiple battles (e.g. Wagner 2000; Filson and Werner 2002, 2004; Smith and Stam 2004; Wolford, Reiter, and Carrubba

2011). However, each of these battles is simply modeled as a costly lottery. In addition, models often either only include a specific number of battles, or assume the war ends after one side wins a certain number, often two.

These abstractions are useful in making the models tractable, and models based on these unrealistic assumptions have led to considerable insights. However, a full understanding of war requires examining the impact of these assumptions to determine how big an effect they have. In this dissertation, I will show that considering military factors adds considerable explanatory power, and helps our theories of war termination better fit observed data.

Conclusion

In this section, I have provided an overview of the bargaining model of war and elaborated on its major assumptions, including rationality and costly war. The bargaining model shows that there should always exist a negotiated settlement that is mutually preferable to war. I then proceeded to show that the bargaining model generally explains war as either due to private information, which prevents the different sides from recognizing this settlement, or an inability to credibly commit to implement this settlement. War should then end once either information is revealed or commitment problems are resolved. However, bargaining models typically deal with combat and the conduct of the war in a very abstract manner. It is thus necessary to incorporate military factors more explicitly into these theories to gain a fuller account of war termination.

In the following section, I will use the basics of the bargaining model to develop the population of wars I will study in the remainder of the dissertation. First, I will justify confining the population to interstate wars since 1918. Then, I will use the bargaining model to categorize interstate wars into ground and bombardment wars.

Developing the Population of Wars

Before beginning to theoretically and empirically evaluate why wars end when they do, it is necessary to place bounds on the wars I will include in the study. I therefore will confine my examination to interstate wars since 1918. The following sections justify these restrictions. I also discuss how to treat multilateral wars, deciding to treat them as a single conflict when the allies are fighting on a single front, but dividing into separate wars when the allies are fighting separately on different fronts.

Temporal Scope

First, it is useful to determine whether any temporal limitations are appropriate. I believe that technological and societal developments made wars in the twentieth century significantly different from those in earlier periods. Technological changes led to the development of operational maneuver, with campaigns spanning entire geographic regions, and made long range bombardment possible. Political and societal developments have less obvious effects, but the increasing number of democracies, the development of international institutions, and changes in international norms likely also had significant effects.

Operational maneuver, where large armies would conduct nearly continuous campaigns over wide geographical expanses, began developing through the 19th century (see Olsen and van Crevald, 2011 for an analysis of these developments). Operational maneuver was made possible through several related developments. Communications technology, such as the telegraph and radio, allowed the coordination of armies over large distances. At the same time, developments in transportation, such as railroads and automobiles, allowed both the logistic support of larger and more widely spread armies, and allowed these armies to maneuver rapidly

over large distances. Social changes, such as nationalism, allowed the fielding of mass citizen armies larger than those of the early 1800s by at least an order of magnitude. These developments cumulated in World War I, where the Western Front extended continuously from the Swiss border to the English Channel.

Other technologies made it possible to conduct long range bombardment without necessarily engaging or risking close combat between ground forces. The effective range and destructiveness of artillery increased greatly. Typical artillery in 1800, was directly aimed to a distance of about a mile. By 1900, artillery could engage in indirect fire (where the artillery crew could not themselves see the target) out to ranges of 10 miles or more (Black, 2002). Even more consequential was the invention of bomber aircraft that could destroy targets hundreds of miles from their bases. Together, these developments raised the possibility of causing damage and imposing costs on an opponent without having to engage in direct battle or attempt the direct conquest of enemy territory.

At the same time, changes in the political system have changed what goals it is possible to fight a war over, and accordingly what political settlements are acceptable. The development of norms against territorial changes through the use of force (Zacher, 2001) means that territorial wars are fought over specific pieces of territory claimed by both sides for reasons of nationality or history rather than simply wanting more territory. Similarly, national honor or power are likely less acceptable reasons to fight wars. At the same time, the number of intergovernmental organizations has increased dramatically, changing the systemic environment in which wars are fought.

For all of these reasons more recent wars are likely to vary significantly from wars in the early 1800s or earlier. While any exact cutoff will have to be somewhat arbitrary, the end of

World War I in 1918 seems like a reasonable date. The basic technologies allowing operational maneuver and bombardment had been developed, while most of the political changes were complete or well underway. My informal review of conflicts also seems to suggest that many of those previous to World War I seem significantly different both politically and militarily to suggest this cutoff. While some, or even many, of the wars in the late 19th or early 20th century may share these features, pushing the date back to far would risk including substantively different conflicts with relatively little gained in an expanded data set. While future studies can develop theoretical expectations about how war termination may work under the different conditions of the 19th century and reasons for the change in the underlying conditions, such efforts would significantly complicate the existing project.

Interstate vs. Civil Wars

Previous research has typically examined interstate and civil wars separately, assuming that they are distinct forms of conflict. The Correlates of War project (e.g. Sarkees and Wayman 2010) also has distinct categories for extra-state wars (between a state and a non-state actor outside its borders) and non-state wars (between two non-state actors). I will follow the tradition of treating interstate war as distinct from these other forms of conflict, and largely confine my examination to interstate wars. At the same time, I will occasionally speculate as to how my findings may relate to these other forms of conflict.

In order to justify distinguishing interstate wars from other forms of conflict, and to lay the groundwork for extending my results to the other forms of conflict, it is useful to discuss how interstate wars differ from other forms of conflict within the bargaining framework. I argue that the primary difference is that interstate wars take place between defined actors with clear bases

of power and support. In contrast in civil wars (and to an extent in extra-state conflicts), both the existence of one of the sides (the rebel group) as well as the relative power of the two sides are endogenous to the conflict. A second potential difference is that civil wars are more likely to contain multiple actors.

In civil wars, both the existence and relative power of rebel groups is endogenous to the conflict itself. In most cases, rebel groups form specifically to fight the civil war, and are not typically a pre-established actor. Independent armed groups typically do not exist in stable, peaceful societies. Thus, in order for war to occur, people and small groups that are dissatisfied with the status quo must coalesce to form armed groups capable of waging war. Even in cases where rebel groups coalesce around pre-existing activist groups, they must transform into an organization capable of combat to effectively fight a war. In contrast, states exist independently of any conflict with other groups, and their identities are not typically dependent on the existence of these conflicts.

In addition, the relative power of the actors in civil conflict is much more endogenous to the conflict than in interstate wars. States possess pre-existing militaries, and clear control over territory and population. While military losses can change the immediate balance of power, and changing control of territory may alter the balance of power, states retain the loyalty of their military and can extract resources from the territory under their control. Thus, states possess a clear base of power that largely does not depend on the course of the conflict. In contrast, civil wars are often a struggle to extract resources and support from the civilian population. The side that is best able to extract support from the population has a clear advantage in the outcome of the conflict. Armed groups (including the state) use both persuasion and coercion to gain

recruits and extract support. Thus, power is partly a function of territorial control, but also depends on the ways the armed groups interact with the civilian population.

In addition to the existence and power of groups being endogenous to the conflict, civil wars are also likely to have more actors. While most interstate wars are bilateral, it is very possible for multiple civil conflicts to exist at the same time. In addition, rebel groups are often not as clearly organized as states, and thus different portions of a rebel group may bargain separately. Similarly, even if the central leadership of a rebel group agrees to stop fighting, more radical members and other spoilers may not abide by the terms of peace. On the other side, states sometimes outsource part of the conflict to armed militias, creating a similar breakdown in authority. Thus, civil wars are much more likely to contain a number of actors than interstate wars.

While the basic logic of bargaining is the same across all types of conflict, the bargaining environment in civil wars is much more complex than in interstate wars. Thus, I will focus on interstate wars, to examine the basic processes of war termination. Future research can extend these findings to the more complex bargaining environment of civil wars.

Multilateral Wars

A final issue is how to empirically deal with multilateral wars, in which at least one side has multiple participants. Some previous researchers have disaggregated multilateral wars into separate observations by dyad. Others have opted not to separate wars into separate dyadic observations, treating all participants as part of a single war. Both approaches can be rationalized within the bargaining framework. If each dyad represents a unique bargaining relationship, such that countries independently make decisions about war and peace, then

disaggregating wars into their constituent dyads makes sense. In contrast, if all members of a coalition adopt common positions, and negotiate and fight as a single entity, then it would be better to leave multilateral wars as a single observation.

I believe that instead a middle path is appropriate. In some multilateral wars, alliances are relatively loose, and each country retains a high degree of autonomy in deciding both when to enter and leave the war. They would also possess a high degree of autonomy in the actual conduct of military operations. In other wars, alliances are much closer, such that allies both closely coordinate military operations and develop a unified negotiating posture. As an example, World War II shows both of these possibilities. The United States and the United Kingdom established a common military command, and closely coordinated their political objectives, such as through issuing the Atlantic Charter. In contrast, the US and UK had a much looser relationship with the Soviet Union. Military operations on the eastern and western fronts were not closely coordinated and there were constant fears that either the US/UK or the USSR would conclude a separate peace with Germany.

To operationalize this distinction, I examine whether the allies fight on a single front. Any combat that occurs on a single front is coded as a single war, regardless of the number of countries involved. In contrast, combat that occurs on different fronts is coded as different conflicts. Thus, the Korean War is coded as a single conflict, as a single front line existed and the forces of the combatants on each side were intermingled with each other. In contrast, the 1973 Yom Kippur War is treated as two separate conflicts, an Israeli-Syrian war on the Golan Heights and an Israeli-Egyptian war on the Sinai Peninsula. I believe that the extent to which allies fight on single front largely captures whether they will fight and bargain as a single entity.

This also has a methodological advantage for the quantitative analysis of ground wars. As I will examine the outcomes of individual campaigns, dividing wars by front most easily allows a campaign structure to be determined. It is difficult, if not impossible, to impose a common campaign structure on different dyads fighting on different fronts, as a state may be taking offensive action on one front, while taking defensive action on the other. However, where forces are intermingled to some degree when on a single front, all dyads would share the same campaign structure, and further dividing wars into dyads would provide only limited additional information.

Ground Wars vs. Bombardment Wars

Before proceeding to develop theoretical explanations about why many wars do not seem to end as predicted by the bargaining model, it is first necessary to inquire whether there are different types of interstate wars exhibiting fundamentally different war processes. Here, I argue that it is necessary to separate wars into what I label ground wars and bombardment wars. In the former, the combatants attempt to take and hold territory either as an end itself or as a means to an end. This means that military victory is possible. In contrast, in bombardment wars, the combatants do not directly fight over territory or other goods that would allow them to achieve their aims on the battlefield. While the two types of wars may share many characteristics, the differing ability to win the war on the battlefield represents a significant enough difference to examine these two types of wars separately.

In examining war termination, I believe a categorization of war types should be based on the strategies chosen by the states involved. Since war differs from other forms of political competition by the use of violence, the processes we would need to focus on are the ways in

which states use violence to achieve their political ends. Thus, it is natural to focus on war strategies, according to the Clausewitzian definition of strategy as “the use of engagements for the object of the war” (Clausewitz, 1984). While strategies could be classified in multiple ways, for the purposes of this study, it is most logical to classify strategies based on how they would relate to the bargaining framework. I believe the critical distinction is whether or not it is possible for the states to achieve outright victory on the battlefield.

In most cases, the combatants engage in ground combat to take and hold territory, which allows them to achieve their war aims militarily without the necessity of a negotiated settlement. It is of course still possible for the combatants to reach a bargained settlement before victory is achieved. However, any such bargaining occurs in the shadow of possible victory or defeat, which likely has significant implications for their bargaining behavior. They may also choose not to bargain until one side has achieved their war aims on the battlefield.

In a small number of cases, however, the combatants rely solely on artillery or air bombardment, thus foregoing the possibility of outright victory. Without any ground offensives to capture territory, any attempt to revise the status quo requires the other side to agree to concessions. Bombardment is used both to impose costs on the opponent and signal each sides’ resolve. Because outright military victory is impossible, in these cases information is the most plausible path to war termination. As I will discuss more below, this makes these cases the most likely for information revelation to lead to the termination of the conflict. For simplicity and conciseness, I will describe conflicts relying primarily on strategies of inflicting costs through bombardment wars (following Bennett and Stam, 1996), and those using strategies aimed at taking and holding territory ground wars.

This categorization is similar to that adopted by Bennett and Stam (1996) with some changes. Bennett and Stam (1996) classify strategies into maneuver, attrition and punishment strategies. The first difference is that I have collapsed Bennett and Stam's (1996) maneuver and attrition strategies into the single category of ground war. I believe that the distinction between maneuver and attrition has little theoretical basis, and is not empirically sustainable.

Theoretically, both strategies aim both to capture territory and to eliminate the opponent's ability to resist: attrition through inflicting casualties and maneuver through disrupting the opponent's ability to coordinate their forces. In practice, both attrition and maneuver are often employed in combination. For instance, at Stalingrad, the Soviets used attritional warfare to focus the Germans towards the city and wear down their forces, while other forces surrounded, and later captured the German army (Black, 2002). Even the trench warfare of World War I's Western Front, likely the poster child of attritional warfare, aimed primarily to create a breakthrough that would enable operational maneuver to be employed (Black, 2002). On the other hand, the Soviet Operation Bagration in 1944 used rapid maneuver to surround and eliminate the German Army Group Center, capturing, killing, or wounding several hundred thousand German soldiers, achieving attritional results through maneuver (Glantz and House, 2015, 256-278).

Secondly, Bennett and Stam (1996) allow each combatant to select a different strategy, creating a total of nine possible pairings. However, I believe it would be very difficult, if not impossible, for the two sides to fight different types of wars. Similarly, if one side prefers to fight a defensive territorial war, it cannot force a combatant that is only employing bombardment to invade. At the same time, a side wishing to employ bombardment could not prevent a war from occurring on the ground if the other does wish to invade. Thus, in practice, a war will turn

into a ground war for both sides or a bombardment war for both sides even if they have divergent preferences over the type of war they fight.

In addition to the theoretical reasons for believing that these wars have sufficiently different processes to treat them as a different category of war, and develop theory independently to explain these cases, there are also empirical reasons for doing so. The unit of analysis used for most of the quantitative testing of ground war, the military campaign, cannot be defined for bombardment wars. This means that bombardment wars literally cannot be placed in the dataset with ground wars, requiring any empirical analysis to be conducted separately. The inability to analyze these wars together further suggests that the war processes are sufficiently different to justify treating them as a separate category of conflict.

The remainder of this chapter and the following empirical chapters will focus on ground wars, particularly exploring barriers that prevent the revelation of private information from quickly ending wars. As noted, information revelation and signaling is the most plausible way bombardment wars end, as the possibility of outright victory is foregone. Thus, how bombardment wars end will be dealt with separately later in the dissertation.

The Population of Wars Examined

The previous findings allow me to develop the population of wars that I will consider in this study. I will examine all interstate wars since 1918. Multilateral wars will be divided into different cases if the combatants fight on different fronts, and considered as a single case if they fight on the same front. Ground and bombardment wars will be examined separately, as the bargaining environment is substantially different in these types of wars.

In addition, I drop three international interventions in civil wars where the civil war continues after the intervention ends. These are the War of the Communist Coalition, the War over Angola, and the Bosnia War. In the War of the Communist Coalition, North Vietnam intervenes in Cambodia on behalf of the rebels, while the U.S. and South Vietnam later intervene against the rebels. Both withdraw, while the civil war in Cambodia continues without immediate resolution. Similarly, South Africa sends a small military force into Angola shortly after the latter's independence, but quickly withdraws while the civil war continues for years. Finally, the Bosnia War is coded as an interstate war largely due to an oddity of CoW coding rules. Bosnia is recognized by an independent state before Serbia formally withdraws, leading to a one-month interstate war that quickly transforms into a civil war as the Bosnian Serb forces become nominally independent of the Serbian state. Because none of these wars actually end, I believe it is appropriate to drop them from consideration. (Sarkees and Wayman 2010, 161-162, 165-168, 177-179)

The population of wars and the strategies used in each is shown in Table 1 below.

Table 1.1
List of Wars

CoW war #	War Name	Time	Type	Notes
107	Estonian Liberation	1918-1920	Ground	
108	Latvian Liberation – v. Russia	1918-1920	Ground	
108	Latvian Liberation – v. Germany	1918-1920	Ground	German forces initially helped defend the newly independent Latvia from the Russian invasion. However, they soon began fighting Latvia to impose a government of their choosing
109	Russo-Polish	1919-1920	Ground	
112	Hungarian Adversaries – v. Romania	1919	Ground	
112	Hungarian Adversaries – v. Czechoslovakia	1919	Ground	
115	Second Greco-Turkish	1919-1922	Ground	
116	Franco-Turkish	1919-1921	Ground	

117	Lithuanian-Polish	1920	Ground	
118	Manchurian	1929	Ground	
121	Second Sino-Japanese	1931-1933	Ground	
124	Chaco	1932-1935	Ground	
125	Saudi-Yemeni	1934	Ground	
127	Conquest of Ethiopia	1935-1936	Ground	
130	Third Sino-Japanese	1937-1945	Ground	COW merges with World War II in 1941. I have extended the end date until 1945 because this is a separate front in the broader Pacific theater
133	Changkufeng	1938	Ground	
136	Nomonhan / Khalkhin Gol	1939	Ground	
139	World War II - Germany v. Poland	1939	Ground	
139	World War II - USSR v. Poland	1939	Ground	
139	World War II - Western/Mediterranean Front	1939-1945	Ground	
139	World War II - Eastern Front	1941-1945	Ground	
139	World War II - Pacific	1941-1945	Ground	
142	Russo-Finnish	1939-1940	Ground	
145	Franco-Thai	1940-1941	Ground	
147	First Kashmir	1947-1949	Ground	
148	Arab-Israeli - Syrian/Lebanon	1948	Ground	Related to previous civil/non-state war in Palestine
148	Arab-Israeli - Jordanian	1948	Ground	Related to previous civil/non-state war in Palestine.
148	Arab-Israeli - Egyptian	1948	Ground	Related to previous civil/non-state war in Palestine.
151	Korean	1950-1953	Ground	Major ground offensives generally ceased by mid to late 1951. The Korean War could possibly be considered a bombardment war after that point. I continue to code it as a ground war due to the continuation of at least some ground combat
153	Off-shore Islands	1954-1955	Bombardment	One island was seized through intense ground assault. Classified as bombardment as this seems to have been an isolated action in the larger conflict
155	Sinai War	1956	Ground	

156	Soviet Invasion of Hungary	1956	Ground	
158	Ifni War	1957-1958	Ground	
159	Taiwan Straits	1958	Bombardment	
160	Assam	1962	Ground	
163	Vietnam War, Phase 2 – US air campaigns against North Vietnam	1965-1973	Bombardment	The Vietnam War included several distinct conflicts, and was in fact part of a broader Southeast Asian Conflict that included the Laotian and Communist Coalition (Cambodia) Wars below. Within the Vietnam War, there was the predominantly guerilla war within South Vietnam, which also included some conventional fighting towards the end. Second, there are the US air campaigns (Rolling Thunder and Linebacker I and II) against North Vietnam, over support of the guerilla war in the south. Since these wars had substantially different logics, I have decided to separate them under the multi-front criterion, even though they involved the same actors.
163	Vietnam War, Phase 2 – Conventional N. Vietnamese attacks on S. Vietnam	1968-1975	Ground	See above for why the Vietnam War is divided into components. Much of the fighting within South Vietnam involved guerilla fighting that bears a closer resemblance to civil war than interstate war. However, starting with the Tet Offensive in 1968, there were several conventional North Vietnamese ground offensives. These also included the Easter Offensive in 1972 and the final North Vietnamese offensives in 1974-75. Since these were the only component that resembles interstate conflict, I will focus on these conventional offensives
166	Second Kashmir	1965	Ground	
169	Six Day War - Sinai	1967	Ground	
169	Six Day War - W. Bank	1967	Ground	

169	Six Day War - Golan	1967	Ground	
170	Second Laotian,Phase 2	1968-1973	Ground	Related to the overall SE Asian conflict.
172	War of Attrition	1969-1970	Bombardment	
175	Football War	1969	Ground	
176	Communist Coalition	1970-1971	--	I drop this conflict, as it is an international intervention in a civil war, and the civil war continues after the intervention ends.
178	Bangladesh	1971	Ground	
181	Yom Kippur War - Golan	1973	Ground	
181	Yom Kippur War - Sinai	1973	Ground	
184	Turco-Cypriot	1973-1974	Ground	
186	War over Angola	1975-1976	--	I drop this conflict, as it is an international intervention in a civil war, and the civil war continues after the intervention ends.
187	Second Ogaden War, Phase 2	1977-1978	Ground	
189	Vietnamese-Cambodian	1977-1979	Ground	
190	Ugandan-Tanzanian	1978-1979	Ground	
193	Sino-Vietnamese Punitive	1979	Ground	
199	Iran-Iraq	1980-1988	Ground	
202	Falkland Islands	1982	Ground	
205	War over Lebanon	1982	Ground	Both Israeli-Syrian (interstate) and Israeli-PLO combat (extra-state) occurred simultaneously. I will focus on the former.
207	War over the Aouzou Strip	1986-1987	Ground	
208	Sino-Vietnamese Border War	1980-1984 (CoW has only 1987)	Ground	There is little information on this conflict. CoW also appears to have misidentified when the most severe fighting happened. CoW codes the war as occurring in 1987. However, the conflict erupted in 1980, with the most intense fighting occurring in 1984. After that, the fighting declined to a series of intense border skirmishes, possibly below war intensity. I am coding the war based on this new information. The conflict also has elements of a

				bombardment war. Artillery was heavily used, and fighting was confined to the border region. However, fairly significant ground combat did occur, and so the war is included as a ground war.
211	Gulf War	1990-1991	Ground / Bombardment	The Gulf War was primarily a ground war. However, the air campaign before Coalition ground offensive had elements of a bombardment campaign although they were also designed to set stage for the ground war. The Gulf War will thus be discussed in both sections
215	Bosnian Independence	1992	--	Dropped - The interstate war phase is defined by COW as occurring in 1992, between Bosnia's declaration of independence and the full withdrawal of Yugoslav regular forces. This seems difficult to distinguish from the civil war phase following. A further intervention by Croatia in 1995 would be properly classified as either international intervention in a civil war or an extra-state war, since the target was the Bosnian Serb forces rather than the Bosnian government.
216	Azeri-Armenian	1993-1994	Ground	Extension of previous civil war.
217	Cenepa Valley	1995	Ground	Some sources list casualty figures well below war threshold
219	Badme Border	1998-2000	Ground	
221	War for Kosovo	1999	Bombardment	
223	Kargil War	1999	Ground	
225	Invasion of Afghanistan	2001	Ground	Most Allied ground combat conducted by Northern Alliance. Air strikes were not intended as bombardment but in support of ground campaigns. Will include Northern Alliance offensives in overall war.
227	Invasion of Iraq	2003	Ground	

Conclusion

This chapter has established two elements foundational to the rest of the study. First, I have examined the two baseline assumptions of the bargaining model, that actors are rational and that war is on net costly. Making these assumptions eliminates explanations based on psychological shortcomings, domestic politics, or beliefs in that war has inherent value. I will accept both assumptions for the duration of this study.

Second, I have discussed several factors used to determine the population of wars examined. As both military technology and politics changed substantially over the nineteenth century, I will confine my examination to wars occurring after the end of World War I. Second, I will follow the common division of interstate wars from civil wars, focusing on the interstate conflicts. In constructing the population of wars, I will treat multilateral wars as a single case where combat occurs on one front, while dividing into multiple cases where combat occurs across several different fronts. Finally, I will examine ground wars (where the combatants fight to take and hold territory) separately from bombardment wars (where the combatants rely primarily on air or artillery bombardment).

The next chapter will show that the existing bargaining explanations of war fail to adequately explain war termination of actual wars. Chapter 3 will then develop a theory for why ground wars end, which will be evaluated in the following chapters. I will then turn examining the termination of bombardment wars in Chapters 6 and 7.

Chapter 2:

Evaluating Information, Credible Commitments and War Termination

The previous chapter laid the basis for my study of war termination by providing an overview of the bargaining model and developing the population of wars. This chapter will build on that foundation by empirically examining the prevailing rationalist explanations of war termination. According to the basic bargaining framework, wars should end when the war cause has been removed. Since wars are only rational when there is either the existence of private information about power or resolve or there are credible commitment issues (e.g. Fearon 1995; Powell, 2006), then wars should end with the revelation of private information or the resolution of credible commitment issues. However, as I will show, neither of these explanations seems to directly explain why most interstate wars have ended. While some conflicts do appear to end through these mechanisms, they leave a large number of cases unexplained. I will first test information revelation explanations for war termination, then proceed to test explanations based on the resolution of commitment problems, and finally briefly discuss risk acceptance and war termination.

Information Revelation and War Termination

As noted in the previous chapter, the first major rationalist explanation for war is the existence of private information about relative capabilities or resolve. Each side has incentives not to reveal information about their capabilities or resolve, which could prevent the combatants from recognizing or agreeing on a war avoiding or war terminating bargain. However, if the

combatants reach a consensus on their relative capabilities and resolve, then the bargaining range should open, allowing for war termination.

Most subsequent studies have assumed that the war process will reveal this private information, allowing such a consensus to form. Previous models have established two separate means by which war would serve to reveal this information (e.g. Filson and Werner 2002, Wagner 2000, Powell 2004a). Most obviously, combat outcomes would convey information about the relative strength of the combatants. If one combatant consistently does better or worse than expected prior to the war, they should rationally update their assessment of their opponent's strength, allowing the combatants to reach a consensus about the relative power balance. Combat may also serve to reveal information about resolve, for instance by observing how tenaciously the opposing army fights.

In addition to battle outcomes, the very decisions on whether to keep fighting reveal information. Less resolved combatants will accept deals that more resolved ones will reject to avoid future costs of war. Similarly, combatants that believe they are less powerful will accept deals that more powerful combatants will reject. Thus, as long as some sort of bargaining process occurs such that offers are exchanged, the continuation of the war would reveal private information. Because offers were not accepted, combatants should conclude that their opponents are more resolved or believe themselves more powerful. Thus, similar to combat outcomes, the bargaining process should lead combatants to reach a consensus on their relative power and resolve, and hence agree on a war-ending bargain.

Interestingly, Wagner (2000) and Filson and Werner (2002) find that the bargaining process is more effective at revealing information than combat. Because combat outcomes are probabilistic, one side losing a battle does not necessarily mean that they are weaker than they

expected. In addition, battles would generally be even less effective at revealing information about resolve, although they could still reveal some information about resolve. However, it would generally be possible to craft a screening offer through negotiations that would be effective at separating weak or unresolved types, allowing for a relatively quick settlement.

Previous Empirical Assessments

A number of attempts have been made to empirically assess whether information revelation leads to war termination. For instance, among other things, Chan (2003) found that intense fighting at the outset of wars is associated with shorter wars, likely because it reveals information about capabilities more quickly. Branislav Slantchev (2004) found that wars last longer as the participants are more equal, which he interpreted as a situation where they are more uncertain about the outcome and thus need more time for information to be revealed. In addition, wars are likely to end badly for the initiator when the war is longer and when the initiator experiences higher losses than its opponent. This was interpreted as the initiator realizing that it was overly optimistic about the outcome or costs when it decided to begin the war. Similarly, Alex Weisiger (2015) examined changes in monthly battle deaths, showing that more intense fighting, which would be more likely to reveal information, leads to more rapid war termination. Finally, Patricia Sullivan (2007) found that powerful states sometimes concede in limited wars when they realize that the costs of obtaining their objective are higher than anticipated. However, this only occurs when the powerful state is seeking an objective that is difficult or impossible to directly achieve through force.

These findings are consistent with the informational account, and thus show it is plausible. However, they are also consistent with other processes of war termination, in

particular military victory. More intense fighting, as Chan (2003) and Weisiger (2015) would also be more likely to lead to outright military victory, making these tests unable to fully test the informational account. At the same time, wars could last longer when the opponents are more equal (Slantchev, 2004) either because it takes longer to reveal which side is stronger or because it takes longer to win. Sullivan's (2007) findings are the only ones not easily reconciled with alternative accounts, but as she admits they only apply to a limited number of cases.

In contrast to the previous work that relies on overall war data or general casualty rates, Kristopher Ramsay (2008) examined war termination in relation to specific battles, more clearly in line with the overall processes in the bargaining model. However, using the U.S. Army's CDB90 dataset of battles, he finds reason to be skeptical of the information accounts. For much of the war, the number of battle days is inversely related to the probability of the war ending. Similarly, shocking victories, where the loss rates are significantly different from the trend up to that point, have only a substantively small, and likely statistically insignificant, effect on the probability of war termination.

However, Ramsay (2008) noted that while the CDB90 dataset was probably the best available at the time, it has serious issues for using it to understand war termination. Ramsay notes that only some wars and some battles within these wars are included in the dataset, raising the possibility of selection bias. In addition, the coding of some variables is either opaque or disputed. I find it more concerning that there appears to be no consistent rationale for labeling an engagement a battle. For instance, Ramsay notes that the Russo-Finnish Winter War has only one recorded battle while there are over twenty recorded battles during the capture of Okinawa in World War II. Thus, the battles in the dataset would have only a loose (if any) relationship to

how wars are fought at the strategic level, and thus the CDB90 dataset would give only limited information on war termination.

Testable Implications of the Information Revelation Explanation

As noted, most of the previous empirical research into information revelation and war termination cannot really distinguish between information as a cause of war termination and other possible causes. In the following section, I will attempt to more clearly distinguish empirically whether wars frequently end through information revelation or through an alternate cause. However, because information revelation cannot be directly observed, any attempt to determine whether information revelation leads to war termination beyond single case studies must rely on some sort of indirect evidence. I believe the clearest way to distinguish informational accounts from alternate accounts is to look for the existence of a true negotiated bargain.

The core finding of the bargaining model is that under perfect information there would always exist a bargain that both combatants would prefer to continued fighting. Once private information has been revealed through combat (and assuming no credible commitment issues), the combatants would thus agree to one of these bargains. In addition, we can conclude that the bargain should display two features. First, it should be intermediate between the two sides war aims at that point. Second, the bargain should alter the status quo from the military situation at that point.

The basic idea of a bargaining process means that the bargain should be between the war aims of the two combatants. Because the war has started, both sides must have contradictory war aims (for instance over who possesses a territory) and be willing to fight to achieve some of their

war aims. However, because war is costly, both sides should be willing to accept something less than their maximum war aims to avoid further fighting. Thus, while they are both willing to fight rather than achieve none of their war aims, they would prefer to accept something less than their maximum war aims rather than continue fighting. This means that under perfect information, a bargain will be somewhere between the maximum war aims of the two combatants. Once all relevant private information has been revealed, the combatants would agree to such a bargain. This means that if information revelation is the cause of war termination, then the war settlement should be somewhere between the war aims of the combatants. This leads to the following testable implication.

Testable Implication 2.1⁶: Wars should commonly end in settlements intermediate between the two sides war aims.

In addition to intermediate bargains, we would expect wars that end due to information revelation would represent settlements different than the military situation (e.g. the amount of territory captured) at the time of settlement. A bargaining range does not necessarily include the battlefield situation at that time. Given that war has started and the information revelation process is assumed to be relatively efficient, it is in fact unlikely that the bargaining range will contain the military situation. If the bargaining range contained the status quo before the war, then both sides would prefer the status quo to war, and would be impossible for the conflict to begin. Thus, some adjustment to the status quo is desired by one party or the other. While

⁶ I will use the term “testable implications” to refer to those of the previous theories to distinguish them from my own hypotheses in subsequent chapters. Testable implications, hypotheses and tables are labeled as chapter # and then testable implication/hypothesis/table # within that chapter.

combat will shift the status quo, it will likely reveal information even more rapidly. Thus, it is not particularly likely that the battlefield situation will have altered the situation enough for the bargaining range to include the status quo at the time the settlement is reached. Thus, any bargain will involve one side ceding territory or other concessions that have not been militarily achieved by its opponent. I will label these preemptive concessions, which should be common if information revelation plays a major role in war termination. This leads to the following testable implication.

Testable Implication 2.2: War ending settlements should commonly involve preemptive concessions, where one side cedes territory or other things that have not been militarily captured.

Analysis

These testable implications can be examined by looking at the proportion of wars that meet these conditions. I coded each conflict in the dataset for whether it meets the condition or not. Drawing on case narratives, particularly those in Sarkees and Wayman (2010), Phillips and Axelrod (2005), and Clodfelter (2008), I compared the outcome of the war (whether a result of a formal ceasefire or not) to the combatants' war aims and the military situation at the end of the conflict to determine whether it met the appropriate condition. A case is coded as a 1 if it meets the conditions of the testable implication, and 0 if it does not. For testable implication 2.1 the outcome is compared to the war aims of the combatants to determine whether it lies in between those war aims. Testable implication 2.2 compares the settlement to the military situation at the end of the conflict. I then tested these testable implications using summary statistics to

determine the proportion of cases that meet the appropriate condition. While the exact proportion needed to accept the testable implications is subjective, it should be possible to determine with a reasonable degree of certainty whether pre-emptive concessions or intermediate bargains occur in a substantively significant number of conflicts or not.

There are ten cases coded as representing an intermediate bargain. These are the Hungarian Adversaries War (Czechoslovak front), the 1st Kashmir War, the Jordanian Front of the 1948 Arab-Israeli War, the Offshore Islands War, the Ifni War, the Vietnam War air campaigns, the 2nd Laotian War, the War over the Aouzou Strip, the Azeri-Armenian War, and the Cenepa Valley War. However, many of these represent relatively easy cases for the informational account. The Hungarian Adversaries War, the 1st Kashmir War, the 1948 Arab-Israeli War, and the Azeri-Armenian War represent cases where the states were newly created, and fought over their final boundaries. In these cases, the exact war aims are often unclear and fluid, sometimes amounting simply to getting as much territory as possible. Accordingly, it is possible that one combatant had fulfilled its core war aims, and was only conceding minor points. In addition, there appears to have been some tacit cooperation between Israel and Jordan during the 1948 Arab-Israeli War, and neither appears particularly committed to the conflict. The Laotian War takes place in conjunction with a civil war over the Laotian regime type, and settled with a power-sharing arrangement. While external states (particularly North and South Vietnam) do a large portion of the fighting they are doing so in support of domestic actors, which makes it a somewhat odd case. The Off-Shore Islands War represents one of the small number of bombardment wars, where information revelation represents the primary plausible means of war termination (as I will describe in the next chapter). Also, there is no formal agreement or ceasefire in this case. Finally, it is unclear that the Cenepa Valley campaign actually reached the

1000 battle death threshold, and it generally appears more like a border skirmish that is commonly settled through negotiations rather than a full-scale war.

There are eight cases coded as one side offering preemptive concessions to the other. These are the Franco-Turkish War, the 3rd Sino-Japanese War, The Pacific Theater of World War II, the Russo-Finnish War, the Offshore Islands War, the Ifni War, the Angola War, and the Kosovo War. Again, several of these cases may be somewhat odd from the informational perspective. Both the 3rd Sino Japanese War and World War II in the Pacific end with Japan's unconditional surrender following the dropping of the atomic bombs, clearly an unusual circumstance. In the Russo-Finnish War, the USSR had gained the majority of its objectives at the time of the settlement, breached and outflanked the Finish main defensive line, and largely eliminated the ability of the Finnish military to resist further. Any information conveyed was very blunt. In the Angola War, South Africa withdraws its soldiers, but continued to support the UNITA rebels and the conflict transforms into a civil war. The Franco-Turkish War occurred immediately after World War I in a fluid situation between Turkish nationalist forces and the French forces intervening in the country. French objectives are somewhat unclear. In the Offshore Islands War, the US helped Taiwan evacuate a number of islands, but these have little value and Taiwan retained control of the most important islands. There was also no formal ceasefire or agreement in this case and the evacuation was entirely voluntary. Finally, Serbia did concede to NATO demands in the Kosovo War despite the absence of a ground offensive. However, this was possibly in response to increased threats of a ground invasion not initially present. Note that both the Offshore Islands and Kosovo Wars represent bombardment wars, which follow a somewhat different logic. Accordingly, while most of these cases could fit the informational account, few if any neatly align with its predictions.

To more formally test whether testable implications 2.1 and 2.2 fit the available data, Table 2.1 displays the number and proportion of cases conforming to the testable implications. These are then tested relative to a series of nulls. There are about 15% of cases that represent an intermediate bargain, and about 11% that represent preemptive concessions. Clearly less than a quarter of cases fulfill each of the testable implications individually at the 95% confidence level. Thus, each of the testable implications individually appears to be incorrect, as a relatively small proportion fit their conditions. Note also that these relatively low numbers occur despite some of the cases coded as meeting the conditions being somewhat unusual from an informational account, as described above.

Table 2.1: Results for Preemptive and Intermediate Bargains

	Intermediate Bargain	Preemptive Concessions	Either Preemptive or Intermediate	Both Intermediate and Preemptive
Yes	10	7	15	2
No	55	58	50	63
Proportion	15.38%	10.77%	23.08%	3.03%
95% confidence interval	6.37% to 24.39%	3.03% to 18.51%	12.56% to 33.60%	-1.22% to 7.28%
t-stat. null = 0.5	-7.6752***	-10.124***	-5.1121***	-22.091***
t-stat. null = 0.35	-4.3493***	-6.2533***	-2.2639*	-15.036***
t-stat. null = 0.25	-2.132*	-3.6726***	--	-10.333***
t-stat. null = 0.1	--	--	--	-3.278**
† p<0.1, * p<0.05, ** p<0.01, ***p<0.001; two tail significance tests				

As both testable implications are predictions about what should be observed empirically if the informational account is correct, it is useful to examine the combination of the two implications. It is possible to combine the two testable implications in two different ways by looking at the cases that meet at least one of the conditions and those that meet both conditions.

Sixteen cases, representing about 23% of the total meet at least one of the conditions.

Statistically, less than 35% of the cases meet either condition at the 95% confidence level. Since looking at cases that meet either condition is the easiest possible test, it appears that at most about a third of cases neatly fit the informational account. A more restrictive test would require cases to meet both testable implications. There are only two cases in the dataset that I coded as meeting both criteria, representing only 3% of the cases. Regarding statistical significance we can be confident that less than 10% of cases meet both conditions at the 99.9% confidence level. While requiring cases to meet both conditions is a relatively strict test, if information revelation easily caused war termination, both testable implications should be frequently observed.

Together, these findings suggest that while information revelation may explain some cases, the informational account cleanly fits only a minority of cases and perhaps only a small fraction of cases.

Credible Commitments and War Termination

As noted in the previous chapter, the second major cause of rationalist war in the bargaining framework is the inability of either of the combatants to credibly commit to follow a war avoiding bargain. Some disputes are over things that affect either the relative power or cost-benefit calculations (i.e. resolve) of the combatants. There might theoretically still be a negotiated settlement that both sides prefer to war. However, the side that gains power or relative resolve as a result of the settlement could not credibly promise not to use their new bargaining leverage to renegotiate the settlement. The other side may thus prefer war rather than ceding bargaining leverage in negotiations. (Fearon, 1995, 1996; Powell, 2004b, 2006, Beard 2017 WP)

Compared to information revelation, there have been relatively few studies attempting to determine whether the resolution of credible commitment issues leads to war termination. The main empirical study of credible commitments and war termination is Dan Reiter's (2009) *How Wars End*. Examining a number of case studies, Reiter found that in some cases (such as the Winter War), credible commitment issues are not severe enough to prevent a settlement once private information is revealed. However, in a number of others, such as World Wars I and II, the American Civil War, and the Korean War, the combatants fought on until one is defeated. In some cases, they even escalated their demands in the face of adverse information as they did not believe they could trust the other combatant to follow through on a settlement. However, the exclusive use of case studies makes it difficult to determine how generalizable these accounts are. Given that only about a quarter of conflicts end in absolute victory (Reiter, 2009, 34-35), it is questionable how prevalent the resolution of credible commitment problems is as a cause of war termination. Thus, it is necessary to more thoroughly examine credible commitment issues with reference to an entire sample of wars to determine the proportion of conflicts where the resolution of credible commitment issues leads to war termination.

In the remainder of this section, I will examine the possible ways war may affect the credible commitment problem, and how war would be expected to end in these scenarios. I will then derive testable implications from these expectations and test these implications to determine whether the resolution of credible commitment problems leads to war termination.

Factors Leading to Credible Commitment Problems

Before examining the ways in which credible commitment problems can be resolved, it is important to note one under-recognized feature of these issues. Notably, for credible

commitments to lead to war, the choice of fighting the war must be able to alter the existence or severity of the commitment problem (Beard 2017 WP). If a combatant's power or cost-benefit analysis was going to change predictably in the aftermath of war regardless of the war's outcome, there would be no way for war to prevent the emergence of the commitment problem. Hence, there would be no reason for the other combatant to choose war instead of a negotiated settlement in the near term. We can thus focus on how war can cause a change in the relative power or cost-benefit ratio rather than all potential changes. Moreover, as Fearon (1996) and Powell (2006) have noted, for such a commitment problem to lead to war, the change must be discontinuous. Otherwise, it would be subject to "salami tactic" bargaining, where at each stage a revisionist demands small changes that are preferable to war, even if the overall change is substantial.

As noted, for credible commitment issues to be sufficient to lead to war, the war must be able to affect the existence of the commitment problem. Under the basic assumption that wars will end when the problems leading to them are resolved, we would expect wars begun by credible commitment problems to end when it is no longer possible for continued conflict to change the existence of a commitment problem. Fundamentally, there are three ways that war could affect a credible commitment problem. First, the conflict could completely eliminate one of the combatants, cutting off any potential for future bargaining. Second, the conflict could affect the cost-benefit ratio of one of the combatants. Finally, the conflict could change the relative power of the two combatants. Each of these ways of resolving credible commitment issues will be further described below and testable implications derived and tested. The cases are directly coded for whether they meet the testable implications, using Sarkees and Wayman (2010), Phillips and Axelrod (2005) and Clodfelter (2008).

Elimination of a Combatant

The clearest way to solve the credible commitment problem is for one combatant to completely eliminate the other, incorporating the defeated state's territory and population into its own. When one combatant is eliminated, it no longer has the ability to bargain, and thus cannot attempt to renegotiate the outcome. If one combatant expects to be able to eliminate the other, they can both end any credibility problems as well as save on any costs they expected to pay to prepare for a future war with their adversary.

If elimination of a combatant played a major role in ending wars, we would expect a large number of wars to involve state death. This is easily measurable by seeing whether a conflict involved the complete takeover of one of the combatants, and its elimination from the state system.

Testable Implication 2.3a: A number of wars should end in state death.⁷

However, a state may seek to conquer another for reasons other than the solution of credible commitment problems. For state death to be a solution to credible commitment problems, it must take place in the context of significant security competition. The state seeking the elimination of the other must believe that failure to eliminate their opponent will lead to significant future problems. This may occur if they believe the other will gain power in the future or that the domestic politics of the other state will become more hardline. Alternatively, even if there is no expected change in relative power or resolve, one state may attempt to end

⁷ Where a letter follows the testable implication number, that indicates that it is one of two or more conditions necessary for the testable implication to be met. It will be paired with at least one other testable implication indicating the other conditions.

what it believes would be a lasting and costly standoff. Thus, if state death played a major role in solving credible commitment problems, then we would expect the instances of state death to be accompanied by intense competition between countries.

Testable Implication 2.3b: Instances of state death should be accompanied by significant or increasing security competition.

Since 1918, five wars have resulted in state-death at some point during the conflict. These are: the Italian conquest of Ethiopia, the German and Soviet conquest of Poland⁸, North Vietnam's conquest of South Vietnam, and the (temporary) conquest of Kuwait by Iraq. This represents about 7.7% of conflicts. However, in only one of these instances (the conquest of South Vietnam) does state death appear to be accompanied by the type of intense competition required by the theory. Italy, Germany, the USSR, and Iraq were all much more powerful than their opponents and likely to remain so. Ethiopia was not even located near Italy.

Thus, the only plausible instance of one state conquering another to forestall future competition would be North Vietnam's conquest of South Vietnam. Given US support of South Vietnam, it is plausible that the North feared a long and costly competition if it did not annex South Vietnam. However, even this instance is a rather strange case for the commitment story for three reasons. Overall, the Vietnam War was extremely costly for North Vietnam, and so it is unclear why future competition would be seen as so severe as to be worth these costs. Second, it is likely that North Vietnam had a strong ideological interest in reunification under Communist rule. Thus, it is unclear the extent to which security competition and credibility drove North

⁸ According to coding rules described in the introduction, these are two different wars.

Vietnam's decision to annex South Vietnam. Despite these issues, this will still be coded as a possible credible commitment case. However, this means that at most there is a single potential case in which state death may occur due to credible commitment issues.

Changing Cost-Benefit Functions

The second possible way that combatants can resolve credible commitment issues is by changing how the other combatant⁹ translates specific outcomes into perceived costs and benefits (e.g. Wolford 2012). If a combatant is expected to become more cost-tolerant in the future, (i.e. casualties or other war costs mean less to it), then they might attempt to renegotiate the bargain struck as it is more willing to threaten war. An increase in the perceived benefits of a favorable resolution of the issue would pose equivalent credibility issues. Conversely, if a combatant's cost-tolerance decreases or perceived benefits decrease, then their ability to credibly commit to maintaining a bargain increases.

Notably, a changing cost-benefit function is a purely domestic matter. It refers to how each combatant translates a given outcome to the perceived costs and benefits, not the likelihood a given outcome will occur. The ability to affect the outcome and incur damage is largely a function of the military balance, and so is best considered in conjunction with relative power. Thus, the cost-benefit function would determine how a combatant translates a given number of casualties and other damage into perceived costs and how much they value possession of disputed territory or other positive outcomes of the war.

⁹ Credible commitment issues would be similarly affected if a combatant believed war would affect its own cost-benefit calculations. However, it is unclear how a combatant could deliberately change its own cost-benefit function by going to war.

As discussed above, for any credible commitment issue to lead to war, the key requirement is for war to be able to change the ability of the other side to commit. About the only way one combatant could predictably change the other's cost-benefit function is by inducing a change in their domestic governing coalition or regime. While it is possible that leaders might change how they view the costs of war during a conflict, it is unlikely that they would do so in a predictable manner. A combatant may go to war attempting to induce the other country to change their governing coalition, although again this is somewhat unpredictable. The surest way for a country to induce governance change would be to temporarily occupy the country and impose a new regime. Thus, if changing cost-benefit functions were a major cause of war termination we would expect a significant number of wars to end in either with voluntary coalition change or forcible regime change.

Thus, if induced coalition or regime change played a major role in the termination of credible commitment wars, we would expect that a large number of conflicts would involve a coalition or regime change. However, under Fearon's (1996) and Powell's (2006) conditions, there must be a significant discontinuity in order for any change in the cost-benefit function to be non-negotiable. Therefore, power sharing agreements that allow opposition parties into the government cannot be the solution to credible commitment problems that were non-negotiable, as some power sharing agreement would have been negotiable earlier in the conflict. Therefore, only regime changes or changes in the actual main governing party would be sufficient to resolve previously non-negotiable credible commitment problems. This leads to the following testable implication.

Testable Implication 2.4a: A significant number of conflicts will involve a change in the governing party of one of the inhabitants or a change in the country's regime.

However, the existence of coalition or regime change is not sufficient to infer that such a change led to the settlement of the war. Two additional conditions are necessary. First, the coalition or regime change needs to occur shortly before the end of the war. If the coalition or regime change does not occur close to the end of the conflict, it cannot be said to induce war termination by changing the ability of the combatants to commit to the settlement. Second, the coalition change needs to increase rather than decrease the ability of the other combatant to commit to the settlement. In other words, the change needs to bring in a government that is either more cost-sensitive or friendlier towards the other state. If a change brought in a more hardline government, then the other state would want to continue fighting to overthrow the hardline regime.

Testable Implication 2.4b: Coalition or regime changes should occur close to the end of the war.

Testable Implication 2.4c: Coalition or regime change should bring in a friendlier government, or one that is relatively more cost-sensitive.

Between these conditions, we can rule out several governing changes as possible resolutions to previous credible commitment problems. Mustafa Kemal Atatürk took power in Turkey during the 2nd Greco-Turkish (1919-1922) and Franco-Turkish (1919-1921) wars. However, as a hardline nationalist, Atatürk would have been more opposed to concessions than

previous governments, thus failing to resolve previous commitment issues. The 2nd Laotian War ended with a coalition government being installed that included the Communist Pathet Lao. However, as a power-sharing agreement, this would not meet the non-negotiability criterion necessary to prevent settlement until this was achieved. Finally, the election of President Eisenhower during the Korean War would also be ruled out as solving commitment issues for two reasons. First, this occurred months before the end of the war. Second, Eisenhower was not clearly a friendlier or more cost-tolerant leader, and was arguably a more hardline anti-communist than Truman.

However, even after ruling out these cases, there are ten conflicts that ended with regime change. These include: the overthrow of the German and Japanese regimes at the end of World War II¹⁰, the Romanian overthrow of the Communist Hungarian regime in 1919¹¹, the Soviet invasion and overthrow of the Hungarian government in 1956, the Vietnamese overthrow of the Cambodian Pol Pot regime, the Tanzanian overthrow of Uganda's Idi-Amin, and the US/coalition overthrow of the Afghan and Iraqi regimes in the early 2000s. Note that four of the ten cases involve World War II.

However, most of these cases seem somewhat odd fits with the overall credible commitment stories. In particular, while the instances of regime change would allow any credible commitment issues to be resolved, most of these cases do not appear to begin due to these credibility issues. Of the ten cases, in six (the four World War II cases, and the Cambodia and Uganda regimes) the regime that was overthrown was in fact the country that initiated the war. This means that in these cases, the credibility problem that was resolved was not what

¹⁰ Both have two fronts: The Eastern and Western European fronts in Europe and the Pacific and Chinese fronts against Japan. Thus, each counts as two wars according to coding rules.

¹¹ The Hungarian-Czechoslovak front of the same war appears to have concluded before the Kun regime lost power.

spurred the initiator to begin the war. Secondly, in the Afghanistan and Iraq cases and possibly the Soviet-Hungarian case, it is unclear why there was no way of creating a stable agreement absent the overthrow of the regime. In Iraq, it seems likely that a robust inspection regime could have been agreed to that would prevent the resumption of Iraqi WMD programs. Similar measures likely could have been taken to prevent further Afghan support for al-Qaeda or other terrorist groups.

In the remaining cases, the relative importance of credibility concerns and other objectives remains unclear. The Soviet Union may have overthrown the new Hungarian regime either for ideological reasons or because it feared a Hungarian defection from the Warsaw Pact that would have weakened its position relative to NATO. Similarly, it is unclear how much of a role fear of the Communist Kun regime relative to territorial aggrandizement played in Romania's attacks on Hungary or the installation of Communist parties in the Laotian government.

Thus, while all of these cases will be coded as possible credible commitment cases, it should be noted that serious questions arise about how closely they follow the credibility story for war initiation and termination.

Strategic Territory

Another factor that could affect the ability to credibly commit is a changing ability to affect the outcome of the conflict or the relative power of the combatants. This can take two forms, although in practice the two are likely functionally equivalent. The first affects the probable outcome of the conflict, such as how much of a disputed territory each side can receive. The second reflects the ability of each combatant to impose casualties or other damage on its

opponent in the course of reaching a military settlement. In practice both of these depend on the relative military capabilities of the two sides, mediated by terrain and other factors that affect these capabilities. Thus, if conflict can affect the relative capabilities in a discontinuous manner, then both the probability outcomes and costs of future conflicts may prevent negotiations.

There are two major ways that the relative military capabilities could be affected in a discontinuous manner. The first is through the capture of strategic territory, while the second is first-strike advantages which are considered below. Rivers, mountain ranges etc. represent defensive obstacles that can create a discontinuous change in power if they change hands. Possession of these would affect both the probable outcome of a conflict, by making it difficult for an attacker to overcome the obstacle, and allow the defender to inflict additional casualties on the attacker. Thus, a revisionist would want to possess the strategic territory as it would give them grounds for further demands, while other states would wish to prevent them from gaining the territory. Thus, the first step in determining whether the capture of strategic territory resolves credible commitment problems leading to the conflict is to see if there are natural or artificial terrain features that might give one side a significant strategic advantage. Note that according to Fearon (1996) the power shift created by the strategic territory would have to be substantial and indivisible. In general, I will look for major defensive obstacles, although other terrain will be considered if it gives one side a clear offensive advantage.

I will only look at essentially natural obstacles. Human created fortifications might fulfill the indivisibility condition and would present defensive obstacles. However, the influence of human fortifications is central to the theory that I will present in the next chapter. Thus, to maintain theoretical clarity it is important to only look at fighting over natural obstacles in this chapter.

Testable Implication 2.5a: A significant number of conflicts will involve fighting over a major defensive obstacle or other indivisible strategic territory.

However, it is possible for strategic territory to exist without being a cause of the beginning or continuation of war. If strategic territory explains war termination, the capture of the strategic territory needs to be closely associated with the end of the war. The war should end once one side captures the strategic territory, and the other chooses not to contest the capture. The war should not drag on considerably beyond the capture of the strategic territory. In addition, the war should not end before a side that has chosen to attempt capturing the strategic territory has succeeded or clearly failed. This leaves us with the following testable implication:

Testable Implication 2.5b: Wars fought over strategic territory should end in close connection with the strategic territory changing hands.

While there is a potential strategic territory in a number of wars, only a few also meet the second condition. For instance, the Shatt-al-Arab waterway may have represented a strategic, defensive barrier, but fighting in the Iran-Iraq War continues long after Iran both pushed Iraq back to the waterway and successfully crossed the barrier. More frequently, strategic territory is captured and then retaken, with the fighting ending shortly thereafter. In these cases, there is no attempt by the initiator to capture the territory again. These cases include the Nomonhan war between Russia and Japan, the 2nd Kashmir War, both fronts of the Yom Kippur War, and the Kargil War. The 1st Kashmir War, Assam War, and Iran-Iraq war have potential strategic

territory that also generally fits this pattern. During the Sinai war, the Suez Canal would likely represent strategic territory, but Israel retreats from it during the peace settlement, negating its ability to solve commitment issues.

There are a number of cases where territory would seem to have military implications, but the strategic advantages were not indivisible. In particular, the mountainous terrain in Kashmir for the 1st and 2nd Kashmir Wars and Kargil War, and the Himalayas in the Assam War would generally create defensive advantages. However, there does not appear to be particular peaks or ridge lines that have special importance in any of these cases. A defensive line in a somewhat different location would likely be about as secure, and so these mountains do not meet the indivisibility criterion.

In other cases, the capture of the potential strategic territory is not closely associated with the end of the war or otherwise does not appear central to fighting the war. For instance, in the 1956 Sinai War, Israeli forces reached the Suez Canal and captured both sides of the Straits of Tiran, both potentially of strategic importance. However, Israel ceded control of both under international pressure, and so gaining control of either territory does not appear central to Israel's decision to fight.

The two 1973 Arab-Israeli war cases do appear to have strategic territory, and that territory represents an important element in the conflict. However, neither case fulfills the second condition of the war ending in close conjunction with the capture of the strategic territory. On the Israeli-Syrian front, the Golan heights represent strategic territory, and may be fairly indivisible. However, the war continued significantly after Israel recaptured the heights, as Israeli forces advanced deep into Syrian territory and into artillery range of Damascus. The Israeli advance was also a very deliberate choice, and not merely a continuation of fighting

because a negotiated end had not yet occurred. On the Israeli-Egyptian front, the Suez Canal represents a major defensive barrier, and so also counts as strategic territory. Egypt successfully crossed the canal, in essence capturing the strategic territory, but Israel decided to counterattack in order to reestablish their defense line along the canal. However, Israel never actually reestablished the defense line militarily. While they crossed the Suez Canal into Egypt, and created the conditions for a return to the status quo ante bellum, this means that strategic territory cannot fully explain why Israel and Egypt decided to settle the conflict when they did.

This leaves only four fairly clear cases of strategic territory that fit the model, the Changkufeng War and all three fronts of the Six Day War. The Changkufeng War was a short conflict between the Soviet Union and Japan in 1938 over the strategic Changkufeng Heights. It ended with Russia recapturing the hill after an initial Japanese attack, and thus Japan deciding not to escalate the conflict further. In the Egyptian-Israeli front of the 1967 Arab-Israeli War, Israel captured the Sinai and established positions along the Suez Canal. Similarly, in the Israeli-Jordanian front, Israel reached the Jordan River by capturing the West Bank. Finally, in the Israeli-Syrian front Israel captured the Golan Heights from Syria, enhancing their defensive position and denying artillery positions to the Syrians.

First-Strike Advantages

The final means that relative power can change is through surprise attacks and first-strike advantages. First-strike advantages exist when attacking first gives the attacker a subsequent advantage in the ensuing conflict. These could occur for a variety of reasons, such as being able to take advantage of an opponent's low mobilization or being able to destroy key elements of their military power before they could react. Any of these possibilities create the type of

discontinuous power shift necessary for credible commitment wars (see Powell 2006, Beard and Strayhorn 2018). By trying to negotiate rather than attack immediately, a country at least gives up the potential advantages of a first strike. It may even hand these advantages to its opponent by allowing them to attack first. The obvious first thing to look for in determining if the resolution of commitment problems created by a surprise attack plays a role in ending wars is that wars would actually have to be begun by a surprise attack, leading to the following testable implication.

Testable Implication 2.6a: A large number of wars would begin with a surprise attack.

As with the previous commitment problems, it is also necessary to examine how wars begun by a surprise attack would end. Here, the key is to recognize that the possibility of strategic surprise disappears the moment the attack occurs. Once shots are fired or bombs dropped, both sides obviously know that they are in a war, and the side taken by surprise will place its forces on alert. This in essence removes the possibility of further first strike advantages. While it may take some time to fully prepare for war after a surprise attack, this should still happen relatively quickly. Once the state that received the surprise attack has fully prepared, the power balance will have stabilized, and any credible commitment problems will have disappeared.

Interestingly, even one state fearing future surprise attacks would not be sufficient for the war to continue absent one of the other credible commitment issues. As previously noted, for credible commitment issues to lead to the initiation or continuation of conflict, then something about the conflict must lead to a change in the ability of the states to credibly commit in the

future. Thus, a state may attempt to overthrow the regime of its opponent or capture strategic territory to eliminate the possibility or limit the damage of future surprise attacks. However, these possibilities have been discussed in the previous sections and their corresponding testable implications. Thus, it remains the case that if first-strike advantages present the only commitment issue, then the war should end quickly as the defender prepares for war and eliminates the possibility of future power shifts. This gives us the following testable implication.

Testable Implication 2.6b: Wars begun by a surprise attack should end quickly.

A number of wars have begun with a surprise attack, however very few of these fulfill the second condition of ending shortly after the surprise attack. Clear surprise attacks occurred during the Eastern and Pacific fronts of World War II, the Indo-Pakistani war over Bangladesh, both fronts of the Yom Kippur War, the Iran-Iraq War and the Falklands War. However, in each of these cases the war continued with at least one major counterattack by the side that received the surprise attack, and in each case the counterattack was relatively successful. This means that by that point both sides were relatively prepared for war, and should have preferred negotiations to further fighting given that the possibilities of a first-strike advantage were gone. There are other cases where there may be an ambiguous first-strike, such as the infiltration of troops into a disputed territory (e.g. 1st and 2nd Kashmir Wars, Ifni War, Cenepa Valley War, and the Kargil War), but these also fail to meet the second condition.

This leaves five conflicts where a surprise attack initiates the conflict, and the war ended quickly in possible accordance with the elimination of further first-strike advantages. The Israeli-Egyptian Sinai War ended within days of Israel's surprise attack, although Israel allowed

a return to the status quo under international pressure. Similarly, all three fronts of the Six Day War began with surprise attacks and end within days. Finally, the El-Salvador – Honduras Football War appears to have begun with a Salvadoran surprise attack and again ended within days.

Analysis

Table 2.2 displays the number and proportion of cases that fit the testable implications for each of the possible ways that credible commitment problems can be resolved. As can be seen, except for inducing regime or coalition change, each of the possible causes has only a relatively small number of cases fit each of the criteria. There are a greater number of cases where the war ends with coalition or regime change, although this still only represents about 15% of cases.

Table 2.2: Results for Credible Commitment Types

	State death	Government Change	Strategic Territory	Surprise Attack	Any
Yes	1	10	4	5	17 ¹²
No	64	55	61	60	48
Proportion	1.538%	15.38%	6.15%	7.69%	26.15%
95% confidence interval	-1.53% to 4.61%	6.37% to 24.39%	0.15% to 12.15%	1.04% to 14.35%	15.18% to 37.13%
t-stat. null = 0.5	-31.5***	-7.6752***	-14.596***	-12.702***	-4.3409***
t-stat. null = 0.4	-25***	-5.4579***	-11.267***	-9.6995***	-2.5205*
t-stat. null = 0.3	-18.5***	-3.2407**	-7.9383***	-6.6973***	--
t-stat. null = 0.2	-12***	--	-4.6093***	-3.695***	--
t-stat. null = 0.1	-5.5***	--	--	--	--
† p<0.1, * p<0.05, ** p<0.01, ***p<0.001; two tail significance tests					

¹² Is less than the sum of the sub types due to some cases fulfilling multiple conditions.

However, because the various factors represent alternative causes of resolving commitment problems, and thus any one factor would likely be sufficient to cause war termination. Thus, it is necessary to look at them together. The final column in Table 2.2 shows the cases that show at least one of the factors of commitment problem resolution. Thus, there are 17 cases where the resolution of commitment problems may lead to war termination, representing about 26% of cases. This is less than 40% of cases at the 95% confidence level. Accordingly, the resolution of credible commitment issues may explain a proportion of cases, but this proportion is very likely a minority of cases.

Risk Acceptance and War Termination

In addition to private information and commitment problems, risk acceptance represents a third possible explanation for war. However, risk acceptance does not provide an independent explanation for war termination. Combatants that are relatively risk acceptant would demand greater concessions to avoid war than ones that are relatively risk averse. This narrows the bargaining range, and if risk acceptance is high enough could even close it entirely, leading to war.¹³ Potentially war could occur even if one state is risk averse as long as the other is sufficiently more risk acceptant than the first is risk averse (see Butler 2007, Levy 1996).

However, wars begun due to risk acceptance would have to end in one of the same ways as those caused by commitment problems. As I noted in the previous chapter, for a war to end, the problem that caused it must be resolved. State death of one combatant would fully resolve

¹³ Powell (2006) shows that there should still be a non-costly lottery (e.g. arbitration) that the combatants could theoretically agree to even if they are risk acceptant. If the non-costly lottery has the same probable outcomes as war both sides would prefer the non-costly lottery to paying the costs of war. However, given the anarchic nature of the international system, the combatants would be unable to credibly commit to implementing the outcome of the non-costly lottery. Accordingly, arbitration or other non-costly lotteries would not often represent a viable alternative, and so risk acceptance would remain a potential cause of war.

the dispute. Similarly, regime change could replace a risk acceptant leadership with a more risk averse one, or one that is more sensitive to the costs of war. The new leadership would thus no longer be willing to fight. Finally, capturing strategic territory could decrease the chances of a risk acceptant state winning, such that even a risk acceptant state would no longer be willing to risk war. Thus, three of the ways commitment problem wars are resolved would also resolve wars caused by risk acceptance. However, there is no other clear way that war would change a state's risk acceptance or otherwise resolve the problems created by one state being risk acceptant. Thus, the previous analysis showing that the resolution of commitment problems only explains how a fraction of wars end also holds for wars caused by risk acceptance.

Conclusion

As previously seen, neither information revelation nor the resolution of credible commitment problems explains a majority of cases of war termination. Individually each represents about a quarter of all cases. These findings are reproduced in Table 2.3, which also shows the number and proportion of cases that fit either of these accounts of war termination. This shows that only about 47% of observed wars end in a way that is reasonably consistent with one of these two explanations. This is statistically significantly less than 60% of cases at the 95% confidence level. This means that at least 40% of cases do not clearly fit either explanation, even being generous in coding cases as fitting the informational revelation account.

Table 2.3: Results for Information and Commitment Explanations

	Either Information hypothesis	Any Commitment	Either information or commitment
Yes	15	17	30
No	50	48	35
Proportion	23.08%	26.15%	46.15%
95% confidence interval	12.56% to 33.60%	15.18% to 37.13%	34.61% to 59.33%
t-stat. null = 0.6	-7.0108***	-6.1612***	-2.222*
t-stat. null = 0.5	-5.1121***	-4.3409***	--
† p<0.1, * p<0.05, ** p<0.01, ***p<0.001; two tail significance tests			

This evidence strongly suggests that neither the informational nor credible commitment accounts adequately explain war termination. Most wars tend to end before credible commitment issues are fully resolved. However, neither do wars appear to end according to the information revelation account. This means that there are barriers to war termination other than the private information or credible commitment issues. The next chapter will develop theories about what barriers exist to prevent war termination and how these issues are resolved. These explanations will then be empirically examined in subsequent chapters.

Chapter 3

A Theory of War Termination in Ground Wars

In the previous chapter, I showed that traditional bargaining explanations fail to explain the termination of a large number of wars. Only about 25% of conflicts end with the resolution of credible commitment problems through state death, regime change, or the capture of strategic territory. Nor does the revelation of information lead to truly negotiated settlements, as relatively few wars involve either preemptive concessions by one side or a bargain intermediate between the two sides' war aims. Overall, information revelation and the resolution of commitment problems explain war termination in less than half of the wars since 1918.

As noted in only a minority of wars are commitment problems resolved. Within the other seventy-five percent of wars, commitment problems cannot have been the reason that war continued as these commitment problems are not resolved. One side may have been seeking to change the power balance through eliminating their adversary, regime change, or capturing strategic territory. However, since they agree to end the war without achieving the change in the power balance, there must exist a settlement that they would have agreed to. While this settlement may not have been obvious due to private information, it would have existed. As an example, during the Iran-Iraq war, both sides sought to change the regime of the other state, and so at first glance the length of this war would appear to be due to commitment problems. However, the war ends with the return of the status-quo ante-bellum. Thus, at some point the combatants realized that achieving regime change was not worth the costs involved.¹⁴ Therefore,

¹⁴ Iraq seems to have given up on the regime change within the first year of the war. In contrast, Iran did not give up on trying to change the Iraqi regime until 1987 or 88.

private information must have existed about how hard it would be to change the opponent's regime.

Thus, information revelation would seem to be central to all wars that did not end in regime change, state death, were not over strategic territory and did not end quickly after a surprise attack. However, as noted above, wars do not seem to end in a truly negotiated settlement, as would be expected once information it revealed. This empirical finding presents two questions. First, why is information not either quickly revealed or once revealed, not efficiently allow for war termination? Second, when and why should we expect wars to end, if neither information revelation nor the resolution of commitment problems can adequately explain war termination?

In this chapter, I will provide a theoretical explanation for why information revelation often fails to end wars quickly. I will argue that defensive advantages prevent war termination for much of the conflict, but allow and support war termination once one side has achieved their war aims. In addition, I suggest that wars are even more likely to end once it is the stronger side that has achieved their war aims.

It is well accepted that defenders usually have military advantage. Moreover, this advantage should grow the longer the defender occupies a given position, as they can construct field fortifications and otherwise improve the defensive potential of their position. These growing defensive advantages present short-term commitment problems inhibiting negotiated adjustments to the status quo. Unsatisfied states have incentives to attack immediately rather than allow their opponent to entrench. At the same time, defenders have incentives not to make concessions, which would likely require giving up prepared defensive positions, and thus allowing their opponent to demand even more.

However, once one side has achieved their war aims, defensive advantages actually make a settlement more likely. One side would be satisfied with the outcome, and defensive advantages make it difficult for the other side to reverse the battlefield outcome. I suspect war termination would be even more likely when the stronger side has achieved their war aims, as weaker opponents would have even less chance of overcoming these defensive advantages.

There are several alternative explanations for why information revelation does not quickly end wars that have either been offered by other scholars or are obvious possibilities. These alternatives include: that one side wins too quickly for a negotiated settlement to be reached, that two-sided uncertainty prevents the effective revelation of information through bargaining offers, or that the balance of power may change during the conflict, presenting new uncertainty. However, none of these explanations are theoretically complete. These explanations help answer the first question of why information revelation does not quickly end wars. However, none of the explanations offer a clear explanation of when and why wars would end instead.

Below, I will first describe the existence of defensive advantages and how they increase with time. Then, I will describe how defensive advantages create short-term commitment problems that inhibit war termination, and how these barriers are reduced once one side has achieved their war aims. Finally, I will discuss a couple major alternative explanations for why information revelation fails to end wars, and why these alternate explanations are not convincing.

Defensive and Offensive Advantages

The core of my theoretical explanation relies on the observation that defenders typically have a military advantage and that this advantage would be expected to increase the longer a

defender occupies a given position. Below, I will describe in more detail the different advantages defenders and attackers have, and why the defensive advantages typically outweigh the offensive advantages. I will then describe why defensive advantages would be expected to increase over time.

Defensive Advantages

Generally, it is easier to win defensive battles in modern warfare. Defenders have three major advantages. First, they are better able to employ their available firepower. Second, they can use terrain to both conceal their forces and provide cover from enemy fire. Finally, defenders likely have an easier time bringing reinforcements to the front. At the same time, the primary advantage of attacking – the ability to choose when and where an attack will occur – has been largely negated by the geographical extent of modern war.

The first major advantage of the defense is that defenders are better able to use their available firepower. By its very nature, defenders are more static than attackers. Attackers must move forward and maneuver to engage the enemy, while defenders must merely resist. Defenders may move forces either to counter the main axis of attack or otherwise to gain positional advantages over the attacker. However, these movements will often be smaller, and will take place out of contact with the enemy. In contrast, in order to defeat the defender, the attacker will have to move while in contact, and likely under fire.

The relative movement is important as most modern ground weapons are most effective when used from a static position. Some weapons, such as heavy machine guns, anti-tank missiles, and towed artillery need to be physically set-up before they can be used, and cannot be used while moving. Other weapons, including rifles and small-arms, and un-stabilized vehicle-

mounted cannon can be used on the move. However, these weapons can be significantly harder to aim effectively while moving. Thus, when fired while moving, they are unlikely to be effective. Modern stabilization and fire control systems have been developed to increase the accuracy while moving of cannon mounted on armored vehicles. Some of these have been touted as enabling first-round hits while moving. While these impressive systems have significantly enhanced the ability to fire effectively while moving, it is likely that they are still more accurate when fired from a fixed position. In addition, typically only weapons on large and expensive armored vehicles have stabilized fire control systems, leaving many weapons without these abilities. Thus, among two equal opponents, the defender has the advantage of being able to more effectively use their available firepower.

In addition to being better ability to use firepower, defenders can better use terrain for cover and concealment. Soldiers gain an advantage when they can conceal themselves from observation. This both limits the ability to effectively aim weapons the concealed soldiers, and may allow them to surprise attacking forces. Even more beneficial is the ability to take cover by placing hard barriers between one's own soldiers and suspected enemy forces. Cover limits or completely blocks the ability of projectiles to reach their target, providing physical protection for the soldiers under cover.

Terrain that can provide concealment or cover is widely available. Even relatively flat and open terrain contains numerous small height variations for individual soldiers to use. Hilly or rocky terrain provides additional cover and can be used by vehicles as well as individual soldiers. In addition, while forests and bushes may provide little physical protection, they can greatly help in concealing military forces from observation.

Both attackers and defenders will attempt to use the available terrain for cover and concealment. However, defenders have a much easier time using the available terrain. First, as previously noted, defenders can be relatively static, while attackers must advance. Thus, defenders can find the best available cover and concealment and stay there. In contrast, attackers must move out of any cover that they have found in order to advance. Second, even if hastily establishing their defensive positions, defenders likely have greater knowledge of the terrain. They can thus plan how to use it both to give themselves the best cover and concealment, while forcing attackers to advance across more open ground. Thus, defenders almost certainly have an advantage in using the available terrain to protect themselves.

Finally, defenders are likely better able to use available reserves. It may be difficult or unwise to for either side to commit all of their forces to the front line. Modern military forces require considerable space to maneuver, and so over-concentration can make it difficult to move forces effectively in either the attack or defense. In addition, too many forces in one area present a lucrative target for enemy firepower, and thus dispersion is necessary to give soldiers and vehicles a good chance of surviving against modern weapons.¹⁵ Finally, keeping forces in reserve allows commanders to respond to unexpected developments, such as countering an unexpected attack or exploiting a breakthrough in the opponent's lines.

Thus, both sides have strong incentives to keep some forces in reserve. However, the defender is more able to take advantage of these forces. First, and primarily, the defender's reinforcements are moving up from behind the lines, and thus not in direct contact with the enemy. In contrast, the attacker's reinforcements must move across disputed territory to enter the battle. Thus, the defender's reinforcements are typically more sheltered from enemy fire than

¹⁵ See Biddle (2006) for a more detailed account of why dispersion is necessary.

the attackers. This would be particularly true if the defender has chosen positions, such as ridgelines, that physically shelter reserve forces. Being sheltered from enemy fire means the defenders forces are likely to be fresher when they enter the battle, and they can move faster as they don't have to take measures to reduce their vulnerability to the enemy's fire.

Second, the defender probably has access to better transportation infrastructure. Because the defender's reserves are moving behind the lines, they are better able to use intact roads and railways, speeding their movements. In contrast, as attackers have to advance across disputed territory, roads and railways may be exposed to fire and or have been damaged by previous combat. This may force the attacker's reserves to move cross-country, slowing their movements to the front.

Offensive Advantages

In comparison to the defensive advantages, offensive advantages are more limited. Attackers typically have some initiative in choosing the location and time off an attack. This may allow attackers to mass their forces against only a portion of the defender's forces. They may also be able to gain tactical surprise by attacking at times when the defender does not expect. In addition, in some circumstances, successful offensive campaigns can significantly disorder opposing forces, temporarily weakening them.

The main advantage that attackers have is that they can choose when and where to attack. As described above, defenders get to choose where to establish their defensive lines to maximize the available cover and concealment, while forcing attackers to advance across open ground. However, attackers get to decide where along these defensive lines they will actually focus their attack. In addition, they have complete freedom in determining the timing of the attack. In

contrast defenders have no way of forcing a battle unless they attack themselves, in which case they would give up the advantages of the defensive.

Being able to choose the location of the attack allows the attacker to concentrate their forces against potential weak points in the defender's lines. Neither side has to deploy their forces evenly across the entire theater, but can choose to concentrate their forces where they think it is most important. Attackers will usually mass their forces along a primary axis of attack, in order to give themselves the most power at the crucial point, while leaving the rest of the front with fewer forces. In choosing where to attack, attackers can also attempt to target weak points in the defender's lines. Defenders will likely try and avoid having any clear weak points, but this may not be avoidable. Thus, attackers can usually mass their forces to gain a more favorable force ratio at the primary point of attack than in the theater as a whole.

However, in modern war, attackers likely have less ability to use maneuver to gain an advantage. Forces are large enough that battle lines often stretch across the entire theater. This means that there would be no flanks to attack, traditionally the weakest parts of a line. In addition, it is only possible to concentrate forces so much. Over concentration makes it difficult to maneuver, while increasing the vulnerability of forces to enemy fire. In larger theaters, concentration still gives attackers a good chance of achieving a successful breakthrough. However, in smaller theaters, it may not be practical to concentrate forces enough to give attackers much advantage at all. Some theaters may even be so small, that it is impractical for either side to have all of their forces on the front lines, which given the defender's greater ability to use reserves would increase defensive advantages.

In choosing the moment of attack, attackers may also be able to gain the benefit of surprise. By attacking when the defenders are not fully ready for combat (either physically or

psychologically), attackers can effectively gain a temporary improvement in the force ratio. However, once both sides have mobilized for battle, this advantage becomes more limited. At this point, most of the defender's forces are already on the battlefield, and so attackers can no longer count on fighting only a small portion of their opponent's military. In addition, the defender knows that attacks are possible, and so will take additional precautions against being surprised. Thus, surprise attacks are likely to be less effective once a war has begun than as the opening battle of a war.

Finally, successful breakthrough attacks can considerably disorganize the defenders, temporarily providing an advantage to the attacker. In extreme cases, defending forces may be routed and temporarily incapable of meaningful resistance. For instance, the Egyptian army was effectively neutralized by Israeli breakthroughs during the 1967 Arab-Israeli War, even though the Egyptians suffered limited casualties. Thus, even if attacking is more difficult than defending, it may create significantly greater benefits towards winning a war.

However, the ability to disorganize the defender's forces through a successful attack does not negate the overall benefits of the defensive. First, the disorganization is inevitably temporary, as the disorganized forces still exist and can be returned to combat effectiveness over time. Thus, the disorganization may produce fewer benefits than would first appear. Second, to achieve these results, the attacker must overcome the defensive advantages described above. Thus, even if successful attacks can create significant results, achieving those results is difficult. Nor would a successful attack always produce this level of disorganization. It is possible for defending forces to retreat in good order, enabling them to prepare for future battles. Thus, it seems unlikely that the possibility of disorganizing or routing defending forces is enough to overcome the general advantages of being on the defensive.

Time Increases the Defensive Advantages

As noted above, both attackers and defenders have certain advantages in battle. Typically, the defensive advantages will outweigh the offensive advantages, and a common rule of thumb is that attackers need a three to one advantage to prevail (e.g. Mearsheimer 1989). However, the degree of defensive advantages may vary over time. In general, defensive advantages will increase the longer that defenders have to establish and prepare their position. Each of the benefits of being on the defensive increases with time, while the benefits of attacking tend to decrease.

The first benefit of defending that I described was that defenders are better able to use their weapons, as they are relatively static, while attackers have difficulty firing effectively while on the move. This benefit probably has the least variation over time, but still can improve when the defenders have time to prepare. Over time, defenders can increase their knowledge of the terrain, allowing them to predict where attackers might advance and where they would be most vulnerable. They can thus develop fire plans to take advantage of this vulnerability, and possibly even pre-sight their weapons. Having developed fire-plans and pre-sighted weapons increases the accuracy of the defender's fire.

Given more time, the defenders may be able to emplace obstacles in the attacker's path. For instance, they can dig anti-tank ditches that limit the ability of vehicles to advance without specialized bridging equipment. Similarly, they could emplace minefields, which may not directly cause losses to the attacker, but would force them to slow down to clear or safely navigate the minefield. By slowing down the attacker's advance, these obstacles give the defender more time to fire upon them. In addition, as slowly moving targets are easier to hit, the

obstacles may also increase the accuracy of the defender's fire. Thus, obstacles increase the attacker's losses, and make it more difficult for attacks to succeed.

The second benefit of being the defender is the greater ability to use terrain for cover and concealment. With time, defenders can both increase their own cover while decreasing the available cover for the attackers. Defenders can dig trenches and vehicle emplacements that increase the cover for both individual soldiers and vehicles. With more time, these can be reinforced with metal or concrete to increase the protection even more. In addition, they can work to camouflage these positions to make them even more difficult for the enemy to spot. All of this decreases the vulnerability of defending forces to enemy fire, increasing the defensive advantage.

At the same time that they can increase their own cover and concealment, defenders can work to minimize that available to attackers. They can clear wooded areas, and other sources of concealment in front of their own positions. This increases their ability to spot attacking forces, and thus direct fire against them. While physical cover, such as rocks and hills, is more difficult to clear, defenders can also choose their positions to maximize the open ground attackers must cross. Thus, with time, defenders can also minimize the available cover and concealment available to attackers, and thus increase the attacker's vulnerability to defensive fire.

The final benefit for defenders is that they often have an easier time getting reserves to the battlefield. While defenders can do little about the attacker's movement of reserves, they can increase the rate at which they can deploy their own reserves when needed. Defenders can develop roads and other infrastructure to allow reserves to more rapidly move to the front when needed. Attackers have less ability to develop similar roads, as they would have to cross disputed territory, and thus their construction would be vulnerable to the defender's fire. In

addition, constructing roads may warn the defender of where an attack is likely, compromising tactical or operational surprise.

The attacker's advantages in choosing the place and time of an attack are also minimized when the defender has time to prepare. Because of the increasing defensive advantages, there may be few weak areas left in the defender's line after they have prepared. In addition, increasing defensive advantages may allow defenders to reduce the number of forces in the most threatened sectors, allowing them to better cover the entire front or increase their reserves. Similarly, the defenders may be able to develop their capacity to warn of an attack, decreasing tactical surprise.

Finally, any disruption in the defender's forces created by previous successful attacks will decrease with time. Defenders will have the ability to reorganize and reequip disorganized forces. Similarly, they will have time to reestablish effective command and control over their forces. Thus, the benefit of a previous successful attack in disrupting the defender's forces will decrease rapidly once the attack finishes.

Defensive Advantages, Short-Term Commitment Problems, and When Wars End

The increasing defensive advantages pose two short-term commitment problems within the war. First, attackers will often want to keep attacking immediately, rather than allow defenders time to prepare their positions. Second, defenders will prefer not to vacate prepared positions, as this would allow the other side to demand more. Both forms inhibit war termination as long as neither side is satisfied with the status quo on the battlefield.

These barriers to war termination are reduced once one side has achieved their war aims, as a potential settlement would not need to alter the status quo on the ground. In addition,

defensive advantages can actually reinforce a settlement once one side has achieved their war aims. At this point, pausing to negotiate will only strengthen the defender's hand, making settlement along the current battle lines particularly attractive. I suspect that war termination would be particularly likely when the stronger side has achieved their war aims. The stronger side might see a reasonable chance of reversing the battlefield outcome, while the weaker side would not.

These short-term commitment problems are different from the long-term commitment problems discussed earlier, as they occur within the war, and are created by the fighting itself, rather than dealing with changes in more fundamental aspects of bargaining power. These short-term commitment problems do not exist until the war begins, and cease when it ends.

Below, I will discuss the two forms of commitment problems. I will then describe why they are reduced when one side has achieved their war aims, why defensive advantages actually reinforce a settlement at that point, and why war termination would be even likelier when the stronger side has achieved their war aims.

Commitment Problems for an Attacker

The increasing defensive advantage will create commitment problems for both the attacker (or dissatisfied state) and defender (or relatively satisfied state). This means that in many cases, at least one side, and possibly both, will prefer to continue fighting rather than negotiate or implement a peaceful settlement.

First, dissatisfied states that would likely gain additional territory if the war continues have incentives to continue attacking immediately, rather than attempt to negotiate a peaceful settlement. Normally, a state that would likely be able to capture further territory could also

demand concessions through negotiations. Knowing that it would likely lose the territory anyway, the other side would typically be willing to make at least some of these concessions, as the war outcome would likely be at least as unfavorable as potential settlement and continuing the war would be costly. Thus, the basic bargaining model would expect that a negotiated settlement would be reached that both sides would prefer to fighting.

However, the situation at the beginning of negotiations would not necessarily be the same as when negotiations are finished and the sides begin to actually implement the settlement. Negotiating the exact parameters of a settlement can take considerable time. Actually, implementing a settlement takes further time, especially that needed to reposition military forces to the new border. As noted above, the defensive advantage will almost certainly increase as defenders have more time in their current position. Thus, in many cases there will be a larger defensive advantage at the end of negotiations than at the beginning.

The increasing defensive advantage over the course of negotiating and implementing a peaceful settlement creates commitment problems that can lead to continued war. Because defenders have relatively few advantages at the beginning of negotiations, a strong revisionist could capture large amounts of additional territory. This might seem to also translate into being able to peacefully gain large amounts of concessions at the negotiating table. However, by the time negotiations have finished, defensive advantages would have increased, making it difficult and costly to capture additional territory. This would correspondingly erode any ability to gain concessions at the negotiating table. Similarly, while a weaker party may suggest that they are willing to make large concessions at the beginning of negotiations, once they have established strong defensive positions, they would renege on any previous positions, and offer few if any territorial concessions. This means that in many cases, a strong, dissatisfied combatant will find

it preferable to attack immediately rather than attempt to negotiate a peaceful settlement that would allow the other side to entrench.

The increasing defensive advantage over the period of negotiations is of course contingent on the front line having changed immediately prior to the potential beginning of negotiations. If the front lines had been static for a significant period of time, then both sides would have already entrenched. While defensive positions could always be further improved, there would be decreasing returns once considerable defensive preparations have been made. Where possible, each side would have made the most consequential improvements first, so fairly static front lines would already have most of the defensive advantages possible. While there are certainly cases where the front lines have been quite static, these may be somewhat rare. Successful attacks by either side inevitably change the front lines, meaning that both sides will start with few defensive advantages.

Thus, in many situations, one side would prefer to attack immediately. Pausing any attacks to negotiate would allow the other side to fortify their positions, decreasing or eliminating the territorial concessions that could be gained at the negotiating table.

Commitment Problems for the Defender

While dissatisfied states may have incentives to attack immediately rather than negotiate, states may also have incentives to refuse to make concessions even if this means continued war.

As noted, once the battle lines have been established for even a short period, defenders will have had time to make preparations, increasing the defensive advantages and making it easier to hold their territory. However, these defensive preparations would be specific to a given front line, and moving the battle lines would eliminate any defensive preparations, resetting

defensive advantages to those inherent in any unprepared position. Any settlement that involves territorial concessions would inevitably require moving the battle lines. Thus, these settlements would also eliminate many of the defensive advantages of the current battle lines, as they would eliminate many of the existing defensive preparations.

Accordingly, the side making concessions in a potential settlement is faced with a dilemma. While agreeing to and implementing a negotiated settlement would end the costly conflict, it would also effectively reduce the conceder's power by reducing their defensive advantages. Immediately after the settlement is implemented, the other side would be in a position to attack the unprepared positions and more easily gain additional territory. Alternatively, they could demand a revised settlement with additional territorial concessions. In either case, making concessions in a settlement now creates the possibility of further losses once the settlement is implemented. While the side gaining the concessions could promise not to attack or demand additional territory after the settlement has been implemented, such a promise would not be credible given the power shift created by the reduced defensive advantages. This means that in many cases, they would prefer to hold onto their current defensive positions in hope of repulsing attacks, even knowing that war would continue, rather than agree to and implement a peaceful settlement that would set the stage for additional losses later.

It is important to note that this form of commitment problem is most prominent at the opposite time of the previous commitment problem. As discussed above, delays to negotiate the settlement would have the biggest impact on defensive advantages when the battle lines are newly established. In contrast, reductions in defensive advantages due to making territorial concessions that move the border from the current battle lines would be most severe if the battle lines had been relatively static. In this case, both sides would have already made significant

defensive preparations, meaning that the difference in defensive advantages created by moving to new, unprepared borders would be most significant.

Accordingly, one of the two types of commitment problems would be present at all times. The side potentially gaining concessions would face the most severe commitment problems when the current battle lines are relatively new, as delays to negotiate would increase the defensive advantages of the current position. The side making concessions in a settlement would face the most severe commitment problems when battle lines have been established for a significant time, as they would be ceding very well-prepared defensive positions. Since the two forms of commitment problems are most severe at opposite periods of time, at least one would always be present.

It may be possible to structure the settlement to reduce these commitment problems. A settlement might delay implementation until the side giving concessions could make defensive preparations along the new border. However, such a delay would also allow them to reinforce their existing positions, creating the commitment problems discussed in the previous position. There may also be other political or psychological reasons that the side gaining concessions would allow the implementation to be delayed until the new borders can be fortified. For either reason, explicit delays in implementing the settlement are likely rare.

Enforcing Settlements Once One Side Has Achieved Their War Aims

Before one side has achieved their war aims, increasing defensive advantages create commitment problems that inhibit war termination. Unsatisfied states have incentives to attack immediately rather than allow the defender to prepare their position. At the same time, defenders have incentives to maintain their current position, rather than agree to a negotiated

settlement that forces them to abandon their prepared defenses. However, when one side has achieved their war aims militarily, these commitment problems are reduced. In addition, in some cases defensive advantages actually provide incentives to settle the conflict. I believe that both the reduction in commitment problems and the additional incentives to settle would be particularly strong when the stronger side has achieved their war aims.

Both types of commitment problems become irrelevant when each side is willing to accept a peaceful settlement that matches the situation on the ground. First, when the final settlement will mirror the current battle lines, neither side needs to worry that the other will use the negotiating and implementation period to reinforce their position. As noted above, time typically increases defensive advantages. Therefore, the preparations made will make it easier for each side to hold their position. However, where the proposed settlement matches the existing battle lines, there would be no adjustments to the battle lines. Thus, neither side has to worry that the other will renege on making promised territorial concessions after they have fortified their position, as there are no concessions expected. Thus, the first type of commitment problem is not applicable where both sides would agree to a peaceful settlement that matches the situation on the ground.

The second form of commitment problem would similarly be irrelevant when the settlement would match the situation on the ground. Remember that this commitment problem occurs when the side making concessions fears that the other will take advantage of its reduced defensive advantages to attack or demand further concessions. However, when the settlement would match the current battle lines, no territorial adjustments would be made, and thus there would be no reduction in defensive advantages. Accordingly, neither side would have to fear

that implementing the settlement would increase the ability of the other side to attack or demand further concessions.

Not only do defensive advantages cease to create barriers to settlements matching the situation on the ground, they can actually make it easier to reach a settlement. First, both sides have defensive advantages already. This makes both sides current positions more secure, likely increasing their willingness to negotiate. Similarly, when both sides are already willing to agree to a settlement along the current lines, the defensive advantages further reduce any incentives to attack or demand additional territory. Second, increasing defensive advantages only further entrenches the existing positions during the negotiation process. Thus, as long as both sides are content with the existing territorial situation, both would actually benefit from a cease fire to negotiate a permanent settlement, as both could use the time to ensure they can hold the territory they already possess.

When would both sides be most willing to accept the situation on the ground over continued fighting? I argue that this settlement is most likely when one side has achieved their war aims, and suggest that settlement is particularly likely when it is the stronger side that has achieved their war aims.

For war to occur, one side must be willing to fight in order to achieve their war aims, and the other must be willing to resist. This generally implies that they would be willing to continue fighting until as long as neither side has achieved their war aims. However, naturally once one side has achieved their own war aims, they would be willing to settle the conflict along the battle lines. They have achieved everything that they began the war to achieve, and thus further fighting is unnecessary. This means that the war would continue only if the side that has not achieved their war aims is willing to contest the outcome, and attack themselves to try and

achieve their own war aims. Since attacking is generally harder than defending, they may be willing to concede rather than try and attack to achieve their own war aims.

The likelihood that the side that has not achieved their war aims would be willing to continue the war may depend on whether they are stronger or weaker than their opponent. If they are significantly stronger than their opponent, then they have a good chance of overcoming their opponent's defensive advantages. In some cases, stronger states may still feel that the costs of continued fighting, especially when required to attack against their opponent's defensive advantages, outweigh the benefits of achieving their war aims. However, stronger states will generally be more willing to continue the war by attacking to achieve their own territorial objectives.

In contrast, weak states would have less chance of successfully defeating a stronger opponent that also benefits from being on the defense. In addition, even if an attack was successful, their stronger opponent would have a good chance of retaking the captured territory. Thus, once the stronger side has achieved their war aims, the weaker side would have little chance of successfully reversing the outcome. They would thus likely be willing to concede. Accordingly, when the stronger side has achieved their war aims, both sides are likely to be willing to settle along the current battle lines.

When the weaker side has achieved their war aims, the war may or may not end depending on the stronger side's willingness to bear the costs of continuing the conflict. The stronger side has a greater chance of reversing the battlefield outcome, and the lack of a prior settlement likely means they are committed to the war. However, their power advantage may not be enough to give them a high probability of overcoming the weaker side's defensive

advantages. In addition, there may be cases where the stronger side is only willing to devote part of their strength to the war, making it difficult to try and reverse a battlefield defeat.

Conclusion

I have argued that defensive advantages pose commitment problems inhibiting war termination. Defensive advantages increase the longer one side occupies a given position, as the defender has a chance to fortify and otherwise prepare their position. This creates two commitment problems. Attackers have incentives to attack immediately rather than allow the defender to prepare their position. In addition, defenders would often prefer continued fighting to a negotiated settlement that would force them to vacate the position. However, each of these commitment problems is reduced when one side has achieved their war aims. At that point, one state is satisfied, and has no reason to continue attacking, and no reason to demand that the defender vacate the current position in exchange for peace. In addition, defensive advantages can reinforce the possibility of a negotiated settlement, as they would make it more difficult to reverse the war outcome. War termination may be particularly likely when it is the stronger side that has achieved their war aims, as the weaker side would find it especially difficult to overcome the defensive advantages and reverse the war outcome.

The basic logic of how power shifts create commitment problems that can cause war has been well established (e.g. Fearon 1995, Powell 2006). Since this logic is the basis for the theoretical expectations offered above, I have not included a detailed formalization in this chapter. A basic formal model is included in Appendix A, which does offer a couple of interesting additional insights.

First, the possibility of defensive advantages increasing over time can inhibit war termination even if it is not certain that attempting negotiations will change these defensive advantages. As long as it is somewhat likely that the defender will entrench their position if the attacker chooses to negotiate, or that the defender will lose some defensive advantages if they vacate an established position, war may occur without negotiations. The mere possibility that these changes may occur may be enough to induce the combatants to choose continuing war rather than a risky negotiated settlement.

Second, these mechanisms can also inhibit information revelation about the underlying power balance or relative resolve of the combatants. As noted in previous chapters, negotiations are often more effective at revealing information than battle outcomes. Because increasing defensive advantages forestall negotiations entirely, they also prevent bargaining from revealing information. This can inhibit information revelation, thus adding an additional factor prolonging the war.

Alternative Explanations for Why Information Revelation Does Not End Wars

There are other explanations for why information revelation does not explain war termination, but none offer a complete and convincing explanation for why wars do end. Three potential explanations either stand out or have been previously suggested. First, it is possible that one side achieves its objectives on the battlefield so quickly that negotiations are not possible before the war ends. Second, Langlois and Langlois (2012) have suggested that when both sides are uncertain about the other's power or resolve, bargaining no longer effectively reveals information, prolonging the war. Finally, Shirkey (2016) has suggested that new private information can be generated during the war, creating new uncertainty and prolonging the war.

None of these explanations are fully convincing. While some wars may indeed end before any negotiations are possible, most last long enough that a settlement is conceivable before one side has achieved all their war aims. Two-sided uncertainty and the generation of new private information may explain why information is not efficiently revealed, but do not provide a clear expectation for when wars would end.

Quick War Termination

One possible explanation for why we don't observe truly negotiated settlements is that one side wins or achieves their war aims before negotiations have a chance to end the war. In this scenario, private information is effectively revealed by battle outcomes and decisions to fight the war. However, by the time the revealed information could lead to a negotiated settlement, one side has already achieved their war aims.

For information revelation to lead to a negotiated settlement, several steps have to occur. First, the state or states that are uncertain need to gather and analyze the newly available information and update their beliefs about the other side's power or resolve. This means both gathering reports about what is happening on the battlefield and reviewing any diplomatic communications to understand what offers had been made and rejected. The countries' leadership then need to put together this new information to update their understanding of the bargaining environment. The two sides then need to communicate to make and accept new offers that are preferable to continued fighting. Finally, the cease fire order and other orders implementing the agreement need to be communicated to the actual forces on the ground. Given that each of these steps takes time, it may not be possible to conclude a negotiated settlement before one side has essentially won on the battlefield.

A first glance at the empirical record would suggest that rapid victory is a plausible explanation for why wars do not end in truly negotiated settlements. Most wars are in fact relatively short. Since 1918, the median length of wars in the COW database is 130.5 days. 57% of wars lasted less than six months, while 66% lasted less than one year. Nine wars actually lasted less than one month. It is also possible that wars may be growing shorter. Since the end of World War II, the median war length dropped to 85 days, while the proportion of wars lasting less than six months and one year rose to 63% and 74% respectively.¹⁶

However, even when most wars seem relatively short, most appear to have sufficient time for information to be revealed and a ceasefire negotiated and implemented. Even in 1918, at the beginning of the period under consideration, communications technology would have enabled these steps to occur fairly rapidly. Battlefield commanders would have been connected to their capitals through telegraph lines, field telephones, and possibly early radio, enabling battle reports and assessments to be transmitted within at most a day. In most cases, there would be diplomats already in the capitals of the opposing powers. If there were not or if more senior representatives needed to be dispatched, railroads and steamships could enable new representatives to travel to the opposing capital or a neutral location within a few days in most cases.¹⁷ Once there, telegraph lines would again enable two-way communication between diplomats and their host government within a couple days at most. Perhaps the biggest limitation in communications was not so much the speed, but the amount of information that could be transmitted over telegraph lines. This would create some limit to the detail of communications between armies, diplomats and political leadership, but is unlikely to make a huge difference.

¹⁶ All of this information drawn from the CoW war database.

¹⁷ While travel could take considerably longer in some cases, such as between the US and Europe, most combatants are located fairly close to each other, and so travel would generally be a matter of days.

Since 1918, transportation and communications technology has improved immensely. Even by the end of World War II, diplomats could likely travel by airplane to meeting locations within hours. Telephone lines and radio would allow both diplomats and military commanders to communicate with their capitals nearly instantaneously.

Accordingly, in the 1920s and 1930s, it seems likely that the information revelation and negotiation process could be completed within probably four to five weeks, with perhaps a few exceptions.¹⁸ Since World War II, that time has likely dropped to days or perhaps a week or two.¹⁹ However, most wars last considerably longer than this. In the interwar period, there was only a single conflict lasting less than one month (the Changkufeng war), with the next shortest lasting 53 days (the Saudi-Yemeni War). Most of the remaining thirteen wars in the interwar period lasted several hundred days. Since World War II, the time period has indeed shortened. However, only five wars out of thirty-eight lasted less than two weeks. A couple others lasted less than a month, but as noted above the median war length was nearly three months. Thus, even though wars are in fact generally short, they do seem to last considerably longer than the time needed for fighting and negotiations to reveal information and then for diplomats to negotiate a ceasefire.

A second issue is that even one side quickly achieving their war aims on the battlefield may not end the war. In many cases, especially if the two sides have relatively even power, the side that has not achieved their war aims would likely either counterattack or demand

¹⁸ Assume a week or so before significant battles occur, and then a few days for battle reports to be compiled. Add in another week or so for initial diplomatic communications. Thus, within three weeks, the basic information needed to identify a settlement would be revealed. Negotiating an interim ceasefire and communicating the ceasefire orders to the armies might take another week. Thus, the overall time needed for information revelation would be four to five weeks at most.

¹⁹ Each piece would likely be accelerated from the above. Armies might be fighting significant battles within hours or days. Information from these battles would be received and processed within a day or two. Diplomatic travel, and initial negotiations to reveal information could take another couple days, with the final diplomatic negotiations taking another couple days. Thus, at most, the process would likely take about a week.

concessions to end the war. Thus, the war would still be expected to end in some sort of intermediate settlement, with both sides getting some but not all of their war aims. However, I showed in the previous chapter that there are few intermediate settlements, and most wars involve one side getting all of their war aims.

Altogether, while military victories occurring before negotiations can end the war offer an obvious explanation for why wars do not end in negotiated settlements, this explanation fails to align with the empirical evidence. While most wars are in fact short, they are considerably longer than the likely time needed to reveal information and negotiate at least an interim settlement. In addition, even if one side quickly captured their war aims on the battlefield, this is unlikely to end the war, and a negotiated settlement would still be the most likely outcome, contrary to the evidence in the previous chapter.

Two-Sided Uncertainty

A second possible explanation, offered by Langlois and Langlois (2012), is that two-sided uncertainty may inhibit information revelation. In particular, when both sides are uncertain, negotiation offers may not effectively reveal information.

War can reveal information in two ways. First, and most obviously, the outcome of battles reveals information about the likely outcome of the war. Battle outcomes are assumed to be closely tied to war outcomes, as the overall war is largely decided by accumulating battle victories. Thus, the probability of winning the war should match the average probability of winning a battle. When one side wins a battle, both sides will therefore update their assumptions about their chances of winning the overall war. However, battles only reveal information about the relative power of the two sides, and not their cost tolerance.

In addition, bargaining and failed bargaining also reveals information. The actors can signal their own strength or resolve by making offers to settle. Stronger or more resolved states will demand more than weaker or less resolved states. Thus, strong states can signal their strength by making more demands. In addition, states can use offers to screen for the other side's strength or resolve. By making more demanding offers, only weak or less resolved states will accept. Thus, a state can update its beliefs that its opponent is stronger or more resolved if it rejects an offer. Signaling and screening through negotiation (and the act of fighting battles) can theoretically reveal information both about the relative capabilities of the two sides and about their cost tolerance.

However, most models (e.g. Filson and Werner 2002; Wagner 2000) have assumed that only one side is uncertain, while the other has full information. Obviously, in most real-life situations, both sides would have some uncertainty about the other's capabilities and/or resolve. Langlois and Langlois (2012) show that when both sides are uncertain, making offers may no longer serve as an effective signaling or screening device. When making an offer, a state may make high demands either because it knows that it is strong or resolved or because it believes that its opponent is weak or unresolved. The other state will not know whether the large demand is because the state knows its own information, or is uncertain about the other side's. Similar, when faced with high demands, a state may reject the offer either because it knows it is strong or resolved, or because it believes the other side is uncertain. Accordingly, offers may no longer reveal much information.

Two-sided uncertainty always makes offers or failed offers less informative. However, this has different effects on information revelation depending on what the states are uncertain about. If they are uncertain about their resolve or willingness to bear costs, two-sided

uncertainty might completely prevent information revelation, as battles themselves reveal essentially nothing about resolve. Two-sided uncertainty might also almost completely prevent information revelation in attritional contests. Where the main source of uncertainty is how long each side can sustain the contest until one's forces collapse, battles would not reveal information until one side actually collapses. Thus, both in situations where the uncertainty is about resolve or the ability to sustain a contest, negotiations would be the primary means of revealing information. As two-sided uncertainty limits the ability of negotiations to reveal information, this could make wars driven by these forms of uncertainty last a significant time.

However, two-sided uncertainty poses somewhat less of a barrier to war termination when the primary form of uncertainty is relative power. In this case, battles would still reveal some information, as battle outcomes would generally reflect the power balance. Thus, after each battle, both sides would update their assessment of the power balance, eventually leading to a consensus about the probability each side had of winning the entire war. This would open a bargaining range, allowing for a negotiated settlement. Since battles would still reveal information, two-sided uncertainty would not prevent this consensus from developing.

However, two-sided uncertainty could slow down the process of information revelation, perhaps considerably. By preventing negotiations from being informative, two-sided uncertainty would eliminate one of the pathways of information revelation, likely slowing the process. In addition, the amount of information individual battles reveal may be relatively limited. Since victory in each battle would be probabilistic, both victories and defeats could occur regardless of the probability of winning. If one state views the other as weaker, being defeated may mean that the other side is stronger than previously believed, or it could mean that they just got lucky. When partial victories and stalemates are also included, the information revealed by each battle

may be fairly limited. Thus, even where the primary source of uncertainty is the power balance and likely outcome of the war, two-sided uncertainty may significantly delay information revelation and war termination.

Two-sided uncertainty may thus explain why information revelation does not lead to a quick and efficient negotiated settlement. However, two-sided uncertainty does not provide a clear expectation for when wars would end. In addition, wars would likely still have to end once information had been revealed (albeit slowly) or commitment problems had been resolved, contrary to the findings in the previous chapter.

Where the private information is about either resolve or the ability to sustain attritional combat, two-sided uncertainty would predict either that the war would continue until either one side was completely defeated or exhausted or war termination would be largely random. Since battles would not reveal information, and two-sided uncertainty might prevent negotiation offers from revealing information, it is possible that there is no way for information to be revealed. Since both sides thought it worth starting the conflict, they could continue with the belief that it was worth continuing until one side could no longer keep fighting. However, as I showed in the previous chapter, most wars end before one side is completely defeated.

There may also be equilibria where one side decides to begin negotiations or concede after a certain amount of fighting. However, these equilibria would likely coexist with others. Therefore, the actual end of the conflict would be inherently unpredictable.

When private information is about power, information would be revealed by battles. However, it is somewhat unclear when exactly the battles would reveal sufficient information to actually end the war. One possibility is that the accumulation of victories by one side would eventually reveal information, particularly when it diverged significantly from one side's pre-war

expectations. However, it is unclear how many battle outcomes would be enough, especially when partial victories or stalemates were included. Another possibility that has been suggested is that particularly surprising victories by one side might be especially informative. While possible, it is unclear what would count as a surprising victory. In addition, even surprising battle outcomes would occur occasionally if battles are decided probabilistically. Therefore, a surprising victory could be dismissed as a fluke. Thus, it is unclear when exactly battles would reveal sufficient information to end the war.

Even when there is sufficient information revelation to end the war while both sides are capable of further fighting, the final settlement may often represent an intermediate bargain. Given that neither side was content to concede to the other side's war aims at the beginning of the conflict, in many cases the bargaining range would not include all of either's war aims. This would require an intermediate settlement. However, the previous chapter showed that few wars end in a settlement intermediate to both sides' war aims.

Accordingly, two-sided uncertainty can explain why information revelation does not quickly end wars. However, it has difficulty explaining when wars would end. Two-sided uncertainty does not make clear predictions about when wars would end. In addition, any predictions would likely not match the empirical finding that intermediate settlements are rare.

New Information

A third explanation, presented by Shirkey (2016), is that the combatants might generate new information during the war, particularly about the balance of power. As wars go on, Shirkey suggests that states experiment with new tactics and strategies, and attempt to develop new military technologies. These new developments reintroduce uncertainty about the relative

balance of power and the likely outcome of a war. Thus, even as the combatants gain knowledge about the outcomes of previous battles, they may not develop a consensus about who is likely to win.

In addition to new tactics, strategies, and technologies, there would be additional factors that would change the balance of power. First, each side may be able to mobilize new forces. The exact number and quality of these new forces would be unobserved by their opponent, creating new uncertainty. In addition, battles cause casualties and destroy equipment, weakening each sides' military forces. Again, the degree to which combat has degraded the two sides forces would be unobserved. Thus, both the mobilization of new forces and the destruction and degradation of existing forces would also change the balance of power and introduces new uncertainty.

By preventing the combatants from developing a consensus about the balance of power, this new uncertainty can inhibit war termination. This might explain why information revelation does not quickly and efficiently end wars. However, the creation of new information does not necessarily provide a clear prediction for when wars would end. In addition, for war to end, at some point there would have to be a consensus on the relative power balance long enough to reach a settlement. Thus, wars would still be predicted to end with an intermediate bargain, contrary to the findings of the previous chapter. I will describe both factors further below.

First, the creation of new private information is essentially random, and does not happen constantly. While there are times in which states are developing new strategies and tactics, there may be others when no new strategies and tactics are obvious. They may also have new strategies, but be pessimistic that they will materially change the balance of power. Similarly, while the battlefield losses and corresponding change in the power balance may be quite

uncertain, they may also be relatively well estimated by intelligence services. Thus, whether there would be sufficient new information to override the information revelation process and prevent the two sides agreeing to a negotiated settlement would also be essentially random. Thus, when wars would end would also be essentially a random process. War might continue when new strategies had been developed or when the opponent's battlefield losses were highly uncertain, but would end if there were no new strategies or if estimates of the opponent's losses were fairly good.

Similarly, the random introduction of new information would not necessarily explain longer wars. Even if new information would become available at some point in the future, there would be likely be periods when no new information was available. This would create opportunities for war settlement, even if a new strategies or battlefield losses developed in the future. For instance, Shirkey (2016) points to the development of Iraqi maneuver tactics in the Iran-Iraq war as creating new information that delayed settlement. However, these new tactics did not emerge until 1987-88, nearly seven years into the war. Thus, there would have been plenty of opportunities to negotiate a settlement before the new information emerged. While perhaps an extreme example, the same principle holds in shorter wars: there would likely have been opportunities after the initial uncertainty was resolved and before new information emerged that would have allowed settlement, and yet the war continued.

Related to this first point, when one side gains new private information, they could become more pessimistic rather than optimistic about their future chances. For instance, unknown to their opponent, their own losses in battle could be quite severe. Similarly, they may determine that a potential new strategy is infeasible. If the new information actual causes one party to become more pessimistic about their chances, it should widen the bargaining space. The

newly pessimistic party will want to settle the conflict quickly, as once their opponent gained access to the information, they would be able to demand more concessions.

Finally, this explanation does not match the observation that wars do not seem to end in negotiated settlements. According to this explanation, for war to end, the two sides would eventually have to reach a consensus about their capabilities and resolve which would allow a negotiated settlement. The final settlement would likely match wars in which no new information would be created. However, Chapter 2 ruled out simple information revelation as an explanation for war termination. These findings likewise rule out the creation of new private information as a complete explanation for why wars end.

Overall, while the creation of new private information might help explain why some wars continue even after the initial uncertainty is resolved, it cannot fully explain how wars end.

Conclusion

In the previous chapter, I showed that basic bargaining explanations for why wars end do not match the empirical evidence. Information revelation does not seem quickly lead to a negotiated settlement. Neither do most wars last until commitment problems are resolved. Possible explanations for this discrepancy include one side winning militarily before negotiations can take place, two-sided uncertainty preventing effective information revelation, or the creation of new private information preventing war termination. However, each of these explanations has difficulty providing a clear explanation for when wars would end.

Instead, I argue that defensive advantages create commitment problems preventing war termination until one side has achieved their war aims, and that war termination may be particularly likely when it is the stronger side that has achieved their war aims. States that have

not yet achieved their war aims have incentives to attack immediately rather than allow the other side to prepare defensive positions. In addition, defenders have incentives not to cede territory, as this would involve giving up prepared defensive positions, creating the possibility that the other side would then demand more concessions. However, these commitment problems are eliminated once one side has achieved their war aims. At this point defensive advantages actually help enforce a settlement. War termination may be even more likely when it is the stronger side that has achieved their war aims, as weaker sides would have particularly difficulty in overcoming their opponent's defensive advantages and reversing the battlefield outcome.

In the following chapters, I will present statistical results consistent with this theory, comparing originally coded data on campaign outcomes to when wars end. I will then present several case studies showing that the hypothesized mechanisms actually occur.

Chapter 4

Ground Wars: Quantitative Empirics

In the previous chapter I presented a theory for why information revelation does not allow states to quickly reach a negotiated settlement. Defensive advantages present short-term commitment issues, hindering a negotiated settlement. However, these barriers are reduced once one side has achieved their war aims. War termination would thus occur when the other side is unwilling or unable to contest the battlefield results. This creates a focal point where war termination is possible once one side has achieved their war aims. This focal point may be particularly effective if it is the stronger side that has achieved their war aims, as weaker states would be particularly unlikely to be able to militarily overcome their opponent's defensive advantages.

Previously in Chapter 2, I demonstrated that information revelation cannot explain the conclusion of most wars, as they do include preemptive concessions or bargains intermediate between the two sides' war aims. In this chapter, I will evaluate the alternative theory (presented in the last chapter) with quantitative evidence on military campaign outcomes. This evidence is consistent with the theory that wars end once one side has achieved their war aims. There is also tentative, although not conclusive, evidence that war termination is more likely when it is the stronger side that has achieved their war aims.

I will first describe my rationale for using military campaigns as the unit of analysis. I will then derive and present testable hypotheses. I will then describe the data collected, including both the data structure and coding rules, followed by a discussion of the methods used

in analyzing this data. Finally, I will present and discuss the empirical results. The next chapter will use case studies to explore these mechanisms in greater depth.

Data Structure: Campaigns as the Unit of Analysis

As noted above, I evaluate the theory with originally coded data on military campaign outcomes. This data is structured with the military campaign as the unit of analysis with each war being subdivided into a series of campaigns, ranging from a single campaign up to twenty-three campaigns. These campaigns represent significant military efforts to achieve the combatants' war aims. Accordingly, campaigns link the combatants' battlefield efforts in tactical engagements to their political goals in fighting the war. I argue that this makes campaigns a natural unit of analysis to study war termination. Each campaign represents a possibility to end the war either by militarily achieving their objectives or negotiating a settlement. I also argue that the natural link between military efforts and political objectives makes campaigns a superior data structure to other possible units of analysis, such as measuring the overall temporal duration of each war.

Below, I will first more clearly define what campaigns are. Then I will show why they are superior to other possible units of analysis. Finally, I will discuss my coding rules and present some basic data on the number of campaigns in each war.

What Are Campaigns?

Most modern wars that involve significant ground combat are fought in large, operational level campaigns. These campaigns represent a combatant's plan to link together a number of small tactical engagements to pursue strategic objectives. In other words, the campaign

represents an operational and strategic attempt to achieve some or all of a combatant's war aims. For instance, a combatant may coordinate a number of small attacks across a theater to try and take disputed territory. Often, campaigns are fought over much or all of the relevant theater. Campaigns may either end relatively quickly or be quite protracted as states attempt to exploit earlier successes or compensate for earlier failures.

As I touched on in chapter 1, several developments over the nineteenth century changed the nature of combat. These changes have led to large campaigns being the central element of modern war. Prior to the nineteenth century, armies usually fought discrete battles, limited both temporally and spatially. Given limited abilities to both finance and logistically support military forces, countries could only raise armies of limited size. Moreover, as communications still relied on sending physical messages, commanders could only coordinate forces over very limited distances. Finally, armies could only move at relatively slow speeds, limiting the ability of dispersed forces to support each other. Thus, commanders needed to keep their forces concentrated, meaning that combat took place over very limited distances. In most cases (with the exception of sieges), this also led to very intense combat that could only be sustained for a couple days. Thus, wars often included relatively rare, intense battles amid large periods of waiting or maneuvering without significant combat.

Several changes over the nineteenth century led to the development of operational maneuver, such that by the early twentieth century combat took place over wide distances and nearly continuously for the duration of the war. Countries increased their ability to raise and support large armies. Nationalism and mass conscription allowed states to field forces an order of magnitude larger than those in the eighteenth century. At the same time, industrialization and transportation improvements allowed these forces to be logistically supported. Improvements in

transportation also allowed forces to be moved more rapidly, increasing the ability of dispersed forces to support each other. At the same time, improvements in firepower necessitated increased dispersion, as massing forces in the face of improved artillery became nearly suicidal. Finally, improvements in communications technology, such as the telegraph, field telephones and ultimately radio, allowed commanders to coordinate forces over massed distances. Thus, armies fought over ever larger geographical areas.

The proportion of time armies engaged in combat also increased. Larger armies meant that fresh units could be rotated into the front line. Similarly, logistical improvements allowed forces to be more easily resupplied. Together, these factors allowed combat to be sustained for longer periods. At the same time, the increased geographical distance meant that it became difficult to outmaneuver an opposing army, limiting the value of pauses between engagements. If a breakthrough was achieved, it needed to be rapidly exploited. Thus, combat became nearly continuous as well.

The combination of increased geographical scope and near continuous combat, led to the development of operational maneuver. Commanders now attempted to coordinate forces across a wide geographical area in campaigns consisting of a number of smaller battles and engagements. Thus, modern wars are most easily understood as a series of campaigns, rather than a number of discrete battles. These campaigns typically cover the entire front, meaning that only one major campaign occurs at a time.

Why Campaigns Rather Than Other Units of Analysis?

Given this inherent structure, I argue that campaigns are a natural unit of analysis to analyze war termination. Campaigns have advantages over both using entire wars as the unit of

analysis and using fixed time points, such as days or weeks. Relative to studying wars as single units, campaigns allow me to gain insight into the internal dynamics of wars. In particular, they allow me to compare military outcomes with when the war ended. Thus, looking at campaigns increases the amount of information available, and thus is obviously better than looking at wars as single units. In essence, I assume each campaign offers one opportunity to settle the conflict. What has occurred in that (and previous) campaign then helps determine whether the combatant states take advantage of that opportunity.

The other option is to use fixed time units, such as days or weeks, or even a continuous duration model. Similar to campaigns, fixed time units would account for internal war dynamics. However, I argue that they are inferior to campaigns as fixed time points are less directly associated with war termination than campaigns.

Relative to duration models based on days or weeks, using campaigns helps account for factors that would impact duration, but are not causally connected to the mechanisms of war termination. In fact, I would argue that temporal time units (e.g. days, weeks, or months) has little direct relevance for war termination. For instance, wars involving large geographic distances will inherently take longer than wars in small areas, as movement simply takes more time. Other wars may involve significant periods without much fighting, which would both extend the time needed for a military victory and limit the amount of information conveyed by continuing the war. Therefore, even wars with similar mechanisms behind war termination may vary substantially in temporal scope. However, because campaigns represent a direct link between fighting and achieving a state's war aims, they create a more appropriate baseline for understanding war termination. Using campaigns also automatically controls for many of the factors that may cause temporal length to vary. For instance, if geographical size makes fighting

take longer, it would also mean the campaigns would take longer even if there are only a few campaigns in the war.

Campaign Coding Rules

Given this understanding of campaigns in modern war, I will use two major coding rules in determining the beginning and end of each campaign. First, I will consider a new campaign to begin when the side taking major offensive action switched, such that one side ceases to attack and the other begins a major counterattack. Very short or local counterattacks do not begin a new campaign if they do not represent a major break in the attacker's offensive. Secondly, I will code two separate campaigns when one side's offensive is separated into two phases by a major break in offensive action. When the attacker ceases offensive action for a period of time, this gives the defender time to recover. Thus, any renewal of the attack must essentially begin again, representing a new campaign. Short pauses relative to the length of the campaign are not counted as representing a major break in offensive action.

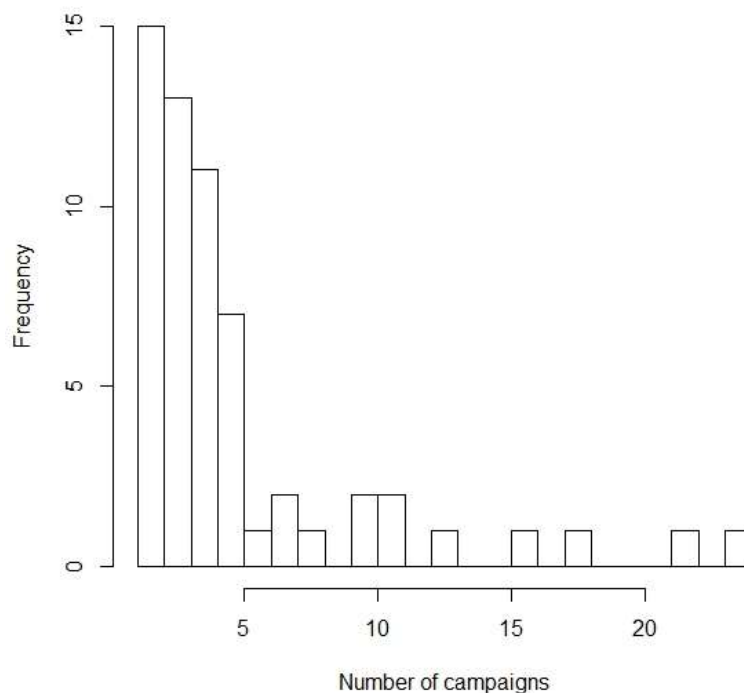
Weisiger (2015) has questioned whether it is possible to accurately code battles, as there would be a significant degree of subjectivity in determining whether an engagement counted as a battle. Accordingly, whether or not something was coded as a battle might depend on the length and intensity of the overall conflict. However, this ignores the shift from fighting a number of discrete battles to longer, continuous campaigns described above. Thus, by focusing on campaigns rather than battles, the simple coding rules described above can eliminate much of the subjectivity.

In addition, while some subjectivity may remain in determining whether a break in fighting or tactical counterattack was sufficient to require the coding of a new campaign, any

errors are unlikely to substantially change the results. By definition, any campaigns erroneously included or left out would not result in the war ending because only the final campaign can lead to war termination. They would also likely be partial victories in the coding described below, which I do not expect to end the war, or defeats, which I only expect to lead to war termination in specific circumstances.²⁰ Thus, errors in coding campaigns would only lead to an increase or decrease in the number of confirmatory cases. While this may lead to some changes in the statistical power of tests, it is unlikely to substantially change the overall findings.

Figure 4.1 displays a histogram showing how many wars end at a given number of campaigns. As can be seen, most wars are relatively short. Fifteen wars end after a single campaign. Another thirteen end after the second campaign. Eleven and seven wars last three and four campaigns respectively. On the other hand, some wars do involve a number of campaigns. The 3rd Sino-Japanese War lasts seventeen campaigns, the western front of World War Two lasts twenty-one campaigns, and the Iran-Iraq War lasts twenty-three. Overall, the number of campaigns in the war generally aligns with the temporal length, as each of the above conflicts represent some of the longest wars in the dataset.

²⁰ Where the weaker side achieves the defeat and has either not gained territory or has already lost all territory under dispute.

Figure 4.1: Number of campaigns until war ends

Hypotheses

Having described the structure of the data, I will proceed to derive testable hypotheses from the theory developed in the previous chapter. To examine the theory presented in the previous chapter, I relate campaign outcomes to war termination. In essence, I will examine differences between which campaigns end the war and which do not. These hypotheses will evaluate first whether there is a focal point for war termination when one side has achieved their war aims. Second, they evaluate whether war termination is even more likely when it is the stronger side that has achieved their war aims. This leads to three main hypotheses.

First, we would expect campaigns where one side achieves its war aims to be significantly more likely to end, as these events create the possibility of both sides credibly

committing to a war ending bargain. As discussed below, these campaigns are coded as total, decisive, and local victories, which creates the following hypothesis:

H4.1: Campaigns that end in a total, decisive, or local victory should be more likely to lead to war termination than other campaigns.

Secondly, while total and decisive victories largely eliminate the opponent's capacity to resist, in local victories they could opt to attempt to reverse the war gains achieved. As discussed above, stronger combatants may be more likely to try and reverse the battlefield outcome. Weaker combatants would be particularly unlikely to succeed against their opponent's defensive advantages, and thus may be less likely to try and reverse the battlefield outcome. Thus, it is possible that local victories in which the attacker is stronger than their opponent are more likely to end the war, while local victories where the attacker is weaker may be less likely to lead to war termination. This creates the following hypothesis:

H4.2: Campaigns ending in local victories in which the attacker has greater military capabilities than the defender should be more likely to lead to war termination than those where the attacker is weaker than the defender.

Finally, it is possibly to directly test the proposition that wars should end if and only if the stronger side has achieved their war aims. My theory would predict that a war would end if the campaign results in a total or decisive victory or a local victory where the attacker has clearly greater capabilities than the defender. In addition, there should be no joiners to the war during

the campaign, which would change the power balance and possibly war aims, hindering war settlement. Campaigns in which these conditions are not met largely should not end. Thus, the theory would predict that the following hypothesis would be correct:

H4.3: Most campaigns should lead to war termination if and only if it results in a total or decisive victory, or a local victory where the attacker has greater capabilities than the defender and where there are no joiners to the war.

Variables and Coding Rules

I examine these hypotheses with originally coded data on military campaigns. In this section, I discuss how the data is coded. I begin with the dependent variable, then the primary independent variables, and finally the various control variables included.

For each of the hypotheses, the primary dependent variable is whether the war ends. This variable is coded dichotomously depending on whether the war ended immediately or very soon after the end of the campaign. Thus, only the final campaign of each war could be coded as leading to war termination.

The primary independent variable is the outcome of each campaign. This variable is coded categorically on whether the attacker achieved a total victory, decisive victory, local victory, partial victory, or suffered a defeat. According to this coding scheme, a total victory means that the attacker gained complete control of the territory, capturing the defender's capital and either replacing the government or annexing the territory. A decisive victory means that the attacker both achieved their war aims and the defender's army had been rendered largely incapable of continued resistance. Total, and to a lesser extent decisive victories are somewhat

similar to Vasquez's (2009) concept of an overwhelming victory. However, whereas Vasquez (2009) focuses on the ability of the defeated state to contest the outcome for a significant period into the future, decisive and total victories refer to the military and political situation immediately after a campaign.

A local victory means that the attacker had achieved their war aims, for instance by capturing or recapturing the disputed territory, but that the defender was still capable of continuing the war. Thus, the defender would have the option of attempting to recapture the disputed territory. A partial victory means that the attacker achieved some success during the campaign but did not fully achieve their war aims. Finally, a loss means that the attacker had very little if any success in that campaign.

Because of the clear relationship between the military victory and whether a war ends, it is obviously possible that coding decisions could be influenced by knowledge of the war outcome. This would be especially problematic for decisive campaigns, where the ending of the war may create the erroneous impression that the defending army was incapable of further resistance. To partially counteract this problem, I was fairly conservative in coding decisive campaigns, coding them as decisive only when there was clear evidence that the defending army had been largely destroyed. Thus, several campaigns often seen as fairly clear victories are coded as local victories.

I code data on both the timing of campaigns and their outcome manually using secondary sources. A first cut will be based on broad reference works including brief narratives of each conflict, including Meredith Sarkee's and Frank Wayman's companion volume to the COW war list (2010), Michael Clodfelter's *Warfare and Armed Conflict* (2008), and Charles Phillip's and Alan Axelrod's *Encyclopedia of Wars* (2005). I use additional sources pertaining to specific

conflicts to supplement this information wherever the reference works are insufficient to establish a definitive coding.²¹

The second major explanatory variable is the relative power of the attacker and defender. Whether a given outcome (especially local victories) leads to war termination may depend on this variable. The base data is gathered from the Correlates of War, National Military Capabilities dataset (version 4.0, Singer, Bremer and Stuckey, 1972). The actual variable is a dichotomous measure of whether the attacker during the campaign has greater capabilities than the defender. Given the limited number of observations in the dataset, this produces clearer results than a more detailed measure. Where there was more than one participant on a side, the capabilities of the major participants are added together. For robustness, measures based on the military expenditures, military personnel numbers²², and CINC score variables will be used. The first two capture the two sides' immediate military capabilities, while the later better captures their overall power that could be mobilized.

Several control variables will be included to account for the possibility that the results are due to a spurious relationship. First, as discussed above, it has been suggested that democracies may behave differently in war. Therefore, I will include the Polity score of both the attacker and defender from the Polity IV project (Marshall, Jaggers and Gurr 2013). Second, previous studies (Bennett and Stam, 1996; Ramsay, 2008) have included the combined population of the combatants, as larger states would have more resources to continue fighting. The population data will be drawn from the COW National Military Capabilities dataset (version 4.0, Singer, Bremer and Stuckey, 1972). Third, previous studies (e.g. Chan, 2003; Bennett and Stam, 1996)

²¹ These additional sources include: Johnson 2011, Murray and Woods 2014, Tal 2004, Croissant 1998, Xhang 2015, and Miller, Curroll, and Tackley 1997.

²² The military expenditures figures are probably the more valid measure of military capabilities, and thus will be used in the primary analysis while the military personnel figures will be used for robustness.

have found that multilateral wars last longer than bilateral wars in some circumstances. Wars will be coded as multilateral whenever there are more than two participants, including wars that were disaggregated into multiple dyads on different fronts.

Fourth, some research (Bremmer 1992, 313–14, 327–28, 337–38; Geller 1993; Wayman 1996; Moul 2003; Reed 2003; Hwang 2010) suggests that war is more likely when the combatants have relatively even power rather than when they are significantly mismatched. Differences in power may have an effect on war termination as well. Wars with unmatched opponents would likely lead to rapid military victory for one side, while the weaker side may be especially eager to negotiate an end to the war. Therefore, I will control for the power ratio using the National Military Capabilities dataset's (version 4.0, Singer, Bremer and Stuckey, 1972) military expenditures, military personnel, and composite index of national capabilities (CINC) scores. Each power ratio is calculated as the weaker state's value divided by the stronger state's.

Finally, informational and other theories have suggested that the military trend may be an important determinant of war termination, with wars being more likely to end as one side accumulates victories. Accordingly, I will calculate a measure of the attacker's win record as the number of victories (any outcome on an offensive campaign short of a complete defeat, complete defeats inflicted on their opponent while on the defensive) they have achieved minus the number of defeats. In addition, as the amount that the trend departs from even may be more important than the attacker's absolute win record, I will also include the square of the attacker's win record. Below, I discuss additional controls for temporal autocorrelation.

Methods

The data will be analyzed using a combination of logistic regression (logit), and crosstabs. In each hypothesis, the dependent variable is dichotomous, as each campaign represents an opportunity for war termination. Hypotheses three and four are thus analyzed using both logit models and crosstabs. I believe that combining logit models and crosstabs allows for a clearer and more robust evaluation of the hypotheses. The logit models allow the marginal effect of each campaign outcome to be compared while the crosstabs show raw counts and percentages of campaigns that fall within each category. The fifth hypothesis makes predictions on whether a campaign will end correctly. Thus, the actual percentage of successful predictions is most interesting, and crosstabs are the most appropriate way to evaluate this hypothesis.

A quick note on possible autocorrelation is needed. Beck, Katz, and Tucker (1998) show that time-series cross-sectional (TSCS) data with a binary dependent variable is identical to grouped duration data. In essence, this data measures the time between events or between the start of a period and when an event occurs. The campaign data in the analysis follows this format, in essence identifying which campaign leads to war termination. Because binary TSCS is grouped duration data, Beck, Katz, and Tucker (1998) show that it can be analyzed using logit models, provided appropriate controls for temporal dependence are included. Their ideal solution is to include a number of temporal dummy variables, each measuring some length between the beginning of the period and the observation.²³ In other words, a dummy could be

²³ A second possible solution is to use cubic splines, which in essence smooth the impact of the temporal dummies. Cubic splines are particularly useful for rare or widely dispersed events, as they take up fewer degrees of freedom and create fewer problems of perfectly predicting outcomes. However, because most wars have few campaigns, the temporal dummy solution is more appropriate.

included for one period, two periods, three periods etc. These variables measure the baseline hazard rate for the event happening, before the influence of other variables.

I have followed this strategy with one modification. Less than 20% of wars last more than six campaigns. In addition, above six campaigns, no more than one or two wars have a given length. This could create technical problems. Thus, I have included temporal dummies for campaigns one through six and a one more for all campaigns above six. In essence, I argue that wars with more than six campaigns are already long wars, and that a shared hazard rate for these long wars is appropriate. I have also run robustness checks replacing the temporal dummies with a simple count variable of the number of campaigns to that point. This robustness check ensures that having a single dummy for all campaigns number seven and up does not have material impacts on the results.

Results

In this section, I will describe the results of the analysis. The first and third hypotheses are solidly supported by the data. There is some tentative support for the second hypothesis as well, although that evidence is far from conclusive.

Campaign Outcomes and War Termination

The first hypothesis deals with the relationship between campaign outcomes and whether the war ends. Table 4.1 shows a cross tabulation of war termination by campaign outcome, including both the raw counts and the percent of each campaign that resulted in war termination. From this table, it can be seen that a very high proportion of campaigns that end in total or decisive victories lead to the war ending. This result is expected, as it would be surprising that a

total or decisive victory did not end the war. Somewhat fewer local victories result in war termination, although local victories are more likely to end the war than have it continue. This result is more interesting, as it is possible for the loser to contest the war outcome. In contrast, partial victories and losses are relatively unlikely to result in the war ending. Thus, this table provides tentative support for Hypothesis 4.1, in that local, decisive, and total victories do appear more likely to lead to war termination than losses or partial victories.

Table 4.1: Campaign Outcomes and War Termination

	War Continues	War Ends	All
Loss	33 (89.2%)	4 (10.8%)	37 (100%)
Partial	145 (89.0%)	18 (11.0%)	163 (100%)
Local	16 (43.2%)	21 (56.8%)	37 (100%)
Decisive	1 ²⁴ (14.3%)	6 (85.7%)	7 (100%)
Total	1 ²⁵ (9.1%)	10 (90.9%)	11 (100%)
All	196 (76.9%)	59 (23.1%)	255
Pearson Chi ²	83.907		
P-Value	0.000		

While the crosstab indicates that different campaign outcomes do change the likelihood of the war ending, it does not reveal whether the differences between particular pairs of campaign outcomes are statistically significant. In addition, it cannot rule out the possibility of a spurious relationship, as the crosstab does not control for any other factors. Therefore, I estimated logit models regressing war termination on the campaign outcomes, with the results

²⁴ This represents the campaign following the US Inchon landing during the Korean war, which largely destroyed the North Korean army. It did not lead to war termination due to Chinese intervention

²⁵ This observation is the Iraqi invasion and occupation of Kuwait during the Gulf War. It did not lead to war termination due to the U.S. and coalition intervention during Desert Shield/Desert Storm.

displayed in Table 4.2. Model 1 presents the basic model, using the CINC score for the power control. Model 2 drops all conflicts directly related to World War II.²⁶ Together, these conflicts comprise 72 campaigns out of a total of 255, or 28% of the total. Since World War II is obviously unusual, this extreme proportion of campaigns associated with a single set of conflicts could have skewed the results. For similar reasons, Model 3 drops campaigns in secondary theaters – those associated with a major, multilateral war, but those that may have had a lesser impact on the overall conflict.²⁷ Finally, Models 4 and 5 replace the CINC score ratio with the ratio of military expenditures and the ratio of military personnel.

²⁶ The conflicts dropped are the 3rd Sino-Japanese War, the Changkufeng War, the Nomonhan War, the Franco-Thai War, and the five fronts comprising World War II.

²⁷ As noted in Chapter 1, I divide multilateral wars into distinct conflicts when allies are fighting on geographically separated fronts or theaters, as settlements could be made on each of the fronts separately. However, one of these fronts may still be central to the overall conflict, while the war on the other fronts end when the war on the primary front ends. Thus, I run a robustness check dropping these secondary theaters.

Table 4.2: Logit Results Relating Campaign Outcomes to War Termination

	Model 1 Basic model	Model 2 No WW II	Model 3 No secondary theaters	Model 4 Mil. Exp. Power control	Model 5 Mil. Per. Power control
total	4.698 (1.186)***	4.431 (1.271)***	4.626 (1.216)***	5.184 (1.241)***	4.798 (1.182)***
decisive	4.062 (1.223)***	3.793 (1.270)**	3.784 (1.253)**	19.614 (1,041.227)	4.190 (1.217)***
local	2.080 (0.463)***	1.914 (0.509)***	1.390 (0.498)**	2.383 (0.498)***	2.099 (0.461)***
loss	-0.738 (0.672)	-1.084 (0.824)	-0.955 (0.686)	-0.630 (0.690)	-0.743 (0.671)
Attacker polity	0.033 (0.031)	0.057 (0.036)	0.034 (0.033)	0.050 (0.033)	0.039 (0.029)
Defender polity	-0.001 (0.033)	0.006 (0.038)	0.004 (0.035)	0.007 (0.034)	0.004 (0.032)
Total population (logged)	-0.179 (0.125)	-0.083 (0.130)	-0.024 (0.131)	-0.247 (0.129)†	-0.161 (0.123)
Multilateral war	-0.604 (0.408)	-0.181 (0.497)	-0.734 (0.474)	-0.627 (0.430)	-0.588 (0.407)
Attacker win trend	-0.097 (0.092)	-0.014 (0.148)	-0.131 (0.096)	-0.123 (0.092)	-0.099 (0.092)
Attacker win trend (squared)	0.056 (0.030)†	0.058 (0.048)	0.034 (0.029)	0.058 (0.030)†	0.054 (0.030)†
CINC ratio	-0.569 (0.852)				
Mil. Expenditure ratio				-1.229 (0.783)	
Mil. Personnel ratio					-0.178 (0.773)
Campaign 1	0.291 (0.721)	-0.550 (0.818)	-0.261 (0.776)	-0.127 (0.781)	0.313 (0.722)
Campaign 2	0.935 (0.708)	0.527 (0.781)	0.620 (0.713)	1.120 (0.732)	0.961 (0.714)
Campaign 3	0.899 (0.783)	0.202 (0.883)	0.668 (0.784)	0.688 (0.827)	0.919 (0.788)
Campaign 4	1.484 (0.751)*	1.150 (0.860)	1.265 (0.770)	1.365 (0.772)†	1.504 (0.749)
Campaign 5	-0.209 (1.216)	-0.598 (1.342)	-15.517 (1200.257)	-0.171 (1.209)	-0.144 (1.213)
Campaign 6	0.770 (0.934)	0.803 (1.047)	0.375 (0.950)	0.733 (0.938)	0.829 (0.926)
Constant	-0.250 (1.564)	-1.086 (1.423)	-1.565 (1.413)	0.621 (1.535)	-0.614 (1.512)
Observations	246	174	206	236	246
Akaike Inf. Criterion	219.737	176.824	196.303	201.016	220.135

† p<0.1, * p<0.05, ** p<0.01, *** p<0.001; two-tail significance tests; standard errors in parentheses

The logit results fairly consistently indicate that campaigns ending in total, decisive, or local victories are statistically significantly more likely result in war termination than those with only a partial victory or a loss in all models. The only exception is that there is no statistically significant relationship between decisive victories and war termination in Model 4, where the ratio of military expenditures is used as the power control. However, given that decisive victories almost have to end the war, and the inflated coefficient and standard error, this lack of significance is likely because decisive victories in combination with one of the other variables perfectly predicts war termination. Thus, the evidence clearly rejects the null for Hypothesis 4.1, and shows that campaigns where one side has achieved their war aims are more likely to end than campaigns that do not.

In addition, the results are suggestive that local victories are less likely to end the war than decisive or total victories, as the coefficient signs for local victories are substantially smaller than those for decisive or total victories.²⁸ When compared to total victories, the coefficient on local victories is statistically significantly lower, with a p-value of 0.290. Local victories also have a statistically significantly different effect than the combined categories of total and decisive victories, with a p-value of 0.0122. However, tests show that the coefficient for local victories is not statistically significantly different from decisive victories alone, with a p-value of 0.105. Regardless, it does appear that local victories are not as effective at ending wars as total or decisive victories. This is not surprising, as it would be difficult for a combatant faced with a decisive or total victory to continue the war unless outside intervention occurred, such as during the Korean War or Gulf War. However, it is possible, and in some cases might make sense, for a combatant faced with an adverse local victory to contest the outcome.

²⁸ These comparisons are made by running a logit model where decisive or local victories replace partial victories as the reference category.

Relative Power and War Termination

The second hypothesis (Hypothesis 4.2) is that for local victories the probability of war termination should depend on the relative power balance, as stronger defenders will attempt to reverse the outcome but weaker defenders will not. To test this hypothesis, I estimated the logit models in Table 4.3, interacting local victory with dichotomous measures of whether the attacker was stronger or weaker than the defender. Models 6 and 9 interact with advantage in military expenditures, models 7 and 10 with the CINC score advantage, and models 8 and 11 with an attacker advantage in military personnel. Models 6-8 drop the power ratio used above, as this could cause multicollinearity issues with the power advantage measures. However, I have added the power ratio measure back in in Models 9-11 as a robustness check. While not shown, I ran additional robustness checks dropping World War II and secondary theaters with consistent results to those shown. In all models, the total and decisive categories are combined to enhance model stability.

Table 4.3: Logit Results Relating Campaign Outcomes, Power and War Termination

	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Decisive / total	5.578 (1.221)***	4.370 (0.917)***	4.307 (0.919)***	5.687 (1.222)***	4.253 (0.924)***	4.299 (0.921)***
Local	2.002 (0.800)*	2.353 (0.640)***	2.056 (0.636)**	2.015 (0.812)*	2.319 (0.643)***	2.052 (0.636)**
Loss	-0.643 (0.683)	-0.747 (0.687)	-0.538 (0.685)	-0.614 (0.693)	-0.724 (0.679)	-0.540 (0.685)
Attacker advantage (milex)	0.123 (0.510)			0.164 (0.512)		
Attacker advantage (CINC)		0.723 (0.482)			0.729 (0.482)	
Attacker advantage (military personnel)			0.705 (0.484)			0.703 (0.484)
Local * att. Advantage (milex)	0.338 (0.955)			0.496 (0.978)		

Local * attacker advantage (CINC)		-0.433 (0.897)			-0.397 (0.905)	
Local * attacker advantage (milper)			0.129 (0.900)			0.134 (0.901)
Attacker polity	0.051 (0.032)	0.038 (0.030)	0.033 (0.030)	0.048 (0.033)	0.032 (0.031)	0.033 (0.030)
Defender polity	0.014 (0.035)	0.006 (0.032)	0.003 (0.032)	0.013 (0.035)	0.001 (0.033)	0.003 (0.032)
Total population (logged)	-0.202 (0.126)	-0.165 (0.121)	-0.191 (0.123)	-0.254 (0.129)*	-0.191 (0.126)	-0.193 (0.125)
Multilateral	-0.573 (0.427)	-0.635 (0.413)	-0.710 (0.417)+	-0.589 (0.433)	-0.655 (0.415)	-0.710 (0.417)+
Attacker win trend	-0.120 (0.097)	-0.087 (0.092)	-0.093 (0.093)	-0.139 (0.097)	-0.086 (0.092)	-0.093 (0.093)
Attacker win trend (squared)	0.060 (0.030)*	0.060 (0.030)*	0.053 (0.029)+	0.057 (0.030)+	0.063 (0.030)*	0.053 (0.030)+
Mil. Exp. Ratio				-1.313 (0.790)†		
CINC ratio					-0.620 (0.848)	
Mil per ratio						-0.125 (0.820)
Campaign 1	0.055 (0.767)	0.464 (0.727)	0.375 (0.719)	-0.128 (0.781)	0.415 (0.729)	0.359 (0.726)
Campaign 2	1.270 (0.725)†	1.123 (0.748)	0.988 (0.738)	1.086 (0.741)	1.058 (0.755)	0.966 (0.751)
Campaign 3	0.892 (0.816)	1.050 (0.785)	1.095 (0.788)	0.676 (0.826)	1.001 (0.789)	1.072 (0.802)
Campaign 4	1.602 (0.760)*	1.655 (0.757)*	1.765 (0.722)*	1.428 (0.769)†	1.616 (0.761)*	1.748 (0.780)*
Campaign 5	-0.182 (1.259)	-0.057 (1.206)	-0.093 (1.282)	-0.215 (1.221)	-0.090 (1.208)	-0.086 (1.281)
Campaign 6	0.907 (0.933)	0.962 (0.930)	1.013 (0.942)	0.753 (0.938)	0.914 (0.938)	1.018 (0.942)
Constant	-0.468 (1.466)	-1.156 (1.429)	-0.728 (1.438)	0.627 (1.580)	-0.595 (1.619)	-0.635 (1.562)
Observations	236	246	242	236	246	242
Akaike Inf. Criteria	204.101	217.840	214.851	203.233	219.299	216.828
† p<0.1, * p<0.05, ** p<0.01, *** p<0.001; two-tail significance tests; standard errors in parentheses						

Overall, the models do not provide strong evidence that local victories are substantially more likely to end the war when it is the stronger side that has achieved their war aims.

However, there is some slight suggestive evidence that this is the case. In none of the models is the interaction term statistically significant. In addition, in the models looking at whether the

attacker has an advantage in the CINC score (models 7 and 10), the coefficient on the interaction is negative, although statistically insignificant. However, in the other models the coefficient is in the expected direction, even if statistically insignificant. As the actual size of the military would be more relevant to immediate war termination, these models are probably a better representation of the actual influences of relative power on whether a war ends when one side has achieved their war aims. Thus, the models may provide some slight, although far from conclusive, evidence in support of the theory.

Given these ambiguous results, Tables 4.4, 4.5, and 4.6 display crosstabs of local victories, with the attacker having an advantage in military expenditures, CINC score, and military personnel plotted against whether the war ended. These tables display the same ambiguous results. In each, a greater proportion of wars end when the side achieving the local victory is more powerful than their opponent. However, in no case is this relationship statistically significant, and the substantive relationship appears quite modest.

Table 4.4: War Termination for Local Victories by Attacker's Military Expenditures Advantage

	War continues	War ends	All
Attacker mil. exp. advantage	5 (50%)	5 (50%)	10 (100%)
Attacker mil. exp. disadvantage	10 (38.5%)	16 (61.5%)	26 (100%)
All	15 (41.6%)	21 (58.4%)	36
Pearson chi ²	0.3956		
P-value	0.529		

Table 4.5: War Termination for Local Victories by Attacker's CINC Advantage

	War continues	War ends	All
Attacker CINC advantage	9 (47.4%)	10 (52.6%)	19 (100%)
Attacker CINC disadvantage	7 (38.9%)	11 (61.1%)	18 (100%)
All	16 (43.2%)	21 (56.8%)	37
Pearson chi ²	0.2708		
P-value	0.603		

Table 4.6: War Termination for Local Victories by Attacker's Military Personnel Advantage

	War continues	War ends	All
Attacker mil. per. advantage	10 (55.6%)	8 (64.4%)	18 (100%)
Attacker mil. per. disadvantage	6 (31.6%)	13 (68.4%)	19 (100%)
All	16 (43.2%)	21 (56.8%)	37
Pearson chi ²	2.1650		
P-value	0.141		

Thus, the data does not provide strong support for Hypothesis 4.2. Local victories do not appear to be much more likely to end the war when it is the stronger side that has achieved their war aims than when it is the weaker side that has achieved their war aims. There is some tentative evidence that this is the case, as the results generally point in the right direction, although not statistically significant. Thus, the interaction between power, battlefield outcomes, and war termination does deserve further study.

At the same time, the lack of clear relationship between whether it is the stronger side that has achieved their war aims and war termination is not particularly surprising. First, the power measures are relatively blunt. Qualitative, as opposed to quantitative, military advantages are not well captured, although the military expenditures data would show some of this. For instance, the power measures consistently depict Israel as weaker than Egypt, when in fact Israeli forces decisively defeated the Egyptian forces on multiple occasions. Second, the impact of defensive advantages may also make stronger parties reluctant to contest war outcomes. A stronger state would have a better chance of overcoming a weaker states' defensive advantages than vice versa. However, defensive advantages may be significant enough that even a strong state could doubt its ability to reverse the war outcome if the side achieving a local victory has substantially entrenched.

Finally, the power data does not capture the level of commitment of each side to the fight. In some cases, one party is willing to commit limited forces to achieve their war aims, but is not willing to raise their commitment if faced with a battlefield reverse. This may be particularly relevant in conflicts fought far from the stronger country's shores. In this case, the forces the stronger side has committed are substantially less than their potential commitment, but they are not willing to reinforce the defeated forces. If the stronger side has a limited commitment, the weaker side may also be willing to contest the stronger side achieving their war aims, banking on the limited commitment to allow the weaker side to achieve their war aims.²⁹

²⁹ Sullivan (2007) makes a similar argument regarding why strong states may lose limited wars.

Effect of Control Variables

Before moving on to the final hypothesis (which only uses crosstabs), it is useful to briefly discuss the findings on the control variables in the logit models. Interestingly, the control variables almost universally have little impact on war termination. Multilateral wars, the log of the combined population, and the victory trend squared achieve each achieve statistical significance in one model, although usually at the weak 0.1 significant level. These variables are also inconsistent, only achieving significance in some models. However, the overwhelming view is that the control variables appear to have little effect on war termination, except through how they would affect the ability to achieve a battlefield victory. The general lack of significance extends to the temporal controls (campaign 1, 2, etc.). The fourth campaign may be more likely to end wars, but the other temporal controls are almost universally insignificant. Given that there is little theoretical reason to believe that the fourth campaign would be especially likely to end a war, it seems that there is also little relation between how long a war lasts and whether the war ends. This generally reinforces the theoretical view that wars only end once one side has achieved their war aims, as otherwise the control variables would likely have at least some effect.

Particularly interesting are the lack of statistical significance on the victory trend variables and the temporal controls. Most relevant for my analysis are the trend variables. If the information model was correct, we would expect at least one of these variables to be statistically significant with a decently sized magnitude. The more the record departed from even, the clearer it would be which side would ultimately win. This should enable war termination through a negotiated settlement if the informational explanation of war termination was correct. In addition, longer wars would also generate more information, so there should be a pretty clear

relationship on the campaign number dummy variables. In contrast, both the trend variables and the campaign number dummies are rarely statistically significant, and of only a relatively small magnitude. This casts further doubt on information revelation as a major reason for war termination.

Predictions of War Termination

The final means of testing the theory is to create predictions for whether each campaign would lead to war termination and compare these predictions to the actual values. Accordingly, I create two variables for predicted war termination, one using the CINC score and the other using military expenditures as the measure of relative power. According to the above theory, a war is predicted to end if:

- a) the campaign results in either a total or decisive victory or a local victory where the attacker has greater power than the defender, and
- b) there are no joiners to the war.

The first condition has been extensively discussed. Campaigns with joiners are generally not predicted to end, as this changes the power balance and possibly the war aims of at least one side. The comparison of these predictions to actual war termination is found in Tables 4.7 and 4.8, and 4.9 below, for military expenditures, CINC score, and military personnel respectively.

Table 4.7: Predicted vs. Actual War Termination, Based on Mil. Expenditure

	War continues	War ends	All
Predicted continuation	180 (87.0%)	27 (13.0%)	207 (100%)
Predicted end	10 (24.4%)	31 (75.6%)	41 (100%)
All	190 (76.6%)	58 (23.4%)	248
Pearson χ^2	74.76661		
P-value	0.000		

Table 4.8: Predicted vs. Actual War Termination, Based on CINC

	War continues	War ends	All
Predicted continuation	189 (85.1%)	33 (14.9%)	222 (100%)
Predicted end	7 (21.2%)	26 (78.8%)	33 (100%)
All	196 (76.9%)	59 (23.1%)	255
Pearson χ^2	66.0106		
P-value	0.000		

Table 4.9: Predicted vs. Actual War Termination, Based on Mil. Personnel

	War continues	War ends	All
Predicted continuation	187 (85.8%)	31 (14.2%)	218 (100%)
Predicted end	6 (17.6%)	28 (82.4%)	34 (100%)
All	193 (76.6%)	59 (23.4%)	252
Pearson χ^2	76.1445		
P-value	0.000		

Overall, the test generally indicates that the theory is correct, although not as strongly as might be hoped. Given the very high chi-squared values and associated p-values less than 0.001,

the predictions clearly improve over random chance. In addition, there is a low rate of false positives, where a campaign was predicted to lead to the war ending, but the war continued. Between 75% and 82% of the campaigns predicted to end a war in fact ended the war, depending on the measure of power used. This is substantially different from the baseline rate of about 23% of campaigns ending the war. Therefore, it would seem that the above conditions are nearly, although not entirely, sufficient for a war to end. However, there is a higher than desirable rate of false negatives, where the model predicted a war continue but the war ended. Given how complex war termination is, and especially the measures of which side is stronger, this high rate of incorrectly predicted continuation is understandable. However, further explanation is warranted.

I have briefly reviewed each of the cases of incorrect predictions – both those where the war continues despite being predicted to end, and those where the war ends despite being predicted to continue. A brief summary of these cases can be found in Appendix B. In most cases, the discrepancy is quite understandable, and so the overall rate of false predictions is certainly not fatal to the theory. In addition, there are some cases that are perfectly consistent with the theory, but were still labeled as incorrect predictions for technical reasons – all predicting a continuation when the war actually ends. In three wars (the 2nd Sino-Japanese War, the Chaco War, and the Egyptian front of the Yom Kippur War), the combatant coded as weaker on at least one of the measures pretty clearly has military superiority because of qualitative advantages or other factors. In five wars (the War of Estonian Liberation, the War of Latvian Liberation against Russia and against Germany, the Russo-Polish War, and the Franco-Thai War) the superior combatant that lost is completely incapable to bringing their full strength to bear. In two wars (the Polish-Lithuanian and Changkufeng War), the weaker opponent

attempted an attack or counterattack that was completely defeated, and the theory would predict they would not try again. Finally, in the Yom Kippur War, Golan Heights Front, Iraq and Jordan join the war during the final campaign. This often leads to war continuation, but in this case does not sufficiently change the balance of power to lead the war to continue.

I recoded the predicted war endings to take account of these cases that obviously fit the theory, but were coded as incorrect predictions for technical reasons.³⁰ Table 4.10 displays these modified predictions using military expenditures to make the initial predictions. These results are even more consistent with the theory. The number of wars predicted to continue that in fact end drops to 20%, compared to 80% successful prediction of war termination. Thus, the basic theory can successfully predict war termination in 80% of campaigns, and war continuation in 90%. None of the remaining incorrect predictions seem fatal to the theory.

Table 4.10: Modified Predictions vs. Actual War Termination, Based on Mil. Expenditure

	War continues	War ends	All
Predicted continuation	180 (90.1%)	18 (9.9%)	198 (100%)
Predicted end	10 (20%)	40 (80%)	50 (100%)
All	190 (76.6%)	58 (23.4%)	248
Pearson chi ²	108.1		
P-value	~0.000		

Conclusion

The quantitative results presented here are all consistent with the theory presented in the previous chapter. According to the theory, information is not efficiently revealed by combat due

³⁰ On the Yom Kippur – Sinai front, the COW data shows Israel with greater military expenditures, but lower power on the other measures. Therefore, this change does not contribute to the differences in Table 4-10

to two-sided uncertainty and a changing balance of power. In addition, defensive advantages present short-term commitment issues, further hindering war termination. However, each of these issues is reduced when one side, and particularly the stronger side, has achieved their war aims.

Several quantitative findings are consistent with this theory. First, campaigns resulting in decisive and total victories for the attacker are particularly likely to end wars, while campaigns that the attacker loses or only gains a partial victory are not likely to result in war termination. Campaigns that result in a local victory, where the attacker has achieved their war aims, appear more likely to end the war than losses or partial victories, but not as likely to end the war as decisive or total victories.

The evidence on the second hypothesis is more ambiguous. The quantitative results do not show a clear relationship between whether it is the stronger side that has achieved their war aims and war termination. However, many of the coefficients do point in the predicted direction, and all crosstabs do seem to show more wars ending when local victories are achieved by the stronger side than the weaker side. In addition, there are good reasons that the results may be ambiguous, including that defensive advantages make even strong states reluctant to continue the war, that states may not be able to bring their full strength to bear, and that the power measures do not accurately capture the relative military strength of the combatants.

Some of these issues can be addressed by directly looking at predictions for when a war will end. Across the three measures of power, 75-80% of wars end when the stronger side has achieved their war aims, or otherwise achieved such a decisive victory that their opponent is physically unable to contest the results. About 85% of wars where this had not happened

continue. These numbers are even clearer when cases that were incorrectly predicted for technical, but not substantive, reasons are accounted for.

Thus, a quantitative examination of which campaign outcomes lead to war termination appears consistent with the theory presented in Chapter 3. Wars clearly end only when one side has achieved their war aims, and their opponent is unable or unwilling to contest the battlefield result. There are also some indications, although tentative, that this is more likely to occur when it is the stronger side that has achieved their war aims. In the next chapter, I will supplement this quantitative analysis with several case studies to verify that the theorized mechanisms account for this pattern.

Chapter 5

Ground Wars: Case Studies

In this chapter, I will continue my empirical exploration for why ground wars end using qualitative case studies.

In Chapter 3, I developed a theoretical explanation for when wars end. I argued that defensive advantages create short-term credible commitment problems preventing war termination until the stronger side has achieved their war aims. Because defenders can fortify and otherwise improve their defensive positions, unsatisfied states would often find it more beneficial to continue attacking immediately rather than pause to negotiate. At the same time, defender's might refuse to accept settlements that would require them to cede territory, as this would involve giving up their fortified defensive positions. However, once one side has achieved their war aims, these commitment problems are reduced, and actually defensive advantages can make settlement more likely by decreasing any incentives to challenge the battlefield victory.

In Chapter 4, I examined this theory using statistical analysis of military campaign outcomes. These results clearly show that war termination is much more likely once one side has achieved their war aims. There is also some tentative evidence that war termination might be more likely when the stranger side has achieved their war aims, but this is not statistically significant. Drawing predictions based on the stronger side achieving their war aims shows that perhaps 80% of campaigns where the war is predicted to end in fact end, and 90% where it is predicted to continue in fact continue.

While the statistical results do support the theory, they are not definitive. The statistical results show that wars tend to end when and only when the one side, and particularly the stronger, has achieved their war aims. However, because it is impossible to clearly code defensive advantages, the hypothesized theoretical mechanisms are untestable using statistical techniques. Thus, in this chapter, I will supplement the statistical analysis with a series of case studies to determine whether the results are in fact driven by the predicted theoretical mechanisms.

To get the best theoretical leverage, I have selected three cases that span diverse lengths of conflict. The 1973 Arab-Israeli War represents a medium length conflict. Although temporally short, it comprises a number of different military campaigns. Thus, there would seem to be several opportunities for a negotiated settlement that were not taken. The Iran-Iraq War represents the second longest ground war in the data set³¹, and one of the deadliest wars in the 20th century. Finally, the 1990-91 Gulf War represents a shorter, intense conflict, with the main coalition ground campaign lasting a mere four days, and comprising a single military campaign. To the extent that defensive advantages have impacts in these conflicts of widely varying lengths, it should establish confidence that they do have an impact on inhibiting war termination, and then enabling war termination once the stronger side has achieved their objectives.

For each case, I will first provide a brief overview of what happened. I will then examine whether traditional accounts of information revelation or commitment problems could explain the case. Third, I will show that defensive advantages were present. Fourth, that these defensive advantages played a role in inhibiting war termination. Finally, I will examine why these defensive advantages no longer prevented war termination when a settlement was reached. This

³¹ The 3rd Sino-Japanese War is slightly longer. The Vietnam War is also longer, but is largely either an internationalized civil war or bombardment war depending on what aspects one focuses on.

should coincide with when the stronger side either directly achieved their war aims, or was otherwise in a position to force a favorable settlement without having to rely on further attacks.

1973 Arab-Israeli War

The first case I will examine is the 1973 Arab-Israeli War.³² This conflict represents an intermediate length conflict. Temporally, the conflict is rather short, lasting a mere nineteen days (Sarkees and Wayman, 2010, 163). However, even during that short period, multiple campaigns occurred on both fronts of the war. In addition, the war involved especially intense consultations within each of the governments involved, as well as in international bodies such as the UN Security Council (Rabinovich 2004). Thus, the conflict provides a relatively clean example of a war that was neither decided in the initial engagement, nor lasted a particularly long time. Additional empirical leverage is provided by the fact that the war involved two fronts which were partially independent but also influenced each other.

Below, I will provide a brief overview of the conflict. I will then examine information revelation and long-term commitment problems in determining the outcome of the conflict. Finally, I will show that there were potential defensive advantages, and that these impacted both the continuation and eventual termination of the war.

Conflict Overview

The 1973 Arab-Israeli War was in many ways a continuation of the disputes in the 1967 Arab-Israeli War³³. During the 1967 War, Israel had captured the Sinai Peninsula and Gaza Strip

³² This war is also variously known as the Yom Kippur War, the Ramadan War, and the October War. I refer to it as the 1973 Arab-Israeli War as the most neutral option.

³³ Also known as the Six Day War

from Egypt, the West Bank from Jordan, and the Golan Heights from Egypt. In doing so, Israel had inflicted an overwhelming defeat on the Arab Armies, particularly that of Egypt, which the Arab States saw as humiliating. While Jordan seemed relatively unconcerned with these losses, both Egypt and Syria wanted both to regain their lost territories and to avenge their military defeat (Asher 2009, 12-20; Heikal 1976, 46-55, Meital 2012, 49-52; Zisser 2012, 70-75).

Egypt's first attempt to regain the territory was the 1968-1970 War of Attrition. During this war, Egypt bombarded Israeli positions along the Suez Canal. By inflicting costs on Israeli forces, Egypt hoped to induce Israeli to cede the Sinai Peninsula back to Egypt (Korn 1992; Bar-Simon-Tov 1980). This conflict is discussed further in Chapter 7 on bombardment wars. However, here it is useful to note that while Egypt was unsuccessful, Israel displayed some military weaknesses that would influence Egyptian and Syrian planning for the 1973 war. In particular, Israeli aircraft proved vulnerable to modern air defense systems, particularly SA-2 and SA-3 surface-to-air missiles. As air support was critical in Israeli victories during the 1967 war, this vulnerability showed a crucial weakness that would facilitate Egyptian and Syrian plans to militarily retake the lost territories (Asher 2009, 31, 114-115, Korn 1992, 225-234, Shazly 1980, 21).

Following the end of the War of Attrition, Egypt and Syria began planning a joint military campaign to retake the lost territories. Both sides decided to focus on limited goals. Syria would attempt to retake, and then hold, the Golan heights without proceeding further into Israel. Egypt's initial goals were even more limited, aiming initially to take and hold a five to ten-kilometer strip along the east bank of the Suez Canal. Taking this strip would either induce Israel to negotiate returning the entire Sinai Peninsula or lay the foundation for further military offensives. (Asher 2009, 178; Meital 2012, 52-55; Zisser 2012, 73-75, Bar-Joseph 2005, 11-13)

To take these territories, Egypt and Syria agreed to attack jointly at 2:00pm on October 6, 1973 (Rabinovich 2004, 54). By coordinating the attacks, Israel would be unable to fully concentrate their military against either opponent. Both Egypt and Syria took great lengths to achieve surprise, for instant concealing their mobilization as military exercises (Shazly 1980, 207-211; Bar-Joseph 2005, 25-32). While Israel did manage to get some advanced warning of the attack, they were still in the process of mobilizing and deploying their reserve forces when Egypt and Syria struck (Rabinovich 2004, 73, 89).

At this point, I will begin summarizing the course of the war on each front separately, beginning with the Syrian-Israeli conflict on the Golan Heights. At the appointed time, five Syrian divisions attacked the Israeli lines, held by two armored brigades and an infantry brigade. The Israeli 7th Armored brigade managed to largely hold the northern Golan Heights, ceding only their forward positions. However, after hard fighting, the Israeli position in the Southern Golan Heights collapsed. A few Syrian forces managed to advance nearly to the 1967 border in the southern Golan Heights. In addition, Syrian commandos captured the Israeli observation posts on Mt. Hermon on the northern edge of the Golan Heights, which overlooked the entire theater (Rabinovich 2004, 142-216; Tzabag 2001).

At this point, Israeli defense minister Moshe Dayan became despondent, believing the existence of Israel was at stake, and pushing for an early ceasefire (Dayan 1976, 476, 481; Tzabag 2001, 185-186). However, the rest of the Israeli cabinet disagreed. Mobilizing additional forces, the Israeli army counterattacked on October 8 and forced the Syrian forces from the Golan Heights by October 10. At this point, the Israeli war cabinet debated whether to cease the advance or continue to attack into Syria. As the war along the Southern Front against Egypt was not going well, Israel decided to continue the advance. Capturing Syrian territory

would serve as a counterbalance to the lost territory in the Sinai Peninsula if a ceasefire was declared. Israeli forces thus advanced towards the outskirts of Damascus. During this advance, the Israeli forces paused briefly to defeat a counterattack by Syrian forces, supported by Iraqi and Jordanian units (Tzabag 2001; Rabinovich 2004).

Syrian forces were preparing for another counterattack. However, the Egyptian acceptance of a UN sponsored ceasefire on October 22 would mean that Syria would be fighting alone. Thus, Syria also accepted the ceasefire. This ended major fighting on the northern front. However, on October 22, shortly before the ceasefire was declared, Israeli forces retook Mt. Hermon and its key observation posts. (Rabinovich 2004, 464-465; Tzabag, 2001; Zisser 2012, 77-80)

While Israeli forces quickly established superiority on the northern front against Syria, they initially had less success against the Egyptian forces near the Suez Canal. Using surprise, the Egyptians managed to cross the canal with five infantry divisions organized into two armies. They quickly advanced several kilometers from the canal and established defensive positions against weak opposition. Initial Israeli attacks were uncoordinated, and Israeli tanks fell victim to Egyptian anti-tank weapons. A major Israeli counterattack on October 8 by three divisions ran into similar difficulties, and was repulsed with significant losses. Most of the next week was comprised of local skirmishes. The Israelis wanted to maintain pressure on the Egyptian forces, but were not ready for another major attack. The Egyptians were largely content to maintain and solidify their defensive positions (Adan 1980; Rabinovich 2004).

The relative stalemate changed on October 14, when the Egyptian forces conducted a major attack towards the Gidi and Mitla passes in the central Sinai Peninsula. Egyptian aims were varied. The first aim was to distract Israel from their ongoing attacks into Syria, therefore

relieving pressure on Egypt's ally. In addition, Egypt probably hoped to exploit their earlier successes by capturing additional territory. Establishing defensive positions at the passes would mean holding approximately half of the Peninsula. However, the Egyptian attack was beaten back with heavy losses by Israeli forces in strong defensive positions (Rabinovich 2004, 348-356; Asher 2009, 150-153).

The Egyptian losses, particularly in armored vehicles, laid the grounds for Israeli counteroffensives. The Israelis had earlier noticed a gap between the Egyptian 2nd and 3rd Armies. Rather than directly assault the Egyptian positions, the Israelis planned to advance through this gap and cross the Suez Canal themselves into Egyptian territory. Starting on October 15, Israeli forces punched through this gap and established a bridgehead on the Egyptian side of the canal. Over the next several days the Israelis managed to secure their crossing site on both sides of the canal amidst heavy fighting. On the Egyptian side, Israeli forces also started to destroy Egyptian SAM sites, enabling the Israeli Air Force to once again provide close air support to the Israeli land forces. Once the bridgehead had been secured, the Israeli forces attacked south along the Egyptian bank of the Suez Canal in order to surround the Egyptian 3rd Army (Rabinovich 2004).

Facing defeat, Egypt accepted UN calls for a ceasefire. The UN brokered ceasefire was declared on October 22, to take effect 12 hours later. However, as the Israeli forces had not completely surrounded the Egyptian Army, they continued advancing and fighting broke out again. Pressure from the United States along with the UN led to both sides agreeing to a second ceasefire to take effect on October 24 (Rabinovich 2004, 441-442, 452-467, 476-477; Sadat, 1978, 263-267).

At the time of the ceasefire, Israel had completely recaptured the Golan Heights and held a significant amount of Syrian territory. Their front lines were within artillery range of Damascus. Egypt still held their narrow bridgeheads along the east bank of the Suez Canal. However, the Egyptian 3rd army was nearly completely surrounded, with only a narrow lifeline at Suez City, and thus its position was essentially untenable. In addition, Israel held 1,600 square kilometers of Egyptian territory on the west bank of the canal (Tzabag 2001, 200). Further negotiations eventually led to all sides agreeing to return to the status quo ante bellum, with all forces withdrawing to their prewar lines. Eventually, Israel and Egypt signed the Camp David Accords in 1979, returning the Sinai Peninsula to Egypt in exchange for Egyptian recognition of Israel.

Information and Commitment Problems

Before examining the impact of defensive advantages on the war, it is useful to examine whether information revelation or the resolution of commitment problems can adequately explain why the war ended. I will argue that information revelation should have led to an earlier resolution of the war, while commitment problems were never resolved.

Even though the war was relatively short, it is still likely that information could have been revealed and a settlement negotiated before the end of the conflict. In general, it is clear that prior to the war Israel was uncertain about Egyptian and Syrian intentions and capabilities, while the Arab states had a relatively clear sense of Israeli capabilities. Prior to the war, Israel believed that their forces were decidedly superior to the Arab forces, given the lopsided outcome of the 1967 War. Thus, Israel believed that any Arab attack would be foolish, and accordingly war was unlikely. However, Israel did not appreciate the efforts the Arab states had made to

rectify their military deficiencies. In particular, Israeli superiority in armored forces was considerably reduced by the acquisition of anti-tank weapons, while their air superiority was compromised by advanced SAM systems. Thus, the Egyptian and Syrian forces were significantly more capable in 1973 than Israel believed. Knowing this, these Arab states were also much more willing to attack than Israel anticipated. (Bar-Joseph, 2005)

However, the initial shocks to Israel should have revealed this information. The Egyptian and Syrian surprise attack showed that in fact the Arab states were willing to go to war. In addition, Israeli forces suffered a number of military defeats, showing that the Arab forces were more capable than anticipated. On the Sinai front, both Israel's initial counterattacks on October 6 and their large-scale counterattack on October 8 were defeated with heavy losses. On the Golan front, parts of the Israeli defense line completely collapsed until reinforcements managed to salvage the situation. On both fronts, Israel suffered a number of aircraft losses to SAMs as their Air Force attempted to support the ground forces.

Thus, it seems that Israel should have begun seeking some negotiated settlement within the first few days based on their new appreciation of the Arab states capabilities and resolve to retake the territories. While Moshe Dayan did in fact support an early ceasefire, he was virtually alone in advocating for this position. In addition, once the initial shock had worn off, even Dayan retracted his initial support for a settlement, and the Israeli leadership was united in continuing the war until the Arab forces had been defeated. (Eban 1992, 531; Meir 428-429)

It could be argued that the war continued after the first few days because the Arab states overestimated how much their capabilities had improved since the 1967 War. Thus, even if Israel had been willing to settle the conflict, the Arab forces continued to demand to great a

change from the pre-war status quo. However, this information would also have been revealed before the conflict actually ended.

On the Golan front, Israeli forces first halted the Syrian advance, and then recaptured the Golan Heights by October 8. Thus, it was clear that once Israel had mobilized their reserve forces, Syria was unlikely to prevail, even with the new technologies. This assessment should have been reinforced by the defeat of a combined Syrian-Jordanian-Iraqi counterattacks against the Israeli advance into Syria. At that point, it should have been clear that even with the assistance of allies, Syria was unlikely to defeat the Israeli army. Either of these points should have induced Syria to begin exploring a negotiated end to the war. However, Syria made no efforts to end the war, and was even planning further counterattacks. They only accepted a ceasefire when the Egyptian acceptance of a ceasefire meant they would be fighting without the assistance of their main ally.

On the Sinai front, it is possible that Egypt overestimated their chances of indefinitely repelling Israeli counterattacks against their position on the east bank of the Suez Canal. This uncertainty might have lasted longer. However, once the Israelis began to cross the Suez Canal on October 15, it should have become obvious that their position was in fact vulnerable. Thus, Egypt should have begun exploring a ceasefire within a few days. However, the war continued for another 10 days until October 25.

Thus, it seems clear that sufficient information should have been revealed to enable the different sides to agree on a settlement significantly before the war actually ended. This leaves the resolution of commitment problems as the remaining traditional explanation for how the war ended. However, the possible commitment problems are either not resolved or their resolution does not coincide with war termination.

The first types of commitment problems that can lead to war are efforts to either entirely take over the other state, or change the opponent's regime to one more favorable. However, all of the states and regimes survive the war intact. Thus, this form of commitment problem can neither explain why the 1973 Arab-Israeli War occurs, nor why it ends when it does.

Strategic territory offers a potentially more plausible explanation. Both the Suez Canal and the Golan Heights might represent strategic territory. However, these pieces of strategic territory also do not adequately explain war termination.

Looking at disputes over the Golan Heights to explain war termination runs into two problems. First, it is not clear that the Golan Heights create sufficient commitment problems to cause war. For a piece of strategic territory to cause war, the value of holding that territory must be indivisible. However, it is unclear that the defensive advantages that possession of the Golan Heights gave Israel were indivisible. The Golan Heights first provided a buffer between Syria and settlements in Northern Israel. Second, the hilly terrain in the Golan Heights was itself more defensible than the plain below. However, neither of these advantages seem indivisible. A smaller buffer would still have provided some benefits. Similarly, there were likely other terrain within the Golan Heights that would have provided many of the defensive advantages as the prewar line. In addition, war termination does not coincide with Israel's recapture of the Golan Heights. Instead, Israel occupies Syrian territory for a substantial period before the two sides agree to a ceasefire.

In contrast to the Golan Heights, the Suez Canal does represent an indivisible strategic barrier. If the Israelis front line was along the Suez Canal, the Egyptians would have difficulty attacking. Indeed, the Egyptian crossing was only feasible given their ability to attack by surprise. However, if the Egyptians had even a small beachhead on the east bank of the canal,

attacking further into the Sinai Peninsula would be considerably easier. Thus, an Israeli effort to regain the entire line along the Suez Canal could represent a commitment problem that could lead to war. However, Israel does not actually regain the canal line. In fact, the Egyptian's hold most of the positions they established in the first few days through the end of the war. While Israel surrounding the Egyptian 3rd Army could make the southern portion of this line untenable, and thus easily regained if necessary, the northern portion of the Egyptian line remained strong. Thus, Israel does not actually resolve the commitment problems that led them to keep fighting when they agree to a ceasefire.

Presence of Defensive Advantages

In evaluating the effect of defensive advantages on the 1973 Arab-Israeli War, I will first show that these defensive advantages exist. I will then explain why they prevented earlier war termination, and finally why the barrier defensive advantages posed decreased enough for the two sides to settle the conflict. Defensive advantages included the terrain, particularly on the Golan Heights, and the Arab use of anti-tank weapons and surface-to-air missiles.

The terrain on the Golan Heights was particularly rugged. Thus, there were numerous places that defending forces could take cover to ambush attackers. These defenses had been improved prior to the war by Israel's construction of anti-tank ditches and numerous emplacements to shelter defending tanks. In addition, having gained familiarity with the terrain allowed the Israelis to more effectively use the terrain to provide cover for their forces. However, many of the initial Israeli fortifications were lost during the initial attack, thus giving up many defensive advantages. In addition, if Syria had been allowed to retain areas of the

Golan Heights, they could have developed their own fortifications and familiarity with the terrain, reversing Israel's advantages. (Cordesman and Wagner 1990a, 43-44)

In contrast, the Sinai Peninsula was relatively more open and did not naturally give as many defensive advantages. However, both sides constructed numerous field fortifications. During the period between the 1967 and 1973 wars, Israel had constructed a major embankment near the canal to give their tanks cover when firing across the canal. Israel had also constructed a number of strongpoints to shelter infantry forces to observe, and even help defend the canal. Once Egypt had crossed the canal, Israel lost these defensive positions. In addition, Egypt constructed their own entrenchments once they had crossed the canal, which were initially quite effective at helping to repulse Israeli counterattacks. (Cordesman and Wagner 1990a, 37-42)

Technology also gave the Egyptian and Arab forces significant defensive advantages, but only if used from a static position. First, the Arab forces, and particularly Egypt, had invested heavily in anti-tank weapons, including rocket-propelled grenades (RPGs) and anti-tank guided missiles (ATGMs). These RPGs and ATGMs gave an individual infantry soldier the ability to destroy tanks. However, they were most effective from defensive and sheltered positions. To use the RPGs effectively, a soldier needed to be relatively close to the tank in order to hit it. Getting this close would be difficult if the soldier had to cross open ground in an attack, but relatively easy if the soldier could use defensive positions to set up an ambush. While the ATGMs could hit from longer range, the soldiers had to manually guide the missile over the entire flight time. To do this, soldiers needed to be able to focus on the tank for the significant periods of time while avoiding counterfire. Again, entrenched defensive positions would help shelter the soldier, making these weapons more effective. (Cordesman and Wagner 1990a, 64-65; Shazly 1980, 34; Asher 2009, 132-139; Dayan 1976, 508)

The second major piece of technology was Syria and Egypt's acquisition of advanced surface-to-air missiles, particularly SA-2 and SA-3 missiles. These missiles largely neutralized the Israeli Air Force's ability to provide support to Israeli ground forces, particularly early in the war. This was a crucial to Arab plans, as Israeli air support was a major factor in their victory in the 1967 war. In addition, these missiles could cover Syrian forces throughout the entire Golan Heights, and Egyptian forces several kilometers beyond the Suez Canal. However, the missiles, particularly the longer range and higher altitude SA-2 missiles, were difficult to move. Thus, they had to be placed in relatively static positions, and could not move with attacking forces. Thus, while they could shield limited attacks from air intervention, they could not cover deeper advances and were largely a defensive weapon. Egypt's losses during their October 14 advance deep into the Sinai Peninsula showed the folly of advancing beyond this air defense umbrella. (Cordesman and Wagner 1990a, 74-81, Dayan 1976, 508-509)

Israel managed to destroy many of the missile sites later in the war, either through bombing them or by overrunning the sites with ground forces. This enabled the Israeli Air Force to once again provide support for Israeli ground forces, which assisted Israel's successful attacks later in the war (Rabinovich 2004). However, over time, the missile sites could be reestablished, once again hindering ground operations.

Thus, both the terrain and technology provided both sides with defensive advantages. In addition, these defensive advantages would have increased the longer a position was held, particularly for the Arab side.

Defensive Advantages as Barriers to War Termination

Examining the war, we can see how these defensive advantages posed barriers to war termination. Three events in particular stand out. The first event is Israel's decision not to cease their advance after they had regained the Golan Heights, but to advance further into Syria. Second, is Israel's decision not to seek a ceasefire or settlement after their failed counterattack against the Egyptian positions on October 8. The final event is the breakdown of the ceasefire as Israeli forces continued to advance. Below, I will examine how defensive advantages prevented war termination on Golan front, and then on the Sinai front.

Golan Heights Front

On the Golan Heights, there are three potential periods that indicate the impact of defensive advantages on preventing war termination. The first was the failure to reach a negotiated settlement after the initial attack. However, this failure to negotiate could easily be explained by the speed of events. Second, a clearer opportunity for settlement occurred when Israel decides to advance into Syria once they have recaptured the Golan Heights. Finally, there was the failure to agree to a ceasefire during the period after Israel's advance.

As noted above, both Syria's willingness to fight and their capabilities should have been revealed to Israel immediately with the first attack. Similarly, when Syria encountered significant Israeli resistance, they should have assessed the difficulty of fully capturing the Golan Heights. However, at this point a ceasefire might have compromised both sides' goals. If Syria had stopped advancing, Israel would have had a tremendous opportunity to stabilize their lines and build up defenses, compromising Syria's goal of capturing the entire Golan Heights. At the same time, if Israel had agreed to a ceasefire, Syria would have retained at least some of the

Golan Heights. They could then have established defenses, which might have made it more difficult for Israel to recapture the Golan Heights. As noted above, Israeli defense minister Dayan did advocate a ceasefire, as he worried that the entire Israeli line was about to collapse. However, most other leaders were confident in Israel's ability to regain the Golan Heights (Eban 1992, 531).

Despite the potential impact of defense advantages at this point, it is unclear if they were decisive in preventing a ceasefire at this point. The failure to reach an agreement could easily be explained by the rapidity of events. Only four days passed from the initial Syrian attack to the end of Israel's counterattack regaining the Golan Heights. While communications were rapid enough that diplomacy is conceivable, it still seems that any diplomatic effort to end the war in this time would have been extremely difficult.

The impact of defensive advantages is clearer in the Israeli decision to advance into Syria after successfully regaining the Golan Heights. There was in fact considerable debate about whether to attack or not. This would seem a natural point for negotiations. Both sides had revealed much of their private information through combat, and both would have to take active decisions to continue the war. In addition, some Israeli leaders pointed to Syrian defensive advantages as a reason not to continue into Syria, as an attack would require breaching Syria's defenses established prior to the war (Dayan 1976, 518-519). However, Israel did decide to continue fighting, even though they have no desire to capture Syrian territory long-term. (Tzabag 2001)

This decision needs to be understood in the context of events on the Sinai front against Egypt. At this point, Egypt was firmly established in their defensive lines and had just repulsed the second Israeli counterattack. Israeli leaders felt that they needed some territorial gains to

counteract the losses in the Sinai Peninsula. Holding Syrian territory might force Egypt to relinquish their gains after a ceasefire, despite the strong defensive lines that the Egyptians had prepared (Dayan 1976, 516-519; Tzabag 2001).

If Israel was to attack the Syrian defenses, it made the most sense to do so immediately. Syrian forces had been significantly degraded in the battle over the Golan heights, losing much of their armored strength and having their front-line divisions disorganized. Thus, even though they had substantial defensive positions, including entrenchments, minefields, and anti-tank ditches, they could not effectively use these defenses until they reorganized their forces and replaced lost equipment. Thus, Israel attacked into Syria due to the immediate opportunity to gain a counterweight to Egypt's defensive advantages on the Sinai front. This opportunity might have disappeared had Israel waited to attack.

The final possible opportunity to end the war earlier with a negotiated settlement occurred after Israel had captured significant Syrian territory. By October 14, Israel had advanced within artillery range of Damascus, and was generally content to halt their advance (Tzabag 2001, 197-198). Given that Israel did not really care about retaining the territory except for its influence on the Sinai front, a negotiated end to the fighting certainly seems possible. Moreover, it is largely inconceivable that either side retained significant uncertainty about the other's capabilities or resolve. Even the intervention of Iraqi and Jordanian units would not necessarily have changed the picture much, as Israel easily defeated their counterattack.

However, no negotiations occurred and Syria (along with Jordan and Iraq) mounted a number of failed counterattacks on the Israeli forces. In fact, Syria was planning yet another counterattack when the ceasefire took effect (Rabinovich 2004, 464-465). Defensive advantages could explain why Syria persisted with the war until this point. Despite Israel's general military

superiority, their position was fairly vulnerable. They had only recently occupied the captured territory, and had not had time to solidify their positions (Tzabag 2001, 197-198). In addition, Israel's need to fight Egypt meant that only limited forces could be devoted to holding the position. This meant that counterattacks might successfully drive Israel back out of Syrian territory, especially given the intervention of Iraqi forces and the possibility of bringing fresh Syrian forces to the battlefield. However, any pause could allow Israel to cement their position, possibly demanding significant political concessions in return for withdrawing from Syrian territory.

Sinai Front

The impact of defensive advantages in preventing the war from ending sooner is quite evident on the Sinai front. In particular, Egypt was not willing to give up any of the territory it had taken on the east bank of the Sinai Peninsula, while Israel was similarly reluctant to negotiate while Egypt held these lines. Once Israel had successfully crossed the Suez Canal into Egypt, the first ceasefire broke down as Israel continued to advance until they had surrounded the Egyptian 3rd Army.

The first evident impact of defensive advantages is in the stalemate between the initial Egyptian attack and both the Egyptian advance on October 14 and Israeli counterattack on October 15. As noted above, at least some information should have been revealed in the opening days of the conflict, as it became clear that it would be difficult for Israel to dislodge the Egyptian positions. If private information was the explanation for why the war continued, the two sides should have been seeking a settlement at this point. However, neither side actually attempted to negotiate. Instead, Egypt held their position, while Israel initiates a series of tactical

operations to keep the Egyptian forces off-balance and prevent them from fully consolidating their position. (Adan, 1980)

This stalemate can be easily explained in the context of the theory. Israel in particular wanted to force the Egyptian forces back over the canal. However, a ceasefire would prevent Israel from achieving this goal. It would enable Egypt to more heavily entrench their position and establish even stronger air defenses over it. This would make it impossible for Israel to push Egypt back across the Suez Canal. Thus, instead of trying to negotiate, Israel continuously executed a number of small attacks and other actions to keep the Egyptian force off balance (Adan 1980). Thus, Egypt would have difficulty either consolidating their current position or advancing deeper into the Sinai Peninsula.

In theory, Egypt wanted to gain control of the entire Sinai Peninsula. However, in the near term, Egypt was content with the limited military gains. These gains both demonstrated Egypt's capabilities, and would hopefully spur additional developments. However, to realize these gains, the Egyptian forces needed to maintain their positions. It would be militarily difficult to cede some ground while maintaining a presence on the Sinai bank of the Suez Canal. The Egyptian's had only captured a narrow strip of territory. Retreating further would rob Egyptian units of any ability to maneuver against Israeli threats, possibly compromising the entire defense. Egypt could also have returned territory such that Israeli forces advanced to the canal along part of the front, but retained all captured territory along other areas. However, this would have allowed Israeli forces to concentrate against the remaining Egyptian forces on the east bank of the canal, again compromising the position. Finally, any retreat beyond the canal would have returned the situation to that prior to the war, when Egypt had limited military options to regain the Sinai. Thus, any retreat would have compromised Egypt's defenses, and thus their ability to

gain their political ends. Given that defensive advantages were so central to Egypt's war plan in the first place, it is clear that Egypt would be unlikely to make any agreement that would compromise these defenses. Therefore, neither side, and in particular Israel, was all that interested in a ceasefire, as it would compromise achieving additional war aims.

The second obvious time that defensive advantages played a major role in preventing the ceasefire was after the Israeli crossing of the Suez Canal. As noted above, at this point the capabilities of both sides should have been fairly clear. While Egypt did begin considering whether to pursue a negotiated settlement, there was no rush to end the war. On the other side, Israel seems quite reluctant to end the war at that point. A ceasefire would have left Egypt with its strong defenses on the east bank of the canal, which they could improve (see Dayan 1976, 533). At the same time, Israel had only modest territorial gains on the Egyptian side to offset the Egyptian gains. Moreover, their beachhead would have been relatively vulnerable. While they could improve the defenses of the beachhead, it still would have been dependent on the narrow breakthrough of the main Egyptian lines.

To offset these advantages, Israel needed to do two things. First, they needed to secure the beachhead and widen the breakthrough corridor. They managed to accomplish this in the days following the initial breakthrough and canal crossing. While the new corridor was still somewhat vulnerable, it became much more secure than in the first few days after the crossing.

Second, Israel needed something to counteract the Egyptian defensive advantages on the east bank in order to force a favorable resolution. Thus, Israeli commanders focused on surrounding the Egyptian 3rd Army by capturing the entire west bank of the Suez Canal south of the breakthrough site. If the Israeli attacks were successful, half of the Egyptian forces would have been left without any possibility of resupply. This would have two effects. It would

directly weaken the 3rd Army's position, making it easier to recapture if necessary. In addition, Egypt would be forced either to agree to a return to the prewar positions or half of their forces would have to either surrender or be defeated. Israeli forces raced south to accomplish this, aware that the UN might push for a ceasefire at any time. (Dayan 1976, 535; Adan 1980)

The importance of surrounding the Egyptian 3rd Army to achieve a favorable end to the war can be seen in the breakdown of the ceasefire and other Israeli actions in the last days of the war. Believing that they had already essentially surrounded the Egyptian 3rd Army, Israeli leaders agreed to a ceasefire taking effect on October 22. However, the leaders had been misinformed about how far Israeli forces had reached, and they were not in fact close to surrounding the Egyptian 3rd Army. Thus, Israeli leaders allowed their forces to continue advancing even after the ceasefire took effect, while refraining from firing. However, as Israeli forces came into contact with Egyptian forces, combat naturally erupted and the ceasefire broke down. (Rabinovich 2004, 443-467)

As a second ceasefire loomed, Israeli leaders ordered a costly attack on Suez City on the south end of the canal. At that point Suez City was the last major piece of territory Egypt held between the Israeli crossing point and the south end of the canal. It was thus the 3rd Army's last remaining lifeline for resupply, and Israel capturing the town would completely cut off the 3rd Army. However, taking the city would be potentially costly, as urban fighting is quite difficult. Nevertheless, Israeli forces did assault the town several times. While they failed to capture the town before the ceasefire took effect, these assaults only make sense if Israel was concerned about completely neutralizing the defensive advantages of the Egyptian 3rd Army. (Rabinovich 2004, 468-477)

Defensive Advantages and the Ending of the War

While defensive advantages posed significant barriers to war termination, we can see how these barriers were reduced once Israel had essentially surrounded the Egyptian 3rd Army. This put Egypt in a position where they would have little choice but to agree to Israel's demands to evacuate the Sinai Peninsula. In turn, Egypt's agreement to the ceasefire meant that Syria was faced with the possibility of fighting Israel alone, thus forcing them to also agree to a ceasefire.

While Israel did not fully achieve their war aims of forcing Egyptian forces back across the canal, they did create a situation where Egypt would have little choice but to agree. As noted above, Israeli forces had essentially surrounded the Egyptian 3rd Army, leaving only a limited lifeline through Suez City. This meant that the 3rd Army would rapidly become incapable of combat due to a lack of supply. Thus, time would make it easier for Israel to overrun the 3rd Army's position. It is even possible that a lack of basic supplies would force the 3rd Army to surrender or starve, leading to an even more humiliating defeat than any Egypt had previously experienced against Israel. While the positions of the Egyptian 2nd Army remained strong, it would become more vulnerable if Israel could concentrate all their forces against the remaining Egyptian forces after defeating the 3rd Army.

In addition, Israel had captured more Egyptian territory than Egypt held in the Sinai Peninsula. Since Egypt likely valued regaining their own territory more than retaining the captured territory in the Sinai, Israel could propose a straightforward trade: Egypt would withdraw from the Sinai Peninsula and Israel would withdraw from Egypt proper. In addition, Egypt had little hope of militarily recapturing the territory. Many of their forces were devoted to holding the territory in the Sinai Peninsula. In addition, Israel could now establish their own defensive positions. In combination with Israel's greater military skill this would make it

difficult to retake the lost Egyptian territory. Thus, Egypt had little military choice but to agree to Israeli peace terms. The traditional barriers to war termination had been eliminated once Israel had surrounded the Egyptian 3rd Army.

Once Egypt agreed to the ceasefire, Syria had little choice but to follow suit. While Israel was focused on fighting Egypt, Israel could only devote part of their strength to holding the territory they had captured in Syria. Thus, Syria at least plausibly had a chance of recapturing this territory in combination with Jordanian and Iraqi assistance, despite Israel's greater skill and defensive advantages. However, once Egypt had agreed to end the war, Israel would have been able to transfer more forces to the Syrian front. This would have made Israel clearly the stronger party in the confrontation, eliminating any chance of Syria militarily retaking the captured territory. Thus, Syria had little incentive to continue fighting, even if they would have to make political concessions to get Israel to return their territory.

Conclusion

Defensive advantages do seem to have played a fairly clear role in the course of the 1973 Arab-Israeli War. These defensive advantages were clearly present, and in fact incorporated in both Egyptian and Syrian planning prior to the war. For much of the war, these defensive advantages inhibited war termination. Israel could not agree to a ceasefire on the Sinai front, as this would allow Egypt to cement their defensive lines, and thus control of territory in the Sinai. This even led Israel to continue advancing after the first ceasefire, as a pause would make it difficult to continue the attack to surround the Egyptian 3rd Army, and thus force Egypt to agree to Israeli terms. On the Golan front Israel decided to invade Syria (after repulsing the initial Syrian attack) to create a counterweight to the losses in the Sinai, which were fortified by

Egyptian defensive advantages. Israel needed to attack immediately, as their best chance to breach Syrian defenses was before Syria could reorganize and reequip their battered forces. Syria attempted to counterattack rather than allow Israel to retain Syrian territory and fortify their positions, which might force painful political concessions. However, once Israel had essentially surrounded the Egyptian 3rd Army, these calculations changed. As the Egyptian position became militarily untenable, they had little choice but to give up their captured territory, even with the defensive advantages. Once Egypt agreed to the ceasefire, Syria had little choice but to follow suit, as they no longer had a reasonable hope of breaching Israeli defenses and recapturing the lost Syrian territory.

Iran-Iraq War

The next case I will examine is the Iran-Iraq War from 1980-1988. The Iran-Iraq war is the second longest conventional ground war since 1918,³⁴ and according to the Correlates of War data is the deadliest war since World War II (Sarkees and Wayman, 2010).³⁵ Qualitatively examining this conflict thus provides several useful pieces of empirical leverage. First, this conflict provides useful variation in conflict length and size, as most other wars are relatively short. The Iran-Iraq war is also a complicated conflict, involving both an Iraqi invasion of Iran and an Iranian counter-invasion of Iraq. Both the initial invasion and the counter-invasion involve multiple campaigns with varied outcomes. The conflict also involved significant international factional politics in Iran, and to a lesser extent in Iraq. Together all of this makes

³⁴ The 2nd Sino-Vietnamese War is the only ground war that is longer (it extends from 1937-1945). The Vietnam War is also longer (see Sarkees and Wayman 2010), but is a combination of a bombardment war and internationalized civil war.

³⁵ Casualty estimates for the Iran-Iraq War vary widely, and it is possible that both the Vietnam War and Korean War had higher death tolls.

the Iran-Iraq War a relatively hard test for my theory. Thus, if defensive advantages play a role in determining both the continuation and eventual end of the conflict, this case would provide strong support for my theory, even if other factors also influence the outcome.

Below, I will provide a brief overview of the conflict. I will then examine information revelation and long-term commitment problems in determining the outcome of the conflict. Finally, I will show that there were potential defensive advantages, and that these impacted both the continuation and eventual termination of the war.

Conflict Overview

The Iran-Iraq War began on the morning of September 22, 1980, with surprise Iraqi air and ground attacks on Iran. The war would end nearly eight years later on August 20, 1988 when both sides accepted UN Security Council Resolution 598. Despite eight years of fighting, and hundreds of thousands of casualties, the outcome matched the status quo ante bellum. (Sarkees and Wayman 2010, 171-173; Johnson 2011; Murray and Woods 2014)

The Iran-Iraq War began out of a combination of territorial disputes over the Shatt-al-Arab waterway and the aftereffects of the Iranian revolution of 1979. Saddam Hussein appears to have believed that he could use the chaos caused by the Iranian revolution to militarily settle the territorial dispute, and possibly gain additional territory. Hussein may have also felt threatened by the Iranian revolution, and believed that military action would bolster counter-revolutionary forces, allowing them to reverse the Islamic revolution in Iran. (Murray and Woods 2014, 45-50; Johnson 2011, 44-45; Razoux 2015, 52-64)

The war itself can be largely divided into two phases. The first, from the Iraqi invasion until mid-1982 involved Iraq's attempts to capture Iranian territory, and the subsequent Iranian

counteroffensives to recapture their territory. The second phase began after Iran's successful expulsion of Iraqi forces from Iranian territory, and involved largely futile attacks to capture Iraqi territory. This phase lasted until the end of the war, when Iraqi forces retook their own lost territory.

The initial Iraqi plan appears to have been a lightning advance modeled after Israel's successful campaign against Egypt during the 1967 Arab-Israeli War. A surprise air attack was intended to destroy the Iranian air force, but was largely unsuccessful. Iraq's ground attacks were more successful, capturing a significant amount of territory and several major towns, especially Khorramshahr. However, the attacks failed to destroy the Iranian army or induce Iran to seek peace. By the end of 1980, Iraq's offensive momentum had stalled. (Murray and Woods 2014, 85-131; Johnson 2011, 49-62)

While Iraq offered a ceasefire at this point, Iran rejected negotiations until Iraq withdrew from Iranian territory (Murray and Woods 2014, 163, 186-192). The conflict remained largely stalemated through most of 1981. Beginning in September 1981, a series of Iranian offensives drove Iraqi forces back across the border. These cumulated in the recapture of Khorramshahr in May 1982. At this point, Iraq withdrew their remaining forces from Iran and offered a ceasefire to end the war. (Murray and Woods 2014, 144-148, 163-164, 171-186; Johnson 2011, 63-79)

Iranian leaders debated whether to accept the ceasefire proposal. However, they decided to demand that Saddam Hussein step down, among other conditions. To keep pressure on Iraq, Iran decided to counter-invade Iraq, and in particular attempted to capture Basra and the surrounding oil fields (Axworthy 2013, 226-230; Takeyh 2010, 370-373). A series of offensives were mounted at varying points along the border for the next five years, which were generally unsuccessful. While the initial Iranian attack would sometimes successfully breach Iraqi

positions, the Iranians were generally unable either to exploit the attack or hold their positions against Iraqi counterattacks. The major exception was Iran's capture of the Faw peninsula in February 1986. Thus, by the beginning of 1988, Iran had managed to capture some Iraqi territory, but had generally been unsuccessful and was growing increasingly weary of the war. (see Murray and Woods 2014; Johnson 2011)

The situation changed in early 1988, leading to the final end of the war. During the previous years, Iraq had built up effective mechanized forces. These were unleashed in March 1988. In a series of well executed combined arms offensives, Iraq drove Iranian forces out of Iraq over the following months, including recapturing the Faw peninsula. These attacks coincided with skirmishes between Iran and the US Navy in the Persian Gulf. On July 14, 1988, Iran ordered their forces to evacuate the remaining Iraqi territory. On July 20, Iran announced that they accepted the UN Security Council Resolution 598 demanding an end to the war, which took effect one month later. The final result thus essentially restored the pre-war status quo. (Murray and Wood 2014, 311-335; Johnson 2011, 159-163)

Information and Commitment Problems

Before examining my theory of how defensive advantages helped explain the continuation and termination of the war, it is useful to rule out traditional bargaining explanations. Given that the war lasted eight years, there seems to be ample opportunity to develop a consensus about both the relative power balance and resolve of the parties, which would have allowed for earlier war termination. Commitment problems, and particularly efforts by both Iraq and Iran to replace their opponent's regime, may have played a role in continuing

the conflict. However, these commitment problems are never resolved, and thus cannot explain war termination.

Over the eight years of the conflict, there would appear to be numerous opportunities for sufficient information to have been revealed to reach a negotiated settlement. During the first stage of the war, a ceasefire would seem to be possible once Iraq's initial offensives had stalled. At this point, Iraq should have realized that it was unlikely to achieve further gains, and that Iran was both capable and willing to fight to reverse these gains. Similarly, Iran should have been relatively aware of Iraqi capabilities. Even if either side was uncertain about Iran's ability to retake the captured territory, Iran's successful offensives in 1982 should have revealed this information, presenting a second opportunity for war termination. Indeed, Iraq offered a ceasefire at this point, indicating that Iraq at least understood the state of the war.

It is possible that some uncertainty continued into the second phase, when Iran counter-invades Iraq. For instance, Iran may have been overoptimistic about their chances of militarily overthrowing the Hussein regime. However, the counter-invasion also quickly stalled. Most subsequent Iranian attacks over the next five years (through 1987) achieved little gains. It seems inexplicable that Iran would not have realized that achieving any significant gains would be unlikely and very costly. Even if Iran believed that Iraqi forces would collapse first due to attrition warfare, it is difficult to understand how this belief would persist for six years. At the same time, Iraq should have realized Iranian commitment to achieving their war aims. Thus, some negotiated settlement should have been possible sometime before the ultimate end of the war in 1988.

Shirkey (2016) suggests that the generation of new private information may have been sufficient to explain why the conflict lasted so long. In particular, Shirkey suggests that Iraq's

development of tactics and forces capable of mounting effective combined arms offensives represented new private information. Iran was wholly unaware of this development, while Iraq could not have been certain of how effective the new forces would be. While this information may have played a role in extending the conflict, it largely cannot explain why the war lasted so long. The offensives were only launched in early 1988. It appears that Iraq did not begin seriously developing and planning these offensives until 1986 (Johnson 2011, 162; Cordesman and Wagner 1990b, 424). Given that the offensives were not launched until the eighth year of the war, it is unlikely that Iraq began developing their operational capabilities much earlier than this. Thus, probably four years passed between the Iranian counter-invasion of Iraq in 1982 and the first Iraqi efforts to improve their combined arms capabilities, and six years passed before these were actually used. These four to six years seem like ample opportunity to develop a consensus on the likely outcome and relative resolve of the combatants, allowing for a negotiated settlement before the new information was created.

Long wars are often explained through commitment problems. Indeed, previous authors (Weisiger 2013, 152-158) have adopted this explanation for the Iran-Iraq Wars length and intensity. On its surface, this explanation seems plausible. At the beginning of the conflict, Iraq and the Hussein regime may have feared the Iran wanted to export the Iranian revolution, and replace the Baathist regime in Iraq. To counter this, Iraq apparently hoped that an invasion of Iran would destabilize the Iranian regime and lead to a counter-revolution. After the war began, Iran reasonably mistrusted Iraqi intentions. They accordingly demanded that Saddam Hussein step down as part of a peace agreement, and plausibly continued the war to achieve this outcome.

However, there is one major problem with using commitment problems to explain the continuation and end of the Iran-Iraq War: these commitment problems were never resolved.

The Islamic revolutionaries actually cemented power during the course of the war, as the Iranian population rallied around the flag under the revolutionaries' leadership (Axworthy 2013, 187-267; Tabbar 2019). Accordingly, Iraq never significantly addressed the threat posed by the Islamic revolution in Iran. At the same time, the Hussein regime retained power in Iraq. Iran was not able to militarily replace the Hussein regime, ferment revolution, or induce Hussein to step down. Thus, neither side achieved a change of regime that would resolve commitment problems.

It is possible, as Weisiger (2013) argues, that Iran initially intended to fight until the Hussein regime fell, but eventually realized that that goal was unachievable at reasonable cost. At that point, which may have coincided with the final Iraqi offensives, Iran agreed to settle the war without resolving the commitment problem. This is a plausible account for Iran's early decision to continue the war. In deciding to counter-invade Iraq in 1982, the Iranian government could have been overoptimistic about either its chances of militarily replacing the Hussein regime or the likelihood that a counter-invasion would spark a revolution. However, it seems relatively implausible that such a belief could persist over the next six years in the face of multiple failed attacks, the failure of the Iraqi army to collapse, and the lack of an Iraqi revolution.

Accordingly, neither private information nor commitment problems can adequately explain why the Iran-Iraq war lasted eight years.

Presence of Defensive Advantages

In evaluating the effect of defensive advantages on the Iran-Iraq War, I will proceed in three stages. First, I will show that there were in fact defensive advantages, and that these could

be expected to increase the longer the battle-lines were static. Second, I will show that these defensive advantages may have contributed to the war continuing. Finally, I will show how defensive advantages no longer posed a barrier to war termination after the Iraqi offensives in 1988.

Both the terrain and force structure of the combatants tended to increase defensive advantages. In addition, as defensive lines were established both sides made extensive efforts to fortify their positions. These defensive advantages can be seen in the relatively static nature of the fighting during most of the war.

Most of the fighting took place along the southern Iran-Iraq border. In this area, several rivers converge. These rivers themselves present defensive boundaries. Much of the surrounding terrain is also fairly marshy, and thus hard to move over, increasing defensive advantages. While less central to the course of the war, the central and particularly the northern border areas also pose difficulties for offensive operations. The central border is fairly hilly, especially on the Iranian side, while the northern border encompasses extensive mountain ranges. Both make movement difficult and help defending forces find cover. (Cordesman and Wagner 1990b, 70-74)

The force structure of both sides also tended to enhance the defense, at least until the last year of the war. Iranian forces were primarily comprised of infantry forces, with only a limited number of armored vehicles. While effective at defense and even limited offensive operations, these forces had difficulty achieving the sustained breakthroughs that could capture significant territory. Infantry forces would have had an even harder time attacking prepared positions supported by artillery and armored reserves. Indeed, in many cases Iranian forces were initially

successful only to be driven back by local Iraqi counterattacks. (Cordesman and Wagner 1990b, 56-70, 424-435)

Iraqi forces had a higher proportion of tanks and armored vehicles, and indeed increased their armored forces as the war progressed. However, for most of the war, these armored forces were not effectively coordinated with infantry support. They were thus vulnerable to infantry defenders armed with anti-tank weapons. Only in the last year did Iraq manage to improve the coordination of their forces and mount effective combined arms offensive operations. However, the weaknesses in combined arms coordination would likely be strongest when facing established defenses. (Cordesman and Wagner 1990b, 56-70, 424-425, 436-441)

These defensive advantages were enhanced over the course of the conflict as defensive fortifications and other preparations were established, especially on the Iraqi side. Around Basra along the southern border, both sides and particularly Iraq rerouted rivers to enhance their defensive preparations. This cumulated in Iraq's construction of the "Fish Lake" – a six-mile-wide moat stretching eighteen miles to limit the approaches to Basra (Johnson 2011 153). In addition, both sides heavily used landmines, barbed wire, and entrenchments to establish strong defensive positions. The ability to construct these obstacles enhanced the defensive advantages as time progressed. (Cordesman and Wagner 1990b, 448-450)

Defensive Advantages as Barriers to War Termination

The previous section showed that there were significant defensive advantages, and that these advantages increased with the time a position was held. It is now possible to examine the extent to which these defensive advantages prevented the war from ending earlier. In doing so, it is useful to focus on why Iran and Iraq failed to reach a settlement at three major points. The

first point, overlapping with the first phase of the war described above, is why a negotiated settlement was not offered or accepted once Iraq's offensives had stalled, but before the Iranian counteroffensives. The second involves the transition period between the two phases: why did Iran counter-invade Iraq immediately after recapturing all Iranian territory, rather than attempt a negotiated settlement? Finally, during the second phase of the war (from 1982-1988), did the parties fail to reach a settlement given the battlefield stalemate?

Defensive advantages would seem to play a fairly clear role in preventing a settlement once the initial Iraqi attacks had stalled, but before the successful Iranian counterattacks. This period would appear to present an ideal opportunity for war settlement. Iraq's resolve to fight had been revealed by their beginning the war. At the same time, the limitations of Iraqi military capabilities should have been apparent to both sides once the Iraqi offensives had stalled. Thus, Iraq should have realized that any further gains would be difficult, while it would have needed to much of the captured territory for peace.

Indeed, the stalemated period in 1982 saw several peace proposals by third parties, including the Organization of the Islamic Conference and the Non-Aligned Movement. These proposals generally suggested a return to the pre-war territorial status quo, and then negotiations over other outstanding issues such as the status of the Shatt-al-Arab waterway. However, neither side accepted these proposals. Internally, Saddam Hussein demanded that there would be no military withdrawals during this time, even as such withdrawals might have supported these peace efforts. (Johnson 2011, 59-60; Murray and Woods 2014, 151-152, 163, 190-191)

This refusal of Iraq to negotiate is quite understandable with reference to defensive advantages. Having captured a significant amount of Iranian territory, Iraq had a substantial bargaining chip for future negotiations, even though further military gains were unlikely. Iraq

likely suspected that these territorial gains could be defended until a settlement. However, if Iraq had given up these gains, Iran would have been able to establish defensive positions. Thus, if no agreement was forthcoming after Iraq had ceded their gains, Iraq would have had difficulty or even been unable to capturing this territory again. Thus, holding territory gave Iraq a potential bargaining chip, but defensive advantages would have made this chip disappear if ceded before a final settlement. Thus, negotiations were forestalled until Iran managed to militarily recapture the vast majority of lost Iranian territory.

The second obvious opportunity for a settlement is after Iran had successfully forced Iraqi forces from Iranian territory. Iraq offered a ceasefire at this point, which would return the situation to the pre-war status quo and largely accept Iranian positions on other disputed issues. Why did Iran continue the war by counter-invading Iraq? The obvious, and partially correct answer, is that Iran believed it could no longer trust any agreement with Saddam Hussein. This commitment problem posed by Hussein's risk acceptance or irrationality could only be solved by removing Hussein from power. Indeed, shortly before the counter-invasion, Iran demanded that Hussein step down as part of any peace agreement. Whether Hussein continued in power represents the type of dispute over indivisible power that can lead to commitment problem wars.

However, the speed with which Iran counter-invaded after Iraqi forces were forced out of Iran is still surprising. Iraqi forces finished withdrawing from Iran (in the face of Iranian pressure) on June 20, 1982 (Cordesman and Wagner 1990b, 141). Iranian forces launched their counter-invasion on the night of July 13-14 (Cordesman and Wagner 1990b, 150). While three weeks might seem a significant period, given the leisurely pace of much of the war, with months between major offensives, this is quite rapid. Why didn't Iran take more time to explore whether some settlement that would address their fears of Iraqi commitment could be reached? An

obvious explanation is the power shifts that would occur during the negotiating period, as Iraq both established new defenses along the border and reorganized and revitalized their battered forces. If Iran was going to counter-invade, it made the most sense to do so quickly.

While there is no definitive evidence that these considerations drove the timing of Iran's counter-invasion, there is some suggestive evidence. Many Iranian political leaders, particularly the more radical revolutionaries, favored continuing the war. Ayatollah Khomeini agreed that the war should continue until Hussein was forced from power, but did not want to invade Iraqi territory. Most Iranian military officials were skeptical of continuing the war, recognizing the military difficulties. However, the generals stated that the only way to continue the war was a counter-invasion. This suggests that the military leaders recognized that Iran's best chance of success was to attack immediately before Iraq could reorganize their forces for defense and establish additional fortifications. (Axworthy 2013, 226-230)

It is during the final phase of the war that it is hardest to see defensive advantages playing a role. However, they were likely still present. Iran's continual attacks on Iraqi positions can be partly explained by attempts to resolve commitment problems by ousting the Hussein regime and a belief that continued attrition warfare would eventually lead Iraqi forces to collapse, given Iraq's much smaller population. However, as noted above it seems likely that Iran should have realized the costliness and difficulty of these efforts before 1988.

Defensive advantages can add an additional explanation for why both sides refused to negotiate during these six years. First, even though most of their offensives were relatively unsuccessful, Iran did hold some Iraqi territory. Similar to the issues in the first phase, Iran would be reluctant to cede this bargaining chip, as defensive advantages would make capturing the territory again difficult. More importantly, between 1982 and 1988, Iraq constructed

increasingly elaborate defenses around Basra (Cordesman and Wagner 1990b, 448-450, Johnson 2011, 153). While ceding some of this territory might help resolve Iranian distrust, Iraq would be reluctant to give up their prepared defenses. These prepared defenses were especially important as they were Iraq's best counter to Iran's attrition strategy. Given the Iran's significantly larger population, Iraq had to inflict disproportionate casualties. Otherwise, the Iraqi army would be the first to collapse due to a lack of new recruits. The difficulty in attacking Iraq's extensive defenses allowed Iraq to inflict these disproportionate casualties in most battles, and ultimately allowed Iraq to survive until they could develop their mechanized counter-offensive forces used in 1988. Thus, while defensive advantages may have played a secondary role to Iran's desire to unseat Saddam Hussein, they did contribute to extending the war during this second phase.

Defensive Advantages and the Ending of the War

Defensive advantages also help explain why the war ended so quickly following the Iraqi offensives in 1988 that forced Iranian forces out of Iraq. In these counteroffensives, Iraq recovered virtually all of the territory they had lost over the past six years. These counteroffensives did two things. First, by recovering all Iraqi territory, they fulfilled Iraq's war aims at that point, as Iraq's only goal since 1982 was restoring the pre-war status quo. Iraq thus had no reason to continue the war. Indeed, in the 1988 offensives there seems to have been no Iraqi consideration of gaining any Iranian territory or forcing other concessions on Iran. Given that Iraq had already shown their defensive abilities, they would be confident that they could maintain this status quo.

At the same time, the counteroffensives shattered any hope that Iran had of achieving meaningful concessions in a settlement. As Iran no longer possessed any significant Iraqi territory, they no longer possessed a bargaining chip. Moreover, Iraq's successful defenses over the previous six years showed that further attacks would be unlikely to succeed. Finally, the Iraqi counter-offenses showed that Iran's attrition strategy had failed – Iraqi military power had not been considerably weakened. Thus, the Iraqi counteroffensives eliminate Iran's main bargaining chip, and Iraqi defensive capabilities meant that Iran would be unlikely to benefit from further conflict. Thus, the Iranian leadership concluded that continued fighting was not in Iran's interest, and agreed to a settlement matching the pre-war status quo.

Conclusion

The Iran-Iraq War likely lasted for so long due to a variety of causes. Iranian efforts to unseat Saddam Hussein to resolve commitment problems and uncertainty about whether their attrition strategy would succeed contributed to the length of the conflict. However defensive advantages likely played a significant role in extending the conflict at several points. First, Iraqi unwillingness to negotiate during the period when they possessed Iranian territory was likely partly due to defensive advantages making Iraq unwilling to cede the captured territory prior to a final settlement. Once Iraqi forces were expelled from Iranian territory, Iran counter-invaded immediately to take advantage of the relatively weak Iraqi defenses at that time. After the counter-invasion, Iraq's elaborate defensive preparations allowed Iraq to inflict disproportionate casualties on the Iranian defenders, and thus withstand Iran's attrition strategy. However, once the 1988 Iraqi offensives had regained Iraqi territory, defensive advantages meant that neither side was likely to achieve further gains, and thus both were likely satisfied to end the war.

Gulf War

The third case I will examine is the 1990-91 Gulf War between Iraq and the multinational coalition over the status of Kuwait. The overall length of the crisis, from Iraq's invasion of Kuwait until the final cease-fire was reasonably long at 254 days. However, actual fighting, and particularly ground combat only took up a fraction of this time. The final coalition ground offensive lasted only four days (Sarkees and Wayman 2010, 176-177). As most of the fighting occurred during the final offensive, there were few counterattacks. Finally, the final ground offensive fully achieves the coalition objectives. Thus, the Gulf war is centered on a very quick, single campaign that fully achieves one side's objectives. Examining this war thus provides additional useful variation compared to the relatively short, but multiple campaign 1973 Arab-Israeli War and the very long Iran-Iraq War.

As in previous case studies, I will provide a brief overview of the war, discuss whether traditional information revelation or commitment problems are sufficient to explain the conflict, and then examine the presence of defensive advantages and how they impacted the continuation and termination of the war. Note that the Gulf War includes a fairly extensive air campaign before the coalition's final ground offensive. Here, I will focus on the ground campaign, while discussing the air campaign further in my discussion of bombardment wars later in the dissertation.

Conflict Overview

On August 2, 1990 Iraq invaded and occupied Kuwait. The United States, with UN authorization, assembled a coalition to defend other Arab countries and ultimately restore Kuwaiti independence. After a thirty-eight-day air campaign and four-day ground campaign, a

cease-fire was declared, restoring Kuwaiti independence and imposing other conditions on Iraq (Gordon and Trainor 1995, x-xi, Allison 2012, 141-144, 146-149).

Iraq's invasion of Kuwait stems from several disputes, exacerbated by Iraq's eight-year war with Iran. In fighting the Iran-Iraq War, Iraq incurred enormous financial costs, and was heavily in debt by the end. At the end of the Iran-Iraq War, Iraq's foreign debts totaled \$80 billion, over twice Iraq's gross national product (Allison 2012, 38-39). In addition, Iraq needed perhaps \$230 billion to repair oil infrastructure damaged during the war. The need to service this debt led to three major points of contention with Kuwait and other Arab countries. First, Iraq argued that Arab lenders should forgive much or all of the debt Iraq owed to them, as according to Iraq the Iran-Iraq War defended the entire Arab world against Iranian aggression. Second, Iraq accused Kuwait of overproducing oil relative to OPEC quotas, depressing the price of oil and therefore Iraqi revenues. Finally, Iraq accused Kuwait of horizontal drilling into Iraqi segments of the Rumaila oil field, thus stealing Iraqi oil. In addition to these economic disputes, Iraq claimed that Kuwait was legitimately a province of Iraq, as it had been part of the Ottoman province of Basra, the forerunner of modern Iraq. Saddam Hussein and the rest of the Iraqi regime appears to have seen these problems as part of a broader international conspiracy against both the Iraqi regime and the Arab world more broadly. Gaining control of Kuwait and Kuwaiti oil would be one step in countering this conspiracy. (Allison 2012, 39-42; Gause 2002; al-Marashi 2009, 51, 53-59; 458-460)

Failing to receive a satisfactory response to these issues, Iraq invaded Kuwait on August 2, 1990. While some fighting occurred with Kuwaiti forces, Iraq quickly occupied and annexed Kuwait (Allison 2012, 46-50). In response, the United States quickly organized an international coalition with UN authorization to oppose Iraq. The coalition had two major goals. First to

defend neighboring countries, particularly Saudi Arabia, against potential further Iraqi aggression. Second, to restore the independence of Kuwait. These goals emerged out of both normative and economic concerns. Normatively, the coalition wanted to uphold international norms against changing borders or eliminating the independence of other countries through force. Economically, the coalition was concerned about allowing Iraq to possess such a large portion of the world's oil reserves, particularly when Saudi reserves were threatened as well. (Allison 2012, 50-51, 63-67)

When Iraq failed to voluntarily withdraw from Kuwait, the coalition began a major air campaign against Iraqi forces and command and control facilities on January 16, 1991. The air campaign had two main goals. First, it sought to degrade Iraqi forces and military capabilities, making the follow-on ground assault easier. To this end, the air campaign planners set the goal of degrading Iraqi combat effectiveness by 50% by destroying tanks, armored vehicles, and artillery pieces. Second, the air campaign aimed to convince Iraq to concede without a potentially costly ground campaign (Clancy and Horner 1999, 274-275; Schubert and Kraus 1995, 167-170; U.S. Government Accounting Office 1997). I will discuss this later goal in more depth during the chapters on bombardment wars.

During the air campaign, Iraq conducted their only significant offensive action after their initial invasion of Kuwait. On January 29, 1991, three Iraqi divisions advanced into Saudi Arabia and occupied the town of Khafji. Iraq hoped to disrupt coalition offensive preparations and perhaps trigger a premature coalition attacks against prepared defenses that would result in significant coalition casualties. However, the coalition air attacks inflicted heavy losses on the advancing Iraqi forces. This allowed Saudi and Qatari ground forces to easily retake Khafji. (Allison 2012, 120-121; Westermeyer n.d.; Malovany 2017; 556-563)

The main coalition offensive began on February 24, 1991. US Marines supported by Arab coalition forces advanced into Kuwait. They quickly pierced Iraqi defenses, largely liberating Kuwait by February 27. At the same time, US and UK armored forces advanced in the west to outflank the main Iraqi defenses and to bring Iraq's elite Republican Guard to battle, where it was decisively defeated. Having largely achieved their objectives, the coalition declared a ceasefire on February 28. (Allison 2012, 130-140; Schubert and Kraus 1995, 107-108, 143-146, 173-206; Clancy and Franks 1997)

The primary objective of liberating Kuwait was militarily achieved by the ceasefire. However, as the Iraqi army was significantly weakened, the United Nations imposed additional conditions following the war. These included dismantling Iraq's weapons of mass destruction programs with inspections to ensure compliance. In 1993, no-fly zones were also implemented over northern and southern Iraq to prevent Iraqi aircraft from attacking civilians in retaliation for various rebellions. Sanctions were maintained against Iraq to ensure compliance with international mandates. (Allison 2012, 146-149)

Information Revelation and Commitment Problems

Before evaluating the role of defensive advantages in the timing of the Gulf War's end, it is useful to review the potential impact of private information and commitment problems. Commitment problems obviously played little role in the conflict. In contrast, information revelation likely played a role in the conflict, but has some limitations in explaining conflict termination.

There are no obvious sources of commitment problems in the Gulf War, at least after the initial Iraqi invasion of Kuwait.³⁶ The coalition never made any efforts to occupy Iraq or replace the Hussein regime. Nor was there clear strategic territory at stake. While Iraq's weapons of mass destruction programs could be a source of commitment problems, they do not appear to have become a major source of conflict until after the war. Some may suggest that Iraq's gaining possession of Kuwait's oil reserves created a regional or global power shift, and thus posed commitment problems. Iraq's possession of these oil reserves was a significant concern for the coalition, although probably secondary to other goals (Engel 2013, 37-38; Freedman 2013, 90-91; also see Nye 1991). However, the oil reserves were not indivisible, and so there would still exist potential settlements that both sides preferred to fighting (see Fearon 1996).

Private information likely did play a significant role in both conflict onset and continuation. At the onset of the conflict, Saddam Hussein likely believed that the US would not intervene if Iraq invaded Kuwait. Hussein appears to have believed that the US was weak and unwilling to fight a serious war, especially over a distant country. Other countries would be unlikely to intervene without US leadership and backing (Malovany 2017, 521; Gause 2002, 59-60). In addition, Hussein appears to have believed that the Arab countries would not support western efforts to push Iraq out of Kuwait, which would make a counteroffensive difficult or impossible (Telhami, 2013). Thus, Iraq's initial invasion was at least partly due to uncertainty about the likely US and Arab response.

³⁶ Attempted regime change is one potential source of commitment problem. Thus, Iraq's initial invasion of Kuwait could be due to commitment problems. For instance, it might have been less costly to both Iraq and Kuwait if the Kuwaiti government had largely conceded, but was allowed to retain nominal power. Iraq could not commit to this deal. However, the initial invasion of Kuwait is primarily a triggering event for the larger conflict between Iraq and the multinational coalition. Thus, these commitment problems are secondary to the overall conflict.

Even after the US had deployed forces to Saudi Arabia, private information may have played a role in continuing the crisis. Hussein apparently believed that the US, and likely other western countries, were unwilling to suffer high casualties. Thus, he believed that the coalition would not actually mount a ground campaign to liberate Kuwait. Even if ground fighting did begin, he believed that the coalition would quickly cease operations in the face of high casualties. Thus, Iraqi uncertainty about coalition resolve played a role in Iraq's refusal to back down in the face of coalition threats. (Malovany 2017, 521; Gause 2002, 59-60)

However, uncertainty is insufficient to explain war termination in two respects. First, Iraq's strategy of inflicting intolerable casualties on the coalition forces relied on defensive advantages, as I will explain below. Second, at least some of the uncertainty could have been resolved earlier in the conflict. The coalition's deployment of very significant ground forces should have signaled the coalition's resolve to liberate Kuwait. While the deployment did not incur casualties, it did involve significant financial cost, and imposed significant hardships on the deployed soldiers. The beginning of the coalition air campaign involved further cost, and actively risked the lives of coalition air crew. Finally, the lopsided result in the Battle of Khafji should have made Iraq reconsider coalition capabilities, and raised doubts about whether the coalition would suffer significant casualties in liberating Kuwait. Thus, there would seem to be multiple opportunities for information about coalition capabilities and resolve to be revealed, allowing for a peaceful settlement before the final ground offensive. Indeed, Iraqi leaders do seem to have reevaluated their assumption that the US would not intervene, and yet still refused to withdraw from Kuwait (Gause 2003, 60). Yet, Iraq failed to offer a satisfactory settlement before the coalition attacked.

Presence of Defensive Advantages

At first glance, there would not seem to be significant defensive advantages in the Gulf War. The desert terrain is quite open, allowing forces to move with ease, while providing defenders few sources of cover or concealment. About the only substantial difficulty the desert terrain posed to attacking forces was the lack of clear terrain features, making navigation difficult except on well-defined roads. However, the introduction of the Global Positioning System largely solved navigation problems for coalition forces. (Schubert and Kraus 1995, 102, 107, 137-138)

The coalition forces were also quite capable of offensive action. They were well supplied with armored vehicles. In addition, the main components of the coalition ground forces, particularly those from the US and UK were highly trained, and very capable of mounting combined arms operations. Thus, the coalition forces were perhaps the most capable offensive forces in the world in 1991 (Cordesman and Wagner 2013, 135-150, 152-156). While Iraqi forces appear well-equipped and formidable, there appears little doubt that they were inferior to the coalition forces. (Cordesman and Wagner 2013, 102-118)

However, extensive Iraqi preparations would potentially create significant defensive advantages. The frontline Iraqi infantry forces had constructed extensive entrenchments to shelter their soldiers and vehicles. In front of the entrenchments, Iraqi forces had emplaced extensive minefields and barbed wire barriers to slow attacking forces, making them vulnerable to Iraqi fire and artillery. Behind the front-line forces, Iraq had placed their elite Republican Guard armored divisions. These were available to reinforce weakened sectors, serve as a second defensive line, or counterattack as required. Thus, during the time between the initial invasion of Kuwait and the beginning of the ground campaign, the Iraqi forces had established a formidable

defense. These defenses were well respected by coalition commanders. Iraqi artillery was seen as particularly formidable, potentially inflicting heavy losses if attacking forces were stalled by other defensive obstacles. (Cordesman and Wagner 2013, 525-528; Malovany 2017, 524-527, 530-532, Schubert and Kraus 1995, 105-106)

Defensive Advantages as Barriers to War Termination

These defensive advantages played a critical role in maintaining Iraqi uncertainty about coalition resolve, and preventing a negotiated settlement before the final ground campaign.

As I described above, Iraq may have been uncertain about the relative capabilities of the coalition, and whether the coalition was resolved enough to fight over Kuwait. However, there are limitations to this uncertainty. It is unlikely that there was significant doubt about the likely outcome of an armed clash, were one to occur. Iraq had a sizeable military that had performed reasonably well during the Iran-Iraq War. However, the coalition was centered around one of two superpowers, supported by two other major powers (the UK and France), as well as a number of regional militaries. Both quantitatively and qualitatively, the coalition would have far outmatched the Iraqi military. Quantitatively, the coalition already deployed more soldiers in theater than the Iraqi army, while major contributors (including the US), had significant numbers of forces not deployed (Cordesman and Wagner 2013, 105, 529-530). Coalition military technology was clearly superior to that possessed by Iraq. While the relative skill level of the coalition forces to Iraq may have been more uncertain, it seems unlikely that Iraq could have believed that their own forces were far more skilled than the major powers opposing it. Thus, in a head to head war, there could be little doubt that the coalition would ultimately prevail.

However, Iraq seems to have believed that the coalition, and particularly the US and European partners, would not be willing to continue fighting in the face of high casualties. A major battle that caused significant casualties would force the coalition to accept a settlement favorable to Iraq, even if they had some military success. This belief that the coalition was relatively unresolved contributed directly to Iraq's refusal to agree to a negotiated settlement prior to the ground campaign. (Malovany 2017, 505-506, 536, 543-544)

However, for this strategy to work, Iraq had to actually be able to inflict significant casualties on coalition forces. Defensive advantages were key to Iraq's belief that they could in fact inflict significant casualties. Given their defensive preparations, Iraq had a reasonable hope of inflicting significant casualties on attacking coalition forces, while also keeping their own casualties manageable (Malovany 2017, 536). As coalition forces were forced to pick their way across Iraqi minefields and other obstacles, they would be exposed to fire from entrenched Iraqi forces. As discussed above, coalition forces themselves projected that assaulting the prepared defenses would be difficult. Shortly after the Iraqi invasion of Kuwait, some experts estimated that liberating Kuwait could cost 10,000 – 30,000 casualties (Reuters 1990; Broder 1991). These fears led to the deployment of additional military forces, allowing offensive options that might minimize these casualties (Schubert and Kraus 1995, 106-109).

However, Iraq would have significantly less ability to inflict high casualties in open battle. If they were removed from their entrenchments, coalition advantages in both firepower and mobility would come into play. This would open a possibility for the coalition to defeat Iraqi forces without suffering heavy casualties. Thus, in order to retain bargaining leverage, Iraq had to maintain its prepared defenses. Retreat from these defensive positions could create a window of opportunity for the coalition to attack and defeat Iraqi forces. More likely, the

coalition would not attack. However, Iraq could not plausibly regain any territory ceded. Thus, ceding any territory, along with the prepared positions, would mean giving up important bargaining leverage for future negotiations.

Iraq also may have worried that moving away from their prepared defenses in a negotiated withdrawal would leave Iraq vulnerable to a coalition invasion. Many Iraqi leaders believed that there was an international conspiracy against the Iraqi regime. Hussein made several comments that if the US was determined on war, then a withdrawal from Kuwait would not stop them (Gause 2002, 60-61). Given this belief, it made sense to face the coalition offensive in their prepared defenses on the Kuwait-Saudi border, rather than gamble that a withdrawal would lead to a peaceful settlement of the conflict. This represents my second proposed mechanism for how defensive advantages prevent war termination.

The one Iraqi offensive at Khafji reinforces these conclusions in two ways. First, it appears part of the plan was to provoke a coalition attack on the already prepared Iraqi defenses. Given the coalition air campaign, Iraq would have preferred the decisive battle to occur sooner rather than later. Thus, by provoking a coalition offensive against Iraqi defenses, Iraq hoped to inflict sufficient casualties to convince the coalition to give up before the air campaign inflicted major damage (Malovany 2017, 556-563). The lopsided defeat at Khafji also demonstrated that Iraqi forces had little chance against coalition firepower outside their entrenchments, reinforcing the importance of those prepared positions.

Defensive Advantages and the Ending of the War

The rapidity of the ground campaign, and how decisively the Iraqi forces were defeated make the influence of defensive advantages less apparent on how the war ends. However, I believe a couple clear influences can be seen.

First, the coalition waited until they had achieved their primary military objectives before declaring a ceasefire. Before the ceasefire declaration, coalition forces had recaptured Kuwait City and the majority of Kuwaiti territory. While coalition forces had not reached all of Kuwaiti territory, they had several reasons to be confident that Iraq would agree to return complete Kuwaiti sovereignty. First, coalition forces had occupied portions of the main highways between Iraq and Kuwait, cutting off the remaining Iraqi forces and making any additional occupation of Kuwait untenable. Second, the coalition occupied a large portion of Iraqi territory, which could be traded for the remaining uncaptured Kuwaiti territory. Finally, and probably most importantly, coalition forces had decimated the Iraqi forces in the theater, making them incapable of continued combat. Many Iraqi forces had been retreating in disarray. A large portion of Iraqi armored vehicles and artillery had been destroyed during the campaign. Finally, any remaining Iraqi units were so disorganized as to be combat ineffective. Thus, it was clear that declaring a unilateral ceasefire would not significantly allow remaining Iraqi forces to entrench, or otherwise compromise the coalition from achieving their primary objective of liberating Kuwait. (Malovany 2017, 582-583; Allison 2012, 138-139; Schubert and Kraus 1995 201; Gordon and Trainor 1995, 404-405, 413-417)

In a few places, coalition objectives had not been completely secured by the ceasefire time, although this was not known when the ceasefire was declared (Gordon and Trainor 1995, 419-420, 423-424). Most importantly, a few places along the Basra highway had not been

captured. In these areas, coalition forces continued to advance even after the ceasefire. Most importantly, elements of the US 1st Infantry Division advanced on Safwan airfield, along the Basra highway, which was occupied by Iraqi forces. US forces threatened to attack unless the Iraqi forces departed (Allison 2012, 140-141; Gordon and Trainor 1995, 435-443). These continued advances show the importance the coalition placed upon gaining key terrain rather than allowing Iraqi forces to hold it and establish defensive positions.

The second piece of evidence in supporting the importance of defensive advantages in the timing of the ending of the war is that the coalition was fully prepared to stop fighting once they had achieved their military objectives. Given that the ground offensive had clearly shown their superiority, they could have demanded significant additional concessions and kept fighting until Iraq agreed. However, the United States and its coalition partners unilaterally declared a ceasefire once their primary objectives had been achieved. This shows that they were both confident that they could retain those objectives, and saw no reason to demand more.

Finally, US and other coalition forces did not immediately leave once the ceasefire was declared. Some of this delay was logistical, as there were too many forces to immediately move back to their bases. However, in addition, units also retained their positions and prepared defenses in case the war continued. Having gained their objectives, coalition forces prepared to defend their gains in case Iraq did not agree to coalition terms for ending the war. (Clancy and Franks 1997, 459-460, 471-476)

Conclusion

While the existence of private information certainly contributed to a failure to settle the Gulf War, defensive advantages played a significant contributing role. Iraq refused to withdraw

from Kuwait both because they were overoptimistic about the number of casualties they could inflict on coalition forces and underestimated coalition willingness to suffer those casualties. However, defensive advantages played a key role in maintaining this uncertainty. Only the strong defensive positions that Iraq had prepared could plausibly lead to these casualties. Thus, the coalition was forced to mount a major ground offensive to force Iraq out of Kuwait. However, once these objectives had been accomplished the coalition established defenses to hold their gains and declared a unilateral cease-fire leading to the final war settlement.

Conclusion

This chapter has supplemented the previous chapter's quantitative analysis of war termination with three case studies. While the quantitative results in Chapter 4 were consistent with my theory that defensive advantages pose a barrier to war termination until one side has achieved their war aims, they could not closely examine whether my proposed mechanisms were what drove these results. Case studies help determine whether these results are actually driven by defensive advantages. In this chapter, I examined three cases: the 1973 Arab-Israeli War, the Iran-Iraq War, and the 1990-91 Gulf War. All three conflicts do display at least some influence of defensive advantages on why they continue and end. Most critically, these wars represent a range of lengths and complexity. The ground campaign in the Gulf War involved only a single campaign which was quite short, lasting only 100 hours. The 1973 Arab-Israeli War was also fairly short temporally, but involved multiple campaigns on both fronts. Finally, the Iran-Iraq War is among the longest and deadliest wars in the dataset. Because these three conflicts span a range of lengths and complexities, seeing the influence of defensive advantages in each bolsters

the theory that defensive advantages play a significant role in preventing, and then enabling war termination.

Defensive advantages played a key role in the 1973-Arab-Israeli War. While not directly related to my study, they played a key role in neutralizing Israeli armored and air superiority, giving Egypt and Syria a plausible war plan in the first place. However, even after Egyptian and Syrian intentions and capabilities were revealed after the initial attack, Israel refused to settle the conflict, but mounted a series of ultimately successful counterattacks. The presence of defensive advantages does seem to play a role in preventing war termination.

Two episodes in particular stand out. First, when Israeli leaders debated whether to counterattack into Syria, defensive advantages seem to have prompted them to do so immediately, rather than allow Syrian forces to reoccupy and reinforce their pre-war positions. The second event involves the breakdown of the ceasefire near the end of the war. Israeli forces continued to advance against Egypt even after the initial ceasefire, which naturally lead to renewed fighting. At least one reason for the continued advance was the need to surround the Egyptian 3rd Army to offset Egypt's defensive advantages across the Suez Canal. In addition, if Israel had paused to negotiate, Egyptian forces within Egypt proper could prepare their defenses, possibly preventing these advances if future negotiations were unsuccessful. However, once Israel successfully surrounded the Egyptian 3rd Army and advanced into artillery range of Damascus, they became willing to settle the war, allowing for the war to end.

While somewhat less clear, defensive advantages also play a role in how the Iran-Iraq War ended. Defensive advantages are clearly present, with both sides and particularly Iran finding it difficult to attack successfully. While the evidence is somewhat ambiguous, defensive advantages may have played a significant role at a couple points in the conflict. During the

initial period of the war, Iran was not willing to significantly negotiate until Iraqi forces had been driven from Iranian territory, while Iraq refused to offer substantial concessions. Defensive advantages could explain this refusal, as Iran was unwilling to allow Iraq to solidify their position, while Iraq did not want to cede the advantages gained by occupying Iranian territory. Once Iran had recaptured all of their territory, they debated whether to end the war or counter-invade Iraq. Defensive advantages can help explain why Iran attacked immediately rather than try to negotiate or take longer to debate the wisdom of a counter-invasion. Iraq's earlier defeat had opened a window of opportunity to successfully invade, which would be closed if Iraqi forces could recover, and construct more fortifications along the pre-war border. Finally, Iran continuously, and generally unsuccessfully attacked into Iraqi prepared defenses around Basra. While Iraqi defensive preparations were well established, Iran did believe that they would ultimately prevail. Iraq understandably refused to make concessions, at least in part because this would require giving up their extensive defensive preparations, making them vulnerable to additional Iranian attacks. The war ultimately ended when Iraq successfully pushed Iranian forces back out of Iraq, making it unlikely that Iran could once again overcome Iraqi defenses.

Finally, defensive advantages played a clear role in why Iraq refused to make concessions in the Gulf War to avoid the coalition ground offensive. By the time of the ground offensive, it should have been pretty clear that the coalition was committed to liberating Kuwait by force if necessary, and would be successful. The coalition had conducted an extensive air campaign, demonstrating both their military capabilities and resolve. The Iraqi defeat at the Battle of Khafji should have further shown that the coalition would prevail in a ground offensive to free Kuwait. However, while Iraq realized that they could not prevail militarily, they believed that they could inflict substantial casualties on the coalition forces, ultimately leading to the coalition offering

better terms of settlement or even allowing Iraq to keep Kuwait. The defensive positions that Iraq prepared along the Saudi Arabian border would have played a key role in Iraq's belief that they could in fact inflict the number of casualties needed to force the coalition to make concessions. However, once Iraq's strategy was decisively defeated by the coalition's flank attack and the coalition liberated Kuwait, both sides became willing to settle the conflict and largely restore the pre-war status quo.

Chapter 6

A Theory of War Initiation and Termination in Bombardment Wars

Up to this point, my analysis has focused on ground wars, which are by far the most common. In this chapter, I turn my attention to the much less common bombardment wars, developing a theoretical account of how they should end. In the following chapter, I will empirically examine this theory using cases studies of all the bombardment wars in the sample.

As described in Chapter 1, bombardment wars are different from ground wars in that in bombardment wars nothing can be achieved through force directly. Combat in most bombardment wars centers around aerial or artillery bombardment, such as NATO's bombing campaign of Serbia during the Kosovo war. In some bombardment wars, such as in the War of Attrition, raids by special forces are also conducted. However, in each case, the bombardment or special forces raids do little but impose costs on the other side. This means that bombardment wars represent a fundamentally different bargaining scenario from ground wars.

Because bombardment wars represent a fundamentally different bargaining scenario where combat cannot achieve anything, the traditional bargaining explanations for why wars occur may not apply. However, since war termination would still logically be related to war initiation, it is necessary to understand how bombardment wars begin. Thus, in order to understand how bombardment wars end, it is first necessary to develop a theory of how they begin. Accordingly, I begin by examining a basic model of coercion, which shows that there is always an equilibrium where the target of coercion makes no concessions and is never attacked. Notably, this equilibrium exists even if there is uncertainty about the costs that either side would incur in punishment attacks. This equilibrium does coexist with equilibria where the target does

make concessions, and where uncertainty could explain observed conflicts. Thus, the explanations for the initiation and termination of bombardment wars will depend on which equilibria is occurring. I will make some tentative suggestions about which equilibrium is more likely, but will not draw firm conclusions. I tentatively suggest that the no-concessions equilibrium is significantly more likely. The target likely has an advantage in selecting the equilibrium, as it can adopt a policy of never making concessions in the face of threats, which ensures that the threats are never carried out.

In either case, bombardment must serve as a signaling or screening mechanism of some sort. Because bombardment wars by definition do nothing but impose costs, they cannot resolve commitment problems and so cannot be caused by commitment problems. However, there are two possible things that bombardment wars can signal for, depending on which equilibrium exists. If the combatants are in a concessions equilibria, there may be uncertainty about the cost of the bombardment attacks, either directly or as a result of the combatants' cost tolerance. The two sides may be uncertain about how many concessions to make or demand based on their uncertainty about the costs of bombardment. In this case, carrying out the bombardment signals and screens for both the physical costs of bombardment and the combatants' cost tolerance. Bombardment would cease once it is clear how costly bombardment is.

However, if the combatants are in the no-concessions equilibrium, uncertainty about the costs of bombardment cannot cause war. Bombardment must serve some other purpose. In this case, I argue that bombardment is intended as way for the war initiator to signal or screen whether the initiator has a credible threat to begin a conventional ground war to resolve the dispute. If the initiator knows it is willing to launch a conventional invasion, it may find that signaling that it has a credible invasion threat is cheaper than going ahead and invading. These

wars would thus end once the target realizes that the initiator does have a credible war threat and makes concessions to avoid a war. Conversely, the initiator may want to screen the target's capabilities to determine whether an invasion is worthwhile. In this case, the initiator will either cease the bombardment when it realizes it does not have a credible threat, or go ahead and invade if it realizes it invasion is worthwhile and the target has not conceded.

In either case, the bombardment war would end once bombardment has revealed the relevant information. This accords with the basic informational account of war termination. However, this process does not necessarily happen quickly or cleanly. Unlike conventional ground combat, bombardment has difficulty revealing information. As noted in previous chapters, one of the most effective ways that combat reveals information is by seeing which bargains a side proposes or refuses during negotiations. However, individual bombardment actions, such as a day's artillery barrage or set of air strikes has relatively low marginal costs on both sides. While the cumulative costs of bombardment may be substantial, this means that individual bombardment actions have difficulty revealing information. I thus suggest that ending bombardment wars may often require some precipitating event, such as a particularly deadly attack or actions by third parties, to reveal the relevant information and end the war.

I begin the chapter by providing a brief empirical summary of punishment wars. I follow by developing the basic coercion model. I then proceed to use this model to understand the causes of bombardment wars and how they end.

A Basic Model of Compellence

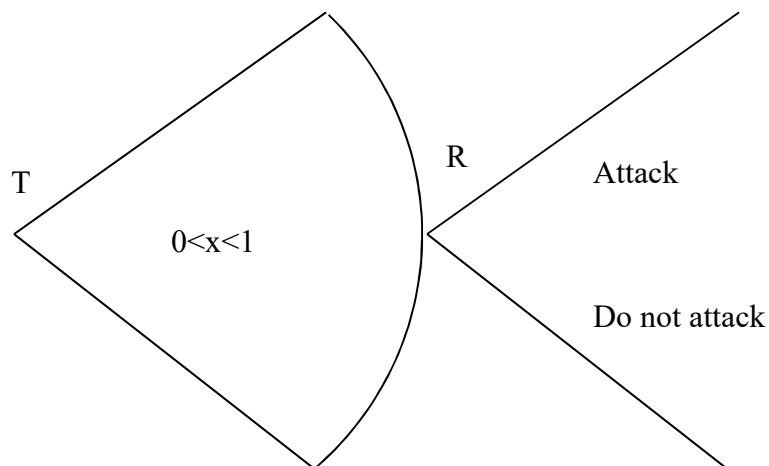
To understand the actual causes of bombardment wars and how they end, it is necessary to develop a basic model of compellence. Compellence refers to situations where one party uses

the threat of punishment to induce another party to change the status quo (see Schelling 1966). This model thus captures a situation where one side can impose costs on the other, but cannot actually force their desired outcome. Bombardment wars are well represented by this basic model.

In this model, I assume there are two states, a revisionist and a target state. The two states are in some dispute over a good, which could be a territory, policy issue, etc., and is normalized to a value of 1. Crucially, in a compellence context, nothing can be changed directly through force. Thus, the target state will make some proposal to divide the good (the revisionist keeps x proportion, and offers the target $1-x$), which will then be implemented regardless of the revisionist's actions. At the same time, the revisionist can choose whether to attack or not. If the revisionist refrains from attacking, then both parties receive the proposed division of the good. If the revisionist does attack, then the two parties receive the proposed division minus the costs of the attack, c_T and c_R for the target and revisionist respectively.³⁷ This basic model, shown in figure 7.1, can be considered as a single stage, a finitely repeated game, or as an infinite horizon game. I consider each of these variants below.

³⁷ For modeling simplicity, I assume the two decisions are made simultaneously. This assumption has little if any substantive impact. I also assume that the costs are fixed and certain. Again, I do not believe that this is a consequential assumption.

Figure 6.1: The Basic Compellence Model



Interestingly, in any finite version of the game, the only subgame perfect Nash equilibrium is for the revisionist to never attack and the target to retain complete ownership of the disputed good. Since attacking always reduces the payoff for both parties for any division of the good, the revisionist never has any incentive to attack in a single stage game. Similarly, in any finitely repeated version, the revisionist would not have any incentive to attack in the final stage. This prevents any threat of future attacks from being credible. Thus, the only optimal choice is to refrain from attacking in all stages. Given that the revisionist will never attack regardless of the division of the disputed good, the target's optimal behavior is to retain complete control of the disputed good. Thus, in any finite context, coercive threats should be ineffective as long as they are mutually costly.

Proposition 7.1: In any finite version of the compellence model, the only equilibrium is for the target to offer no concessions ($x=1$), and the revisionist to not attack.

In addition, the solution where coercive threats are ineffective holds even if there is uncertainty about either the revisionist's ability to carry through with the attack or the actual costs caused by a successful attack. Note that the particular amount of costs is completely irrelevant to the model solution. As long as both parties know that there is some non-zero probability of inflicting some non-zero costs on both sides, the basic solution will hold. Uncertainty would only affect the cost parameters – either the uncertainty that costs would be inflicted or the cost sensitivity of the parties. Thus, uncertainty is irrelevant in any finite version of the game.

Corollary 7.1: as long as $c_T > 0$ and $c_R > 0$, the equilibrium in Proposition 7.1 exists regardless of uncertainty or private information about the values of c_T and c_R

Infinite-Horizon Solutions

The solution is somewhat more complex if the game is allowed to repeat indefinitely. There are solutions where threats of punishment do extract concessions from the target up to the potential costs to the target. There are also solutions where punishment is actually inflicted, although in the basic game these are not substantively sensible. However, it is important to note that these solutions are not unique and coexist with the equilibrium described above, where no concessions are made and no punishment is inflicted. I will describe each of these equilibria below.

The first equilibrium, which I will call the no-concessions equilibrium, is identical to that in the finite game, with the target making no concessions and the revisionist refraining from attacking. In all infinite horizon games, the equilibria in the stage game is also present. Where

punishment strategies are omitted, then the revisionist can never commit to attack. Accordingly, the target would have no incentive to make concessions. Like in the finite duration game, the existence of an equilibrium where no concessions are made and no attacks occur would exist even if there is private information about the probability of an attack being successful or the amount of costs such attacks would incur.

Proposition 7.2 (the no-concessions equilibrium). In infinite horizon versions of the compellence model, there is always an equilibrium where in each stage, T offers $x = 1$, and R does not attack.

Corollary 7.2: as long as $c_T > 0$ and $c_R > 0$, the equilibrium in Proposition 7-2 exists regardless of uncertainty or private information about the values of c_T and c_R

However, where punishment strategies are allowed, the infinite horizon game does have equilibria where the target makes concessions. Any division $1 - c_T \leq x \leq 1 - \frac{(1-\delta_R)c_R}{\delta_R}$ is sustainable in equilibrium. This is maintained by the threat of attacking if concessions aren't made. In turn, the threat of attacking is maintained by a strategy to deviate to the first equilibria if no attack is made when the target offers less than the equilibria amount of concessions. I will describe these equilibria as concessions equilibria.

Proposition 7.3 (the concessions equilibria): In infinite horizon games, any division of the disputed object $1 - c_T \leq x \leq 1 - \frac{(1-\delta_R)c_R}{\delta_R}$ can be sustained with the following strategies:

- *T offers x^* , unless R has failed to attack after T has made an offer of $x > x^*$, in which case T offers $x=1$ from then on.*

- *R attacks if makes an offer $x > x^*$, and does not attack if T made an offer $x \leq x^*$, unless R has failed to attack after T has made an offer of $x > x^*$, in which case R never attacks from then on*

Note that given perfect information, no attacks occur on the equilibrium path as the target does make the desired concessions. Attacks only occur off of the equilibria path, as a threat to force concessions. The attack threat is credible, because the revisionist knows that if it does not carry out the threat, then all future threats are not credible, and the equilibrium would revert to the one where the target never makes any concessions.

Private information could induce attacks within one of the concessions equilibria. If one side was unaware of the probability of successfully attacking or the likely costs of successful attacks, it could accept only the most favorable settlements in order to reveal the private information. However, for private information to cause attacks, the two parties must be in an equilibrium where the target does make concessions against at least some punishers. Note that such an equilibrium always coexists alongside an equilibrium where no concessions are made.

Corollary 7.3: Uncertainty or private information can result in attacks when the parties are playing the equilibrium in Proposition 7-3, until the private information is revealed

There is a third type of equilibria that is worth noting, although it is not substantively meaningful. In this equilibria type, similar to that in Slantchev (2003), a number of rounds elapse where the revisionist does attack, while the target makes no concessions. This equilibrium is maintained by a twin threat and promise after the war rounds have elapsed. If the

attacks are made, the revisionist will make substantial concessions.³⁸ However, if the revisionist deviates and fails to attack, then the equilibrium reverts to the first where no concessions are ever made. As this is worse than suffering the costs of attacking in a limited number of rounds, the revisionist does go ahead and attack.

However, this equilibria type is substantively odd equilibria due to two factors. First, as the attacks are mutually costly, there always exists an equilibrium of the second type that would be Pareto superior to these equilibria. Second, because this is a perfect information game, and given the definition of a Nash equilibria, both sides know the Pareto superior equilibria. Since a Nash equilibrium is a set of mutual best replies, both sides know the other's strategy, and thus, both sides know the final long-term peaceful equilibria in advance. Therefore, both sides would mutually prefer to skip the rounds where attacks are made, and move directly to the long-term equilibria. In essence, the two sides would be threatening to punish each other for doing what they both would prefer happen. Formally, this solution is not renegotiation proof, one of the common restrictions to eliminate non-sensible equilibria in infinite horizon games. Thus, both sides could likely come to a mutually preferred agreement to stop the fighting.

Conclusion and Implications

This basic model reveals some interesting implications about the mechanisms of military coercion. Notably, there is always an equilibrium where coercion is impossible – where no concessions are made and no attacks are mounted. Notably, this equilibrium exists even if there is uncertainty about the probability of successful attacks or the cost tolerance of the two players, as long as attacks are known to be mutually costly. In infinite horizon games, there are sensible

³⁸ This long-term equilibrium would have to be itself maintained by punishment strategies similar to those in the second equilibria type.

equilibria where concessions are made, although these also involve no attacks as long as there is perfect information.

Causes of Bombardment Wars

Why then might observed attacks occur in bombardment wars? In this section, I show that attacks must rationally be a signaling or screening mechanism to reveal private information. However, the exact information revealed varies depending on which of the equilibria is actually played. If the equilibrium where no concessions are made is selected, then attacks would serve to signal the ability of the revisionist to use conventional force to achieve its objectives in a ground war. In contrast, if an equilibrium where concessions are sometimes made is played, then attacks could reveal information about the costs of the attacks, and thus settle the amount of concessions actually made.

Before discussing each in more detail, I will first discuss why credible commitments cannot explain bombardment attacks, and reiterate that I am assuming that attacks are mutually costly. Then, it is necessary to consider when the no-concessions equilibrium would occur and when the concessions equilibrium would occur, as the explanation for observed bombardment depends on which equilibrium is being played. Finally, I will elaborate on the causal mechanisms in the different equilibria. In each equilibria type, war occurs as a signaling or screening mechanism, but what information is revealed through bombardment is different.

Rejected Explanations

Before describing the potential causes of bombardment attacks, I shall briefly deal with two other potential causes of attacks. I will show that commitment problems cannot be a

potential cause of punishment attacks. Then, I will discuss why bombardment could occur for purely symbolic reasons, but that such symbolic attacks are unlikely to reach war levels.

Unlike in ground wars, commitment problems are unlikely to cause bombardment wars as long as both states are basically rational, and attacks that do occur are unlikely to reach war levels. As discussed in Chapters 1 and 2, commitment problems can only lead to war if there is an indivisible source of bargaining power that can be captured militarily. However, by its very nature, bombardment is unable to significantly change the power balance except in rare cases. Moreover, these rare cases are unlikely to cause sufficient casualties for the attack to rise to war level. As air or artillery bombardment cannot take and hold territory, they cannot capture strategic territory. Attacks will likewise have difficulty significantly weakening the opponent's military. In addition, military targets that could be damaged through bombardment are not likely to fulfill the requirement that disputes over bargaining power be indivisible.³⁹ Nuclear facilities through air attack would represent an indivisible source of bargaining power, but attacks on them are unlikely to reach war levels (as demonstrated by the Israeli attacks on Iraqi and Syrian nuclear reactors). Finally, attempting to assassinate the enemy leader(s) through air attack would also fulfill the conditions for commitment problems to lead to war. However, such attacks are again unlikely to reach war levels. In addition, to my knowledge there are no attempts to militarily assassinate a rival leader in recent history outside of a broader conflict.⁴⁰

³⁹ The one case where bombardment may have significantly changed the power balance is Israel's air strikes at the beginning of the 1967 Arab-Israeli War. These air strikes largely eliminated the Egyptian and Syrian air forces, giving Israel a crucial advantage in the war that followed. However, this is an unusual event, and attempts by other powers to replicate this success in the 1965 Indo-Pakistani War and the Iran-Iraq War were largely unsuccessful. In addition, the air strikes did not have any direct political impacts, necessitating a ground war for Israel to achieve their war aims.

⁴⁰ The U.S. did attempt to kill Sadaam Hussein at the beginning of the invasion of Iraq, but this was part of the overall invasion, and not an isolated attack.

Bombardment wars, as with other forms of war, could occur if they are fundamentally non-costly. Attacks could occur simply as symbolic efforts of enmity or disapproval of the status quo. If the benefits of taking a symbolic stand outweighed the more physical costs of the attack, an attacker could choose to attack even if they knew that the attacks would have no substantive effect. However, I will leave this possibility aside. Non-costly attacks violate the assumption that war is fundamentally costly that I made in Chapter 1, and that is standard in bargaining models of war. While some bombardment may be for purely symbolic purposes, it seems unlikely that such actions would reach war level. According to the COW coding, a conflict must involve 1,000 battle deaths to be included in the war list. This implies that any punishment campaigns must be both relatively intense and sustained to count as a war. Single attacks or brief campaigns, such as the 1998 cruise missile attacks against al-Qaeda or the Desert Fox campaign against Iraq, could be largely for symbolic purposes. However, it seems unlikely that countries would mount the intense and sustained campaigns needed to reach war level for purely symbolic purposes.

Accordingly, neither credible commitment issues nor symbolic attacks are likely to cause punishment wars. Therefore, I will discard these explanations for the remainder of the analysis.

Equilibrium Selection

As described above, two distinct equilibria coexist in the infinite horizon versions of the game. There is always an equilibrium where the target makes no concessions, and the revisionist conducts no attacks. There may also be an equilibrium where the revisionist makes concessions (less than the value of the attack) under the threat of attacks if the concessions are not made. In the concession equilibria, attacks can occur due to uncertainty about the costliness of attacks.

However, in the no-concession equilibrium, attacks must serve some other purpose. It is thus necessary to discuss what conditions are likely to make one equilibrium more likely than another. Although I will not yet draw any firm conclusions, a few things suggest that the no-concessions equilibrium is more likely.

In order to theorize about the conditions that make one equilibrium more likely, it is critical to note two important facts. First, neither type of equilibrium is Pareto superior to the other. Second, the target always prefers the first equilibrium (where no concessions are made), while the revisionist always prefers an equilibria of the second type, where they do achieve concessions. Thus, neither equilibrium is mutually preferred.

Therefore, it is necessary to look at intersubjective beliefs to determine which equilibrium will be played. Nash equilibria are defined as situations each player's actions are a best reply to the other's actions. In essence, this means that each correctly anticipates what the other will do, and acts accordingly. This in turn means that where there are multiple equilibria, the equilibrium that actually occurs is the equilibrium that the players believe will occur. In the context of the compellence model, bombardment threats will work if the actors believe they will work at inducing concessions, and a concessions equilibria will occur. In contrast, if they believe that bombardment threats will not work, then the threats will actually be ineffective, and the no-concessions equilibrium will occur. Thus, the exact equilibrium that occurs will depend on norms and beliefs.

I hypothesize that in most cases the no-concessions equilibrium will be chosen for two reasons. Status quo biases and risk aversion both favor this equilibrium. Natural status quo biases would be reinforced by norms against altering the status quo through the threat of force.

In addition, the target likely has greater ability to shape the beliefs about which equilibrium will occur by adopting a general no-concessions policy. I will review each of these factors below.

In general, people are psychologically predisposed to favor the status quo. In addition, global norms increasingly disapprove of the use or threat of force to alter the status quo.

Favoring the status quo will make the first equilibrium more likely. In essence, this suggests that the target would care more about maintaining the equilibrium with no-concessions than the revisionist would care about achieving concessions. Accordingly, the two sides are more likely to fall into the equilibrium where no concessions are made than the one where concessions are made.

Risk aversion would also tend to favor the status quo. Both sides take greater risks in the equilibrium where concessions are made than the equilibrium where no concessions are made. In granting concessions, the target runs the risk that the revisionist attacks anyway. Thus, the target would give up some benefits while perhaps being attacked anyway, increasing its reluctance to offer concessions. On the revisionist's side, the attack threat is only maintained by future concessions if it is carried out. However, the attacker would run the risk that the target would fail to make future concessions even if it carried out the attack. In turn, this reduces the credibility of the revisionist's attack threat, making the overall equilibrium less likely.

Finally, I believe that the basic form of the game gives the target a greater voice in choosing the equilibrium than the revisionist. Remember, this game form occurs in situations where the target has complete discretion over the amount of concessions that it grants to the revisionist. This suggests that the target could adopt a policy at the beginning of (or prior to) any conflict that it will never grant any concessions under the threat of force. The revisionist would thus be faced with trying to overturn an established policy, rather than simply trying to achieve

concessions in a vacuum. Thus, by being able to set such a policy, the target could essentially choose which equilibrium it faced, and would naturally choose the more favorable equilibrium. The target would have added incentives to adopt such a policy if it believed that there were multiple issues or adversaries that may be affected, as maintaining the policy in one issue area would reinforce it in other areas.

While I believe the no-concessions equilibrium is generally more likely, there are a few situations that might make a concessions equilibrium occur. These would occur when beliefs and normative factors suggest that the target should make the demanded concessions for reasons other than the bombardment. This is more likely to occur when IGOs or regional or global hegemony are the revisionists demanding concessions. First, IGOs and hegemony may be threatening punishment in order to enforce norms, such as human rights. The attempt to enforce these norms partially counters, and may override the norms against threatening force. Second, IGOs and hegemony are likely concerned about the implications for third parties. They thus have greater incentives than other states to inflict punishment to deter these third parties, even if they do not expect the punishment to work in that case. Finally, power disparities mean that punishment actions may only inflict minor costs on the coercing state. This generally makes them more willing to execute punishment actions even if they believe that there is only a small chance compulsion will work.

Screening/Signaling in a Concessions Equilibria

As noted, bombardment wars must be due to private information, and bombardment serves to reveal some sort of information. The more straightforward cause of bombardment wars occurs where the combatants are in a concessions equilibria. Because the threat of attacks can

induce concessions, private information about the costs or probability of success of punishment attacks could prevent immediate settlement. Actual attacks would then reveal this information, allowing the conflict to be settled.

To see this, let us assume that the two parties are in an equilibrium where the revisionist gets the maximum amount of concessions possible. The actual maximum amount of concessions the revisionist can achieve is dependent on the probable costs that the revisionist can inflict during bombardment. This in turn would be dependent on the probability of bombardment successfully causing casualties or other damage, the probable amount of casualties and damage, and how much the target would care about those casualties and damage. These in turn would depend on military factors on both sides, such as the forces used to conduct the attack and any defenses the target has, as well as political and social factors that make the target more or less sensitive to attacks.

Thus, private information can exist, and can determine the amount of concessions that the revisionist could extract from the target. In some cases, the target may want to offer only small concessions initially, to weed out revisionists that could make only minor attacks. Stronger revisionists may then attack in order to induce more concessions. Similarly, revisionists may be uncertain of the target's cost tolerance, and therefore attack in order to induce cost-sensitive targets to settle early, leaving only the more cost-acceptant targets. In either case, private information can lead to revisionists carrying out attacks, if there is an equilibrium where concessions are made.

Private information can also determine whether the revisionist can even make a credible bombardment threat. Note that the equilibrium where concessions are made only exists if $1 - c_T \leq x \leq 1 - \frac{(1-\delta_R)c_R}{\delta_R}$, so if the revisionist does not have a long enough shadow of the future or

if attacks incur too many costs on the revisionist, the revisionist can never achieve any concessions. This leads to a situation where revisionists may have private information about whether they can in fact credibly attack. Accordingly, the target may initially make no concessions, and then only grant concessions once the target has shown that they are willing to attack.

In either case, private information can lead the revisionist to carry out attacks to reveal information about the probability of attacks being successful, the damage they would inflict, and the cost-tolerance of the two states.

Screening/Signaling in the No-Concessions Equilibrium

The more complicated cause of bombardment wars occurs when the combatants are playing the no-concessions equilibrium. The no-concessions equilibrium exists even if there is private information about the probability of an attack being successful, the costs that would be inflicted, or how much the states would care about those costs. Therefore, if the two states are in the no-concessions equilibrium, there must be some other information that is being conveyed, and some other threat that might lead to concessions for the revisionist to benefit from attacking.

In the no-concessions equilibrium, I believe that bombardment wars serve to reveal private information about what would happen in a conventional ground war. Private information about the probability the revisionist would be able to achieve its goals in a conventional attack, the costs the two sides would incur, or how much they care about those costs could lead to a conventional attack to resolve the issue and reveal this private information. However, the revisionist may also be able to reveal this information without a conventional ground attack through a bombardment campaign. If the bombardment campaign was a less costly way to

reveal the information, then it would likely be preferred to a conventional war, as it would allow the issue to be resolved at lower cost. In particular, I suggest that bombardment may help reveal whether the revisionist has a credible ground attack option at all.

Bombardment campaigns would reveal private information by serving as a costly signal or screening device. Since bombardment creates costs for both sides, both parties would want to settle the issue as soon as they could to avoid these costs. At the same time, states with differing abilities to conduct or withstand a conventional attack or with different cost tolerances would have different final settlements that they would be willing to accept. Thus, the revisionist can begin by demanding large concessions under the threat of both a conventional attack and bombardment. Assuming the offer is rejected, carrying out the bombardment signals the revisionist's own resolve and capabilities to the target. At the same time, rejecting settlement offers signals the target's own resolve and capabilities. Offers can be adjusted and the bargaining campaign continued until enough information has been revealed to settle the conflict.

Bombardment campaigns might also more directly reveal information about capabilities. The exact nature and strength of the bombardment provides intelligence information about the forces used in the bombardment, from which the parties can deduce information about broader capabilities. For instance, is the artillery and aircraft used relatively modern, or does it appear older? How proficient do the crews appear to be? Similarly, what defensive measures are taken against the bombardment, and how effective do they appear to be? Answering each of these questions would allow intelligence officers to form a broader picture about the capabilities of their adversary, in turn revealing information about the probability of winning a conventional war and the costs of doing so.

So, if the two states are playing the equilibrium where no concessions are made, then observed punishment attacks could only occur to signal or screen for information about a conventional conflict, such as the probability of winning or the adversaries' cost-tolerance. If the revisionist finds that a bombardment campaign is a more cost-effective means of revealing this information than a conventional attack, then it would choose to engage in bombardment attacks.⁴¹

Summary and Comparison

In this section, I have shown that there are two possible causes of bombardment wars. As bombardment can rarely resolve commitment problems, bombardment wars can only occur due to private information. Bombardment thus serves one of two possible signaling/screening functions. If the combatants are in the concessions equilibrium then bombardment can signal the probability of successfully inflicting damage and the perceived costs of the damage. However, if they are in the no-concessions equilibrium, bombardment would serve as a costly signal or screening device for whether the revisionist can credibly threaten a ground invasion.

I also noted that the no-concessions equilibrium seems generally more likely, although the concessions equilibria can occur in some cases. This means that bombardment wars would be more likely caused by attempts to determine whether the revisionist had a credible war threat than attempts to determine the costs of bombardment. In addition, the bombardment attacks must convey sufficient information to make the attacks worthwhile. Determining whether the

⁴¹ It is possible that punishment attacks are rarely more cost effective than conventional war in revealing private information and settling the issue. They cannot settle the issue directly, which represents one inherent drawback. The lack of ground combat would similarly make it more difficult to gain information about conventional capabilities. If punishment attacks are typically seen as a less cost-effective means of settling the issue, this could explain the relative rarity of punishment wars relative to ground wars.

revisionist has a credible ground attack option would have significant value, making it a likely cause of bombardment. However, the exact costs of bombardment itself, and thus the exact amount of concessions made in a concessions equilibria, seems much less critical, and thus less likely to make determining this information worth the costs of bombardment.

How Would Bombardment Wars End?

In the previous sections, I demonstrated that bombardment wars are fundamentally a means of signaling or screening for private information. Using this baseline, we can begin determining the process by punishment wars end.

Bombardment Wars End When Information is Revealed

Fundamentally, as bombardment wars are a signaling or screening device, they will end once all relevant information has been revealed. The duration of the bombardment campaign would thus be determined by the amount of costs necessary to differentiate between the types. Less resolved or less powerful targets will make concessions sooner than more resolved types. Similarly, less resolved or less powerful revisionists will cease attacks and agree to lesser concessions than more resolved revisionists. Thus, as the bombardment campaign lasts longer and inflicts more damage on both sides, targets will conclude that revisionists are generally stronger or more resolved. Similarly, revisionists will also conclude that targets are stronger or more resolved.

In a concessions equilibria, the bombardment reveals the likely costs of future bombardment. Once this information is revealed, then the parties to agree on the amount of

concessions needed to avoid future bombardment. With this negotiated settlement in place, the bombardment war would end.

The bombardment may also reveal to the revisionist that continuing to carry out the bombardment would not be worth the potential concessions achievable. Remember that for only a certain cost range of the bombardment do concessions equilibria exist. The revisionist may initially believe that the costs could fall within this range, and then find out that they do not. In this case, the revisionist could cease bombardment without having gained any concessions.

In the no-concessions equilibrium, the bombardment reveals whether the revisionist has a credible ground attack threat. In this case, there are only two relevant states: either the revisionist has a credible attack threat or it does not. Revisionists that know they do not have a credible attack would not continue a bombardment campaign. Similarly, targets that are convinced that revisionists do have a credible attack option would make sufficient concessions to satisfy the revisionist.

However, if one or both sides was unsure of whether the revisionist had a credible attack threat, then the target would offer no concessions. If the revisionist believed it might have a credible attack threat, it could decide to launch a bombardment campaign to reveal to both sides whether this was true. If only one side is uncertain, the beginning of a bombardment campaign would determine whether the revisionist had a credible attack threat with certainty. At the same time, this would not immediately end the conflict, as enough attacks have to occur to prevent the weaker types from bluffing and pooling with the stronger types. As the length and intensity of bombardment is a continuous variable, even weak or unresolved revisionists would be tempted to bluff and conduct a few bombardment attacks unless they knew that a significant number of attacks would be necessary to convince the opponent of their resolve. Similarly, weak or

unresolved targets would be willing to suffer through a few attacks unless they knew that doing so would be insufficient to convince the revisionist of their cost tolerance.

Information Revelation in Bombardment Wars May Require Precipitating Events

While information revelation is the only possible explanation for how bombardment wars end, this process does not necessarily happen cleanly. Because individual bombardment actions have relatively low marginal costs, it would be unclear when enough bombardment has occurred to convey the relevant information. Thus, for the two sides to actually settle the conflict, a precipitating or catalyzing event may be necessary. This event forces the sides to consider what the bombardment has revealed, and thus change course and settle the conflict.

While overall bombardment wars may be quite costly, individual bombardment actions have relatively low cost. For the state on the receiving side of the bombardment, attacks inflict damage on facilities and may cause casualties amongst the target's military or civilian population. Over time, these attacks could cause significant damage. In fact, to reach war levels, the bombardment would have to cause thousands of casualties. However, the bombardment on any single day is only likely to cause a fraction of this damage. It may damage some structures or other facilities and cause a few casualties, but is unlikely to cause the thousands of casualties in a bombardment war all at once. Empirically, this becomes clear in that most bombardment wars are sustained for a period of time.

The marginal costs for the revisionist might be even lower. If there is little possibility of retaliation, the revisionist may risk a few casualties among the artillery or air crew involved in bombardment and would have to pay for the ordnance used. Again, over time these costs can add up to be quite substantial, but a single day's bombardment would not be particularly costly.

The revisionist may also risk retaliatory bombardment, which would impose costs by causing casualties and damaging facilities, as above. While this would raise the revisionist's costs of continuing the bombardment, a single day of continuing the war would still not impose significant costs.

However, it is only by imposing costs that bombardment can convey information. Signals must be costly to overcome incentives to deceive. Over time, bombardment can convey sufficient costs to reveal the necessary information about the combatants' capabilities and resolve. In a concessions equilibria, the cumulative costs of bombardment would be enough to reveal both the likely future costs of bombardment, and whether the possible concessions are enough that the revisionist has a credible bombardment threat. In the no-concessions equilibrium, the cumulative costs would reveal enough information about the relative capabilities and resolve to determine whether the revisionist has a credible war threat. However, this information would not be revealed quickly in a single day or week of bombardment, but only slowly over time.

The low marginal cost of bombardment means that it would be difficult to determine exactly when enough bombardment has occurred to reveal the relevant information. Why would enough information have been revealed on one day, but not the previous day given that only relatively few costs occurred in-between? This difficulty applies not only to external observers, but also to the leaders of the combatant states. How do they know that enough bombardment has occurred to show that their opponent is more capable or resolved than they initially thought? Why should they make concessions at one point in time, rather than waiting another day given that suffering one more day of bombardment would not impose significant additional costs?

Thus, I believe that a precipitating event may be necessary to end bombardment wars. A precipitating event would be something that occurs that prompts the leaders to reevaluate how much information has been revealed. In essence, the precipitating event forces the leader to look once more at the big picture, rather than their day to day tasks. By looking at the big picture, the leader recognizes how much costs have already been imposed by the bombardment, and thus how the bombardment may have separated their opponent's types. Thus, once the precipitating event happens, the leaders would reevaluate what information has been revealed, and thus settle the conflict. Note that the precipitating event doesn't need to convey much information itself. The costs of bombardment remain the primary means of determining the relative capabilities and resolve. The precipitating event merely spurs the leadership to analyze the full amount of information revealed by the bombardment, rather than focusing on the small day to day marginal costs.

Precipitating events could thus be any number of factors. Particularly deadly attacks may suffice. If one day's bombardment has imposed twice the costs as normal, this may spur leaders to look at the overall costs of the bombardment campaign. Another form of precipitating event could come in the form of major diplomatic communications. By forcing a response, these diplomatic communications force the leaders to examine the entire course of the bombardment war, and thus realize the amount of information that has been revealed.

Conclusion

In this chapter, I have argued that wars fought primarily through bombardment must serve to signal and screen for private information about the relative power and resolve of the combatants. In a concessions equilibria, the bombardment serves to reveal information about the

costs of the bombardment itself. In the no-concessions equilibrium, which is probably more likely, the bombardment would serve to reveal whether the revisionist has a credible threat of a ground invasion to settle the issue militarily. Thus, these wars will end (or possibly transform to a conventional ground war) once bombardment has inflicted sufficient costs on the parties to reveal this information. However, because bombardment has low marginal costs, precipitating events may be necessary for the leadership to come to terms with the information revealed. In the next chapter, I will examine the cases of punishment wars to see how well these cases fit these theoretical explanations.

Chapter 7

Bombardment Wars: Case Studies

The previous chapter provided a theoretical explanation for when bombardment wars begin and end. The defining feature of bombardment wars is that it is impossible for the bombardment to significantly alter the status quo on its own. Any change to the status quo must be voluntary. This means that bombardment cannot resolve commitment problems, and thus commitment problems cannot be a cause of bombardment wars.

Accordingly, bombardment wars must be due to private information, and would end once this private information was revealed. But private information about what? One possibility is that one side believes that the threat of bombardment alone can compel the other to make concessions. In this case, bombardment would serve as a costly signal about the revisionist's ability and willingness to carry out the bombardment. However, there is also always an equilibrium where the target makes no-concessions. In this case, bombardment would most likely serve as a costly signal for the revisionist's ability to escalate the conflict to a conventional ground war to directly achieve their objectives.

In either case, the revelation of private information about relative capabilities and resolve would enable the war to end. However, in most cases bombardment has a relatively low marginal cost. Relative to the overall war, each day of artillery fire or air strikes causes relatively little damage. This means that each day of bombardment would have limited information value. Accordingly, it would often be unclear when sufficient bombardment had taken place to reveal the necessary information. I thus argue that ending bombardment wars may often require precipitating events - catalysts that force the combatants to come to terms with the

information bombardment has revealed, and thus decide to make the necessary concessions to end the war.

In this chapter, I empirically analyze this theory of both why these wars begin and end using case studies of each bombardment war since 1918. There have been far fewer bombardment wars than interstate wars. There have been only four conflicts conducted nearly exclusively through bombardment: The 1st and 2nd Taiwan Straits conflicts, the Israeli-Egyptian War of Attrition, and the Kosovo War. In addition, there are two wars where bombardment occurred in conjunction with other combat. The Gulf War included a bombardment phase before the coalition embarked on ground operations. Second, the Vietnam War involved a major air campaign against North Vietnam alongside, but separate from, the counterinsurgency in the South.⁴²

Given the limited number of bombardment wars, it does not make sense to run quantitative tests on bombardment wars. The limited number of cases means that any cross-case statistical tests would have limited statistical power, and would not provide solid evidence to confirm or refute the theory. In addition, unlike ground wars, where campaigns represent a natural subdivision allowing an increase in the number of observations, there is no particularly clear subdivision within punishment wars, as bombardment or guerilla attacks are nearly continuous. Even if there was, the limited number of conflicts would diminish the reliability of the results. Thus, rather than attempting any quantitative tests, I will conduct case studies of each of the bombardment wars in the population.

⁴² As noted in previous chapters, the counterinsurgency in South Vietnam bears more resemblance to civil wars than interstate wars, despite the heavy involvement of both North Vietnamese and American forces. At times, the Vietnam War also becomes a conventional ground war, notably in 1968, 1972, and 1975. However, these ground campaigns are sporadic. I am therefore confining my consideration of the Vietnam War to the air campaign against North Vietnam.

I will first review my theoretical expectations. Then, I will present a brief overview of the population of bombardment wars, and their major attributes. I will then proceed to conduct more in-depth studies of each of the six cases.

Theoretical Expectations

Both the cause of bombardment wars and how they end differs substantially from ground wars. As noted in previous chapters, bombardment cannot achieve a revisionist's objectives directly, while a ground invasion could. This creates a fundamentally different bargaining scenario, which has not been thoroughly explored. The previous chapter thus developed a theory for both the cause of bombardment wars and how I would expect them to end. Here, I will summarize that theory in order to draw empirical expectations for both elements.

In the basic model of bombardment wars, there is always an equilibrium where the target makes no-concessions and the revisionist never attacks (the no-concessions equilibrium). This equilibrium exists regardless of uncertainty or private information about how costly bombardment would be or how resolved the two sides are. Under some circumstances, there would also be a range of equilibria where the target does make some concessions under the threat of bombardment.

Bombardment wars must occur due to private information, with bombardment serving as a costly signaling or screening device to reveal this information. In a concessions equilibria, bombardment wars are likely due to uncertainty or private information about the costs of bombardment, thus obscuring the amount of concessions the target needs to make to prevent the revisionist from carrying out their bombardment threat. In the no-concessions equilibrium,

bombardment must serve to reveal information about something else. I believe that in this case, bombardment serves to reveal whether the revisionist can credibly threaten a ground invasion.

In general, I believe that the no-concessions equilibrium is more likely, due to status quo biases, norms against threatening force, and the ability of states to adopt a general no-concessions policy. Therefore, in most cases determining the credibility of a ground attack is the most likely cause of bombardment wars. In some cases, such as when the revisionist is a great power or represents an international organization, the concessions equilibria become more likely, meaning that bombardment wars could determine the costs of bombardment itself. For each case, I will first discuss whether the combatants appear to be in a concessions or no-concessions equilibrium, and how this impacts why the war happens.

In most cases, I would expect bombardment wars to end once the relevant information is revealed. Where bombardment serves to reveal information about whether the revisionist has a credible threat of ground invasion, the bombardment campaign could end in one of three ways. First, the revisionist could realize that its chances of success in a ground invasion are not worth the costs, and end the bombardment without achieving concessions. Second, the target could realize that the revisionist is both willing and able to mount a ground invasion, and go ahead and make concessions to prevent a larger conflict. Finally, it is possible that the revisionist believes that a ground invasion is worth it, but bombardment is ineffective at convincing the target of this, in which case the revisionist may escalate to a conventional ground invasion. Thus, the bombardment campaign should end once enough information has been revealed for either the target to realize that a ground invasion is credible, for the revisionist to realize that the probability of a successful ground invasion is not worth the costs. Alternatively, the

bombardment campaign would escalate to a conventional ground war once the revisionist realizes that bombardment is unlikely to convince the target that a ground invasion is imminent.

In a few other cases, the states may be playing an equilibrium where concessions would be made based on the threat of bombardment alone. In this case, a negotiated settlement would end once the two sides reach a consensus on the relative costs of bombardment, given their relative valuation of the disputed issue. Alternatively, the revisionist may realize that their own costs of bombardment are too high to make a continued bombardment threat credible, leading them to cease bombardment without having gained anything, even if a concessions equilibria would be otherwise possible.

However, in both cases, information revelation is complicated by the low marginal costs of bombardment. These low marginal costs mean that individual acts or days of bombardment carry relatively little information. This makes it difficult for leaders and decision makers to recognize the amount of information revealed and reevaluate whether they need to settle the war. Thus, war settlement may often require precipitating events to prompt leaders to reevaluate what information has been revealed, and the costs and benefits of further conflict.

In the following case studies, I will evaluate both the causes of bombardment war and why they ultimately end. For each case study, I will first provide an overview of the conflict. I will then evaluate the theory of why the war occurred with reference to the compellence model. Finally, I will examine why and how the war ended when it did.

In examining the theory for why the war occurred in the first place, I will look for a couple of major things. First, I will discuss whether the combatants appear to be playing the concessions or no-concessions equilibria. Second, I will look for whether there appears to be significant uncertainty about either the costs of bombardment (in the concessions equilibria) or

whether the revisionist has a credible war threat (in the no-concessions equilibrium). Finally, I will examine whether the parties appear to be using bombardment as a deliberate means of resolving this uncertainty.

I will then evaluate whether war ends when the relevant information is revealed. If the parties are in a concessions equilibria, then bombardment should end once information is revealed that creates a consensus on the costs of bombardment itself. If the parties are in the no-concessions equilibria, and so bombardment is over uncertainty about the potential of a ground war, this means the war should end in one of three ways. First, the revisionist realizes that they do not in fact have a credible invasion threat, and ceases the bombardment without having achieved anything. Second, the target realizes that invasion is likely, and makes concessions to forestall the ground war. Finally, the revisionist believes it has a credible threat, but is unable to convince the target that invasion is likely, and so goes ahead and launches the invasion.

In either case, I will also look at the impact of the low marginal costs of bombardment. First, this should mean that a significant amount of bombardment is needed to reveal the relevant information. Second, I will look for the presence of precipitating events that spur the leadership on one side or the other to reevaluate the how much information has been revealed, and what this means for whether they should settle the conflict.

Basic Empirical Findings

Before examining the cases in more detail, it is useful to examine some basic empirical data on bombardment wars. In the CoW database,⁴³ there are four bombardment wars that occur independently of other ground wars: the 1st and 2nd Taiwan Straits Crises⁴⁴, the Israeli-Egyptian

⁴³ Sarkees and Wayman 2010

⁴⁴ In the CoW database, these are labeled the Offshore Islands War and the Taiwan Straits War respectively.

War of Attrition, and the Kosovo War. Two other bombardment campaigns are associated with other wars. First, an intense bombardment campaign preceded the coalition ground offensive during the Gulf War. Second, the Vietnam War featured an intense bombardment campaign against North Vietnam alongside the counterinsurgency in the South. In addition, both the Korean War and the Sino-Vietnamese Border War also share some characteristics with bombardment wars. However, because bombardment occurs in conjunction with ground combat throughout the entire war in both cases, I do not examine either here.

These wars have varying lengths and outcomes. In length, the bombardment campaigns ranged from 38 days in the Gulf War (before the ground war begins) and 76 days in the Kosovo War to 516 days in the War of Attrition and about 8 years in the US aerial campaign against North Vietnam. The outcomes were similarly varied. In several cases, including the War of Attrition and 2nd Taiwan Straits Crisis, no concessions were ever made and the final situation matched the status quo before the war. At the other extreme, in the Kosovo War, Serbia eventually gave in to all of NATO's demands. In between these extremes, the 1st Taiwan Straits Crisis resulted in Taiwan and the US ceding many disputed islands to mainland China, while retaining others – all without a formal agreement. Finally, the bombardment campaign in the Gulf War escalated to a conventional ground attack, and bombardment was unsuccessful at resolving the dispute.

The length and basic outcome of each conflict are noted in the following tables. The coding from Chapter 2 on identifying wars ended by information revelation is retained. Since no concessions can be achieved through force, any war that involved preemptive concessions involves at least some changes to the pre-war status quo, while those that do not involve no changes from the status quo.

Table 7.1: List of Bombardment Wars

	Length	Intermediate bargain	Preemptive concessions	Notes on outcome
1 st Taiwan Straits Crisis (Offshore islands war)	235 days	Yes	Yes	War ends with US/Taiwanese withdrawal from many disputed islands
2 nd Taiwan Straits Crisis (Taiwan Straits War)	90 days	No	No	Bombardment campaign fizzles out – No concessions made
War of Attrition	516 days	No	No	Cease fire ends bombardment campaigns – no concessions made. 1973 Arab-Israeli War follows
Kosovo War	76 days	No	Yes	Serbia concedes to virtually all of NATO demands
Gulf War (Before ground campaign to liberate Kuwait)	254 days from invasion of Kuwait until end; 38 days air bombardment before ground campaign begins	N/A (war continues)	N/A (war continues)	Bombardment campaign unsuccessful at convincing Iraq to withdraw, ground war to liberate Kuwait is launched
Vietnam War – air campaigns (Coincides with counterinsurgency in South Vietnam)	~8 years from beginning of US involvement until US signs peace agreement	No	No	Bombardment largely unsuccessful at convincing N. Vietnam to stop supporting the insurgency in S. Vietnam

1st and 2nd Taiwan Straits Crises

The first major bombardment wars I will examine are the Taiwan Straits crises in 1954-55 and 1958. Because these two wars involved the same combatants, were in the same basic location, and were over the same basic issues, I will discuss them together.

Conflict Overview

The two Taiwan Straits crises emerged out of the Chinese Civil War. Once the Communist forces had taken over mainland China in 1949, the Nationalist government and their supporters fled to Taiwan. In addition, the Nationalist forces retained a number of small islands

immediately off of the coast of mainland China, at times within a few miles of the coast. The biggest of these islands were Quemoy island and Matsu island ground. The Nationalists also retained control of the Yijiangshan Islands and the Dachen Islands. All of these islands had both symbolic and military value to the Nationalists. Symbolically, the offshore islands represented a link to mainland China, representing the Nationalists' claim to be the legitimate government of all China and their promise to return to the mainland. Militarily, the islands could serve as bases from which to mount raids against mainland China, as well as potentially serving as a first line of defense against a Chinese invasion of Taiwan. (Garver 1997, 114-115; Elleman 2015, 14-16, 20-23

Immediately after the Nationalist withdrawal from the mainland, the US Navy began conducting patrols in the Taiwan Straits. This had the effect of enforcing peace on both sides. The patrols prevented the Communists from invading Taiwan to complete their victory, but also prevented the Nationalist forces from attacking or raiding mainland China (Elleman 2015, 30-31, 34-36). However, this enforcement of the stalemate ended with Eisenhower's election in 1952. During the Presidential campaign, Eisenhower promised to "unleash Chiang [Kai Shek]" against Communist China. Accordingly, the US lifted its blockade restrictions and encouraged the Nationalists to mount raids against mainland China. At this point, the Nationalist deployed significant military forces on the offshore islands and began blockading mainland China. (Garver 1997, 77, 115-123; Elleman 2015 53, 60-62)

In response to both the Nationalists' military moves and increasing US support for the Nationalists, the Communists began bombarding the offshore islands on September 3, 1954. This bombardment continued intermittently for the next several months. Then, on January 18,

1955, the Communists militarily seized Yijiangshan Island,⁴⁵ virtually eliminating its garrison in the process. (Garver 1997, 123, 128-129; Elleman 2015, 63-64; Li 2001, 148-149)

The US made several moves in response to the Communist bombardment. First, the US negotiated a mutual defense treaty with the Nationalist government. Second, the Eisenhower Administration sought and received a Congressional authorization to use force in defense of Taiwan. However, at the same time, the US came to believe that the remaining Yijiangshan Islands and the Dachen Islands were militarily indefensible, and convinced the Nationalist government to evacuate these islands. In February 1955, US Navy vessels transported the Nationalist garrisons of these islands back to Taiwan. (Accinelli 1990; Pruessen 2001, 97-98; Suettinger 2006, 255-257, 265; Elleman 2015. 64-65)

On April 23, Chinese Premier Zhou Enlai announced that the Communists did not want a war with the United States, and proposed negotiations to settle the various disputes. The Chinese shelling of the offshore islands remaining in Nationalist possession petered out shortly thereafter. There was never a single ceasefire declaration or other definitive end to the conflict. (Suettinger 2006, 258-259; Jun 2006, 311; Li 2001, 152-153; Garver 1997, 131-133)

While the conflict paused for several years, the underlying tensions remained. Taiwan maintained control of Quemay and Matsu, and continued to blockade mainland China. These tensions erupted into open conflict again in the 2nd Taiwan Strait Crisis of 1958. On August 23, China bombarded Quemay with 40,000 shells. Taiwan responded in kind by bombarding Chinese positions on the mainland. A few air-to-air skirmishes also took place. During this period, China also attempted to interdict Taiwanese supply convoys to Quemay and Matsu with both artillery interdiction and ship patrols. US Navy escorts allowed the convoys to get through

⁴⁵ Sometimes referred to as “Yijiang Island”

without major incident. The 2nd Taiwan Straits Crisis began to deescalate on October 6, when China declared a temporary ceasefire, which was extended on October 13. China resumed limited bombardment on October 25, but announced that they would only shell on odd numbered days, to allow Taiwan to safely resupply their garrisons. While this shelling continued for another 20 years, it largely consisted of propaganda shells filled with leaflets rather than explosives. Taiwan similarly fired on Chinese positions on even-numbered days, again using primarily propaganda shells. (Suettinger 2006, 268-275; Elleman 2015, 90-94, 96-97; Garver 1997, 133-149)

Cause of the Wars

Communist China had overarching goals during both the 1954-55 and the 1958 crises. The first was maintaining Communist control over mainland China against attempts to restore the Nationalist government. The second was to reunify Taiwan with mainland China under Communist control (Li 2001 145-148, 156-160; Jun 2006, 294-298). China's ability to achieve these goals depended primarily on US, and to a lesser extent US allies', intentions and not on the military balance of any of the parties. China was clearly militarily superior to the Nationalist forces on Taiwan. They could thus resist any Nationalist attempt to retake mainland China. With some preparation, Communist China was also in a position to invade Taiwan, as long as the US did not intervene. However, the US was clearly militarily superior to the Chinese forces. If the US protected Taiwan, any Chinese invasion would fail. In addition, US efforts to overthrow the Communist government would pose a potential danger to the Communist government, even if the Communists had a decent chance of repelling a US invasion using massed infantry.

Thus, to realize their primary goals, China needed to determine US intentions. How determined was the US to protect Taiwan? Was the US seriously considering military intervention on mainland China? If the US was not committed to defending Taiwan, then China could proceed with efforts to militarily reunify Taiwan with mainland China. However, if the US was committed to defending Taiwan, then military efforts would be fruitless, and may even compromise China's long-term goals by inflicting significant losses on the Chinese forces. Demonstrating the importance of gaining information, during the second crisis, Mao said "the purpose of the bombardment was not to reconnoiter Chiang Kai-Shek's defenses but rather to reconnoiter and test the determination of the Americans (Li 2001, 158)." Second, China needed to deter the US, as well as US allies, from committing to the defense of Taiwan as much as possible. To accomplish these objectives, China carefully tailored the amount of force used to further their overall objectives, while avoiding a wider conflict. (see Jun 2006 295, 301, 304, 310-311, 313; Li 2001, 146, 148, 151, 156, 158)

On the other side, the US was in fact fully committed to defending Taiwan. In addition, they wanted to maintain an alliance with Taiwan as part of their general strategy of containing communism. While they were potentially interested in undermining the Communist regime in mainland China, the US was reluctant to push the issue too far in fear of triggering a general war that would include the Soviet Union. In contrast, the Nationalist leaders in Taiwan were interested primarily in regaining influence in mainland China, and were at least open to deals that would trade increased influence for breaking the alliance with the US. Thus, the US felt they needed to support Taiwanese possession of the offshore islands, and thus their chances to potentially return to the mainland, in return for maintaining the alliance. At the same time, they needed to restrain nationalist ambitions enough to prevent Taiwan from dragging the US into a

general war. However, this dynamic was not apparent to Communist China. (see Garver 1997, 112-114, 123-135, especially 143-144; Pruessen 2001, 99-101; Accinelli 2001, 111-113, 118, 139)

In both 1954-55 and 1958, bombarding the offshore islands helped China determine US intentions, while signaling Chinese resolve in an attempt to deter the US and US allies from committing to the defense of Taiwan.

During the 1954-55 crisis, Chinese bombardment and other actions had two goals. First, they wanted to deter the US and other western countries from establishing a close alliance with Taiwan. In 1953 and 1954, the United States had begun increasing security ties that would ultimately lead to the mutual defense treaty with Taiwan. (Garver 1997, 52-54; Jun 2006, 301-303). China may have also believed that the US wanted to add Taiwan to the broader regional alliances in the Pacific. By bombarding the offshore islands, China demonstrated to western countries that any alliance with Taiwan might lead them to become involved in a more general war with China, either over the offshore islands or over Taiwan itself. While the US did go ahead and conclude a mutual defense treaty in December 1954, no other western country did (e.g. Kelly 2018, 141-142). However, it is unclear whether any other western country was interested in an alliance in the first place.

The second goal of the bombardment would have been to test how far US commitment to Taiwan extended (Li 2001 151). Especially early in the period, the US maintained an ambiguous public posture on whether their defense commitment extended to the offshore islands. By doing so, they hoped to deter a Chinese attack on the offshore islands, even though the US had already decided not to defend the islands (Pruessen 2001, 90-32; Suettinger 2006, 264-265). Thus, there was ambiguity about the extent of US defense commitments. By bombarding the islands, and

ultimately seizing Yijiangshan Island, the PRC forced the US to either defend the offshore islands or demonstrate the limitations of their military commitment.

Finally, China wanted to obtain possession of the offshore islands as a prelude to an eventual reconquest of Taiwan, although this was tertiary to opposing and testing US commitments to Taiwan (Jun 2006, 297, 303-304). The bombardment served as a signal that China was committed to taking the islands by force if necessary. China likely hoped that the bombardment would lead to a voluntary evacuation of the islands.

For all three objectives, China relied on the possibility of a ground war. They do not appear to have believed that the costs of bombardment would directly deter the US or other countries from siding with Taiwan, or induce an evacuation of the offshore islands. This is especially true because bombardment created few costs for the US at the time, as the US had no forces other than possibly a few advisors on the offshore islands. However, the possibility of direct military action by the PRC to seize the offshore islands or even Taiwan was constantly in the background. Thus the 1954-55 clash is best understood as in the no-concessions equilibrium, where bombardment sought to demonstrate the possibility of direct military action. The only difference is that one of the PRC's objectives was to try and deter western action that could lead to a full-scale war, rather than being entirely attempting to compel the targets to take action.

It appears that China's immediate goal in the 1958 crisis was to probe US commitment to Taiwan. China may have believed that the continuing tension over the offshore islands, along with changing world events may have reduced US commitment to Taiwan. By bombarding Quemoy, China would force the US to reveal at least some information about US intentions and commitment to defending Taiwan (Jun 2006, 304, 312-313; Li 2001, 158). The bombardment would have a couple effects. First, the US had military advisors deployed with the ROC forces

on Quemoy and Matsu (Li 2006, 158). In fact, two American advisors were killed on the first day's bombardment. Thus, they would suffer direct risks in maintaining the deployment on Quemoy and Matsu. Second, the bombardment would significantly interdict the supply lines to the islands. Taiwan did not have the capability themselves to reopen the supply lines. To maintain the ROC deployment on these islands, the United States would have to intervene, creating more costs and risks (Elleman 2015, 93-94; Suettinger 2006, 269; Garver 1997, 136-137). Thus, if the United States chose to intervene, China would know they were fully committed to the defense of Taiwan. However, if the US moved to extricate themselves, China would know the US was not committed to the defense of Taiwan, and could press for reunification more forcefully.

Again, China's use of bombardment to screen relied to a large extent on the possibility of militarily seizing Quemoy and Matsu islands. China likely did not really believe that their bombardment would achieve much. China clearly could not directly achieve any of their territorial goals without military invasion. Moreover, the primary costs to the US would come if a wider war broke out. This would occur if China invaded either the remaining offshore islands or Taiwan itself. Thus, it appears that the situation was again largely in the no-concessions equilibrium, and the bombardment primarily screened for the US willingness to resist a direct Chinese attack. However, the bombardment did create some more direct costs and risks to the US, by threatening US advisors and any US forces attempting to resupply Quemoy and Matsu. These costs could potentially coerce the US to abandon its commitment to Taiwan. At the same it seems unlikely that these costs played a major role in US thinking.

Thus, both crises relied on the threat of a more general war. In the first crisis, China hoped that the threat of a more general war over Taiwan would persuade the US and other

western countries from forming alliances with Taiwan. In addition, if an alliance was formed, the risk of war would force these countries to demonstrate the depth of their commitment to Taiwan. In the second crisis, the risk of general war would force the US to demonstrate how strongly they were willing to support Taiwan. The bombardment brought about crises where the risks of a broader war would become apparent, forcing the revelation of this private information.

Why the Wars Ended

Both crises ended as China gained information on US commitment to Taiwan. However, interestingly, in both cases the US showed an intermediate degree of commitment. The US clearly showed that they were willing to defend Taiwanese independence. However, they showed only limited interest in making sure that Taiwan retained the offshore islands or retained an ability to intervene in mainland China. In the end, this forced a complete revision of PRC strategy, as China realized that further pressure might actually increase the probability of Taiwan becoming fully independent.

In the first crisis (1954-55), three main events fully revealed US intentions, leading to the end of the crisis. The first was the signing of the US-Taiwanese mutual defense treaty on December 2, 1954 (Accinelli 1990, 332). The second occurred when the US Congress passed a resolution authorizing the use of force to defend Taiwan on January 29, 1955 (Accinelli 1990, 333-338). Together, these events showed that despite the possibility that the PRC would attempt to invade Taiwan, the US remained committed to its defense. Thus, China's attempts to deter the alliance through bombardment had clearly failed. Moreover, it did appear clear that the US would provide at least some military support if Taiwan was threatened. This assessment would

have been bolstered by some suggestions by US officials that the US would use nuclear weapons if necessary to defend Taiwan (Garver 1997, 124, 131; Li 2001 150; Suettinger 2006, 257).

However, shortly thereafter, the US pushed Taiwan to agree to evacuate the Dachen and Yijiangshan island chains in February. At the same time, Taiwan reinforced the garrisons on Quemoy and Matsu. (Elleman 2015, 64-65; Suettinger 2006, 256) This would have demonstrated that US commitment was limited primarily to the defense of Taiwan proper, and possibly Quemoy and Matsu.

Accordingly, bombardment had conveyed about all the information about US intentions that China could get at that time. China therefore began considering how to deescalate the crisis. On April 23, Zhou Enlai proposed ambassadorial level talks between the US and the PRC to discuss a number of outstanding issues (Li 2001, 152; Jun 2006, 311). US agreement gave China the face-saving cover necessary to end the crisis. While not quite the precipitating event that I proposed, the fact that bombardment continued for two months after the evacuation of the Dachen and Yijiangshan islands does demonstrate how the low marginal cost of bombardment can enable it to continue for some time.

The second crisis, in 1958, again showed that the US was willing to defend Taiwan, but had limited commitment to Quemoy and Matsu. The US responded to the bombardment by escorting Taiwanese resupply convoys to Quemoy and Matsu with US Navy warships. However, the US also ordered their warships to remain three miles from the Chinese mainland, thus respecting Chinese territorial waters.⁴⁶ As Quemoy and Matsu lay within this three-mile limit, the Taiwanese convoys had to proceed the final distance unescorted. Thus, the US signaled that while they were committed to defending Taiwan, they were also uninterested in

⁴⁶ While many countries had begun asserting a twelve-mile limit to territorial waters, the US continued to recognize only a three-mile limit.

provoking a general war, and had limited interest in holding the offshore islands themselves. This impression would have been reinforced by the US restraining Taiwan from retaliating against Chinese targets on the mainland. (Elleman 2015, 92-94; Accinelli 2001, 124; Garver 1997, 136-138).

In addition to the military moves, the US made several diplomatic moves towards de-escalation. In early September, the US agreed to restart the suspended ambassadorial level talks. In addition, in both public communications, and private overtures to both China and Taiwan, the US proposed a ceasefire where Taiwan would reduce the garrisons on Quemoy and Matsu in exchange for a cessation of Chinese military efforts to regain control of Taiwan (Suettinger 2006, 270-271; Accinelli 2001, 128-130; Garver 1997, 138-139). These overtures again showed that while the US was committed to defending Taiwan itself, its commitments were generally limited to the defense of Taiwan rather than the reconquest of China or Taiwanese retention of Quemoy and Matsu.

The revelation that the US was committed to the defense of Taiwan, but only Taiwan, brought an end to the conflict, but in a paradoxical way. While the US proposal to deescalate by trading a ceasefire for a reduction or withdrawal of the Taiwanese garrisons on Quemoy and Matsu seems logical, both China and Taiwan found it deeply disturbing. Both believed that if Taiwan lost control of Quemoy and Matsu, that the Nationalists' primary link to the mainland would be severed. Accordingly, Taiwan would likely begin focusing on internal issues, leading it to drift apart from mainland China, and likely eventually resulting in independence. As the US military prevented China from invading Taiwan, yet restrained the Nationalists from attacking the mainland, there would be little either side could do to prevent the eventual separation into

two Chinas if Taiwan withdrew from the offshore islands. (see Li 2001, 163-171; Jun 2006, 298, 314)

This realization brought a significant change in Chinese strategy. Rather than trying to push the US away from Taiwan or force a withdrawal from Quemoy and Matsu, China decided to maintain a low-level tension over the islands, while allowing Taiwan to maintain or even increase their garrisons on the islands. This would maintain Taiwan's link to the mainland, hopefully preventing its development towards independence and allowing reunification at some point in the future. To do this, the Chinese executed one more intense barrage during Secretary of State Dulles' visit to Taiwan. Then, they declared that they would only bombard the offshore islands on alternate days. In addition, the intensity of the bombardment drastically decreased, consisting mostly of propaganda shells filled with leaflets. This allowed the islands to be resupplied and limited the incentives to fully withdraw from the islands. At the same time, the continued low-level bombardment kept some attention focused on the islands, thus maintaining Taiwan's links to the mainland. (see Li 2001, 163-171; Jun 2006, 298, 314)

Thus, the major conflict ended when the US response to the bombardment revealed the degree of commitment to the islands. Interestingly, in contrast to the other cases, and somewhat at odds with my theory, the bombardment in the 1958 crisis does appear to have had significant marginal costs. The first-day of bombardment consisted of about 40,000 shells and caused hundreds of casualties (Accinelli 2001, 117, Clodfelter 2008, 674). Subsequent bombardment was also quite intense, although sometimes interspersed with days without any bombardment. Thus, the bombardment and US response revealed information relatively quickly, and there was no need for precipitating events to spur decisions to end the conflict. These differences could be

due to China much more deliberately using the bombardment as a screening tool, instead of the primary signaling purpose in other bombardment wars.

Conclusion

Both the 1954-1955 and 1958 Taiwan Straits crises emerged out of the Chinese civil war and the retreat of the Nationalist forces to Taiwan and other offshore islands. The Communists in mainland China wanted to gain control first of the islands immediately offshore, and ultimately Taiwan itself. However, an intervention by the United States or other capitalist powers would prevent China from achieving this goal. Thus, in both of the Taiwan Straits Crises, China used bombardment to both signal their resolve and capabilities and screen for the willingness of the United States to intervene in any attempt to take the offshore islands or Taiwan. By signaling their ability to cause significant damage to any intervention, they hoped to deter the United States and other capitalist countries from committing to the defense of Taiwan. At the same time, they hoped to determine whether they could militarily seize Taiwan and the other islands without provoking an intervention. Therefore, the situation was clearly in the no-concessions equilibrium, and bombardment served to signal and screen about a potential direct invasion.

These actions had mixed impact. The United States was in fact committed to the defense of Taiwan, despite the potential costs. The initial bombardment thus actually spurred the United States to conclude a defense treaty with Taiwan, and Congress to authorize the use of force if needed. On the other hand, the United States was not committed to defending the offshore islands, and convinced Taiwan to withdraw from many of them in 1955. Recognizing the United States' limited commitment, communist China thus ceased their bombardment in the first crisis.

Bombardment was renewed in 1958 for the same reasons, with the same results – showing that the United States was committed to the defense of Taiwan, but not the remaining offshore islands. With this new information, China changed their strategy, allowing Taiwan to retain the offshore islands in order to maintain their links to the mainland, and hopefully set the stage for eventual reunification.

The intensity of the bombardment, particularly during the 1958 crisis, mitigated the need for precipitating events. The 1958 crisis appears to have thus ended fairly quickly after China updated their understanding of the situation. While no clear precipitating event is evident in the 1954-1955 crisis, the fact that it continued for two months after the information was generally revealed does show the low marginal costs of bombardment.

Kosovo War

The next case I will examine is the 1999 Kosovo War. On March 24, 1999, NATO initiated Operation Allied Force by bombing Serbian installations. NATO's immediate objective was to end the humanitarian crisis caused by Serb offensive operations against the Kosovo Liberation Army (KLA), that had displaced thousands of ethnic Albanians. A longer-term objective was to create a political settlement resolving disputes between Serbia and the ethnic Albanian Kosovars over the status of Kosovo. After 78 days of bombing, Serbia largely conceded to NATO's terms on June 10, 1999.

Conflict Overview

The Kosovo War emerged out of the broader breakup of Yugoslavia. Following the breakup, many Kosovars wanted independence from the rump Yugoslavia (essentially Serbia).

However, this independence movement was firmly resisted by both the Serbian government and Serb minorities within Kosovo.

At the time of the war in 1999, Kosovo was a province within Serbia. Under the 1974 Serb Constitution, Kosovo had been granted autonomy within Serbia with many of the powers of the other Yugoslav Republics (e.g. Croatia, Bosnia). However, this autonomy had been revoked in July, 1990, due to both growing Serb nationalism and Slobodan Milosevic's efforts to increase his political power. While largely populated by ethnic Albanian, Kosovo did have a significant Serb minority, probably comprising about 10% of the population. In addition, Kosovo had significant historical meaning to Serbs, as the location of the "Field of the Blackbirds", where a Serb Army had unsuccessfully attempted to stop the Ottoman invasion in 1389. This battle served as one of the founding myths of the Serb nation. (Norris 2005, xx; Daalder and O'Hanlon 2000, 6-8)

With the breakup of the larger state of Yugoslavia in the early 1990s, there was a growing desire among ethnic Albanians for Kosovo's independence. For most of the period, this had involved peaceful political action, led by Ibrahim Rugova. The independence movement included setting up some parallel political institutions and some non-violent resistance and demonstrations. Overall, the independence movement hoped to gain international legitimacy and recognition, which would compel Serbia to offer Kosovo independence. (Daalder and O'Hanlon 2000, 8-10; Sell 2002, 264-265, 269-271; Henrikson 2007, 124-124)

Separate from the political movement, other Kosovar Albanians formed armed groups to fight for independence. In 1993, these were united into the Kosovo Liberation Army (KLA). The KLA used violent guerilla attacks, and even terrorism, in an effort to force Serbia to grant Kosovo independence. The failure of the peaceful movement and growing crackdowns by the

Serb government on peaceful protests led the Kosovar population to become increasingly radicalized. Starting in 1997, the KLA increasingly became the central pro-independence movement. (Daalder and O'Hanlon 2000, 10-11, Henrikson 2007, 125-126)

In 1998, a violent crackdown by Serb forces (some of it preemptive) led to a significant number of Kosovars fleeing, creating a potential humanitarian crisis. The growing conflict attracted attention by the US, NATO, and UN, who tried to negotiate a political settlement throughout 1998. Throughout the year, US (and to an extent NATO) leaders began developing a strategy of threatening airstrikes to convince Milosevic to agree to and implement a settlement. In October, 1998, Milosevic agreed to a cease fire and the deployment of an Organization for Security and Co-operation in Europe (OSCE) monitoring mission. He also stated his agreement with principles that could lead to a long-term political settlement. (Daalder and O'Hanlon 2000, 27-57; Henrikson 2007, 126-159; Sell 2002, 279-291)

However, the KLA was not included in the settlement. Thus, violence continued and then escalated in early 1999 (Daalder and O'Hanlon 2000, 57-59, 63-64; Henrikson 2007, 156, 158-159, 162-165). To stop the escalating violence, the US and NATO decided to work to create a long-term solution to the Kosovo conflict. Accordingly, they convened a summit at Ramboulet, France between the Serbian government and representatives of the Kosovo Albanians, including the KLA. Rather than simply mediate and let the two sides work out an agreement, US and NATO negotiators presented a near complete text that they believed would solve the conflict. The Kosovar delegation agreed to this text. However, the Serb delegation refused to agree, objecting to a number of provisions. In addition, Serbia was already looking at a potential military solution to the conflict (Sell 2002, 295-299; Henrikson 2007, 168-175; Daalder and O'Hanlon, 65-66, 69-84). Accordingly, Serbia launched a major operation (with

only limited discrimination) against the KLA, which displaced thousands of Kosovars and led to a potential humanitarian emergency. (Henrikson 2007, 174; Cordesman 2001, 15-16)

After a last-minute failed effort to get Serbia to agree to the Rambouillet agreement, NATO began bombing Serbia. NATO's objectives were, first, for Serbia to cease their offensive in Kosovo, allowing for the return of the refugees. Second, they wanted Serbia to agree to a long-term settlement on the lines of the Rambouillet proposal, including the deployment of a NATO peacekeeping force. Both NATO and Serbia anticipated that the other would back down after a few days. However, neither did. NATO steadily escalated the bombing, and began considering a ground campaign to force the Serb army out of Kosovo. Finally, after 78 days, Serbia agreed to a settlement very similar to the Rambouillet accords. (Daalder and O'Hanlon 2000; Henrikson 2007; Cordesman 2001, 20-32)

Causes of the War

The Kosovo War seems to be caused predominantly by a dispute about which equilibrium they are in. Serbia believed that the situation represented a no-concessions equilibrium, and thus they could safely refuse to meet NATO's demands. In contrast, NATO believed that the situation represented a concessions equilibria, and thus bombing would serve as a costly signal about NATO's ability to inflict costs on Serbia and resolve to do so. Accordingly, they believed that an air campaign would induce Serbia to make concessions. As the war went on, NATO began considering whether they might be in the no-concessions equilibrium, and accordingly began considering a ground invasion. At this point, bombing would also serve as a costly signal of NATO's willingness to begin a ground offensive, although that was at best a secondary purpose.

Overall, it is understandable within the context of my theory why the two different sides had different conceptions of which equilibrium was occurring. As noted, Serbia initially believed that the equilibrium was the no-concessions equilibrium. Thus, any NATO bombardment was likely symbolic, and would end shortly. This belief was bolstered by two factors. First, from Serbia's perspective, the conflict in Kosovo was an internal dispute. Thus, international norms of sovereignty would suggest that Serbia had the right to do what was necessary to secure their own population. In contrast, any NATO bombing would be a violation of sovereignty, and thus would arouse opposition. Second, NATO was demanding a significant change to the status quo. Not only did NATO want a resolution of the immediate humanitarian crisis, they wanted a long-term solution that would involve at least Kosovo's autonomy, and possibly independence. NATO also wanted the deployment of a NATO led peacekeeping force to implement the settlement (Henrikson 2007 170-171). The magnitude of these demands would thus mean that status quo biases should have made compellence ineffective. Previous experience might have bolstered this Serbian assessment. In particular, the US and UK's bombing of Iraq in 1998 over Iraq's refusal to cooperate with UN weapons inspectors lasted only a few days, and ended without inducing Iraq to cooperate with the inspections. (see Sell 2002, 300-301)

Notably, Milosevic did believe that NATO would bomb Serbia. Shortly before the bombing began, Milosevic told Richard Holbrooke "Go ahead and bomb us, you will never get Kosovo," and confirmed that he understood that rejecting the Rambouillet agreement meant NATO bombing (Sell, 2002, 299). However, he likely did believe that this bombing would be largely symbolic, and by holding out for a few days, NATO would cease the operation without achieving any concessions. Thus, he clearly believed that the situation was in the no-concessions

equilibrium. Since at this point, there was no hint of a NATO ground attack, he believed that Serbia could safely stand firm without risking major damage. (LeBor 2004, 286-287)

On the other hand, NATO also had reasons to believe that the situation was a concessions equilibrium. First, NATO believed that they were enforcing emerging post-Cold War norms of human rights and self-determination. Since NATO believed that they were enforcing these emerging norms, they had reason to believe that Serbia would be expected to make concessions. Second, the status of the US and NATO relative to Serbia made it possible that they would succeed in inducing Serbia to make concessions. The US at the time was the sole superpower, and was taking on the role of enforcing and developing global norms. Similarly, (alongside the EU), NATO was one of the most prominent international organizations operating in Europe. Here, it is also useful to note that while Russia was ambivalent about NATO's actions, they did not oppose NATO (Daalder and O'Hanlon 2000, 74; Henrikson 2007, 166). So, there were no major regional powers that fully supported of Serbia. Thus, NATO could believe that it was enforcing international order in the region, again making a concessions equilibria more possible. Finally, NATO could look at the success of the brief bombing campaign at the end of the Bosnia war (Operation Deliberate Force) as a model (Henrikson 2007, 109-110; Daalder and O'Hanlon 2000, 91-93). Since that was successful at inducing the local Serb forces⁴⁷ to stop fighting and come to the negotiating table, NATO leaders could believe that overall European countries would give in to NATO demands, as if a concessions equilibria was generally likely.

As the war progressed, some NATO leaders began to consider the possibility that bombing would not be sufficient to induce Serbia to agree to settle the situation. However, neither were these leaders willing to cease trying to resolve the situation in Kosovo. They thus

⁴⁷ In the Bosnia war, the Serb forces were technically independent of the Serbian or rump Yugoslav state, although they did receive substantial assistance.

began seriously considering a ground invasion of Kosovo. An invasion would both resolve the immediate humanitarian crisis and force Serbia to agree to terms on Kosovo's future status. The possibility of a ground invasion would have offered an additional rationale to the bombing. By continuing the air campaign, NATO would demonstrate that it was serious about resolving the situation, even if it took a ground invasion. Since there was no doubt that NATO could defeat Serbia militarily, the bombing could serve as a costly signal for NATO's intentions. (Daalder and O'Hanlon 2000, 130-132 155-158, 162-164; Cordesman 2001, 243-246)

Overall, NATO leaders certainly did intend bombing as a costly signal. They believed that it would show that NATO was serious about resolving the Kosovo situation, and had the capability to inflict significant costs on Serbia if they did not agree to NATO demands. However, believing that the situation was in one of the concessions equilibria, they intended it primarily as a signal about NATO's ability to inflict costs, and not on their willingness to embark on a ground invasion. There is no evidence that NATO leaders explicitly saw the bombing as a signal of NATO's willingness to embark on a ground invasion once they began considering ground operations. However, the bombing could serve this purpose. In addition, the potential for a ground invasion would have reduced any drawbacks of continuing the bombing. Hopefully the air campaign's signaling purpose would work, but if Serbia continued to refuse to comply then the bombing would at least help prepare the battlefield for a ground invasion by targeting Serbia's military capabilities.

Why the War Ended

After 78 days, Serbia did give in to essentially all of NATO's demands, including autonomy for Kosovo and the deployment of a NATO peacekeeping force (Daalder and

O'Hanlon 2000, 173-175). Ultimately, Milosevic came to believe that NATO would do whatever it took to impose its solution to the conflict. Milosevic may also have been worried about the increasing possibility of a NATO ground invasion, although this does not appear to have been decisive in the Serbian decision to concede. Thus, overall, Serbia changed their perception of the situation and came to believe that they were in a concessions equilibria, and the bombing revealed sufficient information to allow a negotiated end to the war. At the same time, the length of the bombing campaign and the role of Russian diplomats in prodding a solution show that the low marginal costs of bombing only reveal limited information.

Near the end of the conflict, Milosevic and other Serbian leaders seemed to realize that they needed to make concessions to end the war. NATO's continued bombardment and surprising unity seemed to have convinced Milosevic that they were in a concessions equilibria. Moreover, the costs of the bombardment to Serbia were becoming too severe, as NATO increasingly hit infrastructure and other economic targets. In fact, Milosevic said that he had become convinced that NATO would totally destroy Serbia if they did not concede. (Sell 2002, 306, 310-311)

In addition, it was becoming clear that Serbia could only inflict minimal costs on NATO in return. Only two NATO aircraft were lost to Serb air defenses, and both pilots were rescued (Haulman 2009, 7,8). Furthermore, as Serb air defenses were degraded by NATO airstrikes, the risks of future NATO aircraft losses would have diminished. As the no-concessions equilibrium requires that combat be mutually costly, the minimal costs to NATO further shifted the equilibrium into a concessions equilibria. Serbian realization that NATO was only suffering minimal costs would have reinforced their decision to concede.

A secondary factor in Milosevic's decision making may have been fears of a ground invasion. Russian diplomats did tell Milosevic that NATO was considering a ground offensive. Since NATO would surely win any ground war, the likelihood of a ground attack would have provided a significant inducement to concede. However, it is unclear how seriously either the Serbian leadership or Russian diplomats took the possibility that NATO would escalate to a ground attack. Instead, it appears that the primary impetus behind Milosevic's concession decision was the likely future costs of the air campaign, as detailed above. (Sell 2002, 311-312; Daalder and O'Hanlon 203-204; Norris 2005, 187)

Despite the relative effectiveness of the bombing in eventually convincing Serbia to concede to NATO demands about the resolution of the conflict, there is also clear evidence about how the low marginal cost of bombardment extended the war. First, despite the relative and growing intensity of the bombardment, and the lopsided power balance, Serbia did not concede until after 78 days of bombing. The lengthy nature of the bombardment demonstrates how individual air-strikes, or even individual days of bombing, were relatively ineffective at conveying information about NATO's capabilities and resolve.

The second element showing the low marginal effects of bombardment is the importance of Russian diplomats in getting Serbia to make concessions. Shortly before Serbia agreed to concede, Russia diplomats met with the Serbian leadership. They presented NATO's latest proposal, clearly conveyed that agreeing to that proposal was necessary for Serbia to end the bombing, and that that proposal was the best deal that Serbia could get. Russia was generally neutral in the conflict. However, they were in close contact with NATO leaders. At the same time, Russia had historic ties to Serbia that meant they were trusted by the Serbian leadership. Thus, Russia's approach to the Serbian leadership is the exact sort of catalyzing event that I

postulated could be necessary to end bombardment wars. Because of the low marginal information value of bombing, the Russian delegation probably conveyed a significant amount of information both about which equilibrium existed and NATO's resolve within that equilibrium. (Norris 2005, all, but especially 182-194)

Conclusion

Overall, the Kosovo War appears to be in a concessions equilibria, although it does have some elements of the no-concessions equilibrium. NATO appears to have believed that the threat of bombardment alone would be sufficient to get Serbia to agree to NATO proposals on the future of Kosovo. In addition, Serbia does ultimately make these concessions, after Milosevic becomes convinced that NATO will "totally destroy" Serbia through the bombing. The fact that a ground war threat was unnecessary or not central shows that the conflict was in a concessions equilibria. The situation being in a concessions equilibria makes sense, as NATO was an intergovernmental organization led by the United States as the sole superpower, and the bombing was intended to enforce norms of human rights and self-determination. All of these are factors I suggested would make concessions equilibria more likely. At the same time, Serbia initially adopts a no-concessions policy, believing that NATO's bombardment will be short. In addition, NATO began considering a ground invasion, which plays an ambiguous role in Serbia's ultimate decision to concede. Thus, the war appears to be at least partly a result of which equilibrium existed.

The war does clearly end with the bombardment revealing NATO's capability to inflict costs on Serbia, as well as their resolve to keep bombing until Serbia conceded. As noted, Milosevic ultimately believed that NATO would "totally destroy" Serbia. The bombardment

may also have conveyed that NATO was willing to begin a ground invasion to settle the issue directly if Serbia did not concede, although this appears to have played a secondary role. Thus, information revelation does explain the end of the war.

At the same time, the Kosovo War clearly displays the low marginal costs of bombardment, and the need for precipitating events to prompt a reevaluation of the information revealed by bombing. The bombardment lasted for seventy-eight days, despite the clear power disparity between NATO and Serbia. In addition, it took a visit by Russian diplomats to prompt Milosevic and the other Serbian leadership to reevaluate the likely outcome of the war, and ultimately agree to make concessions. This is exactly the type of precipitating event I suggested often is required to end bombardment wars.

Egyptian-Israeli War of Attrition

The final full bombardment war is the Egyptian-Israeli War of Attrition in the late 1960s. This war followed the 1967 Arab-Israeli War, and was an Egyptian attempt to convince Israel to return the captured territories. Ultimately, it ended without any change to the status quo.

Conflict Overview

The War of Attrition involved heavy exchanges of artillery fire between Israel and Egypt across the Suez Canal. Formally lasting from March 1969 through August 1970, less intense artillery exchanges had begun in 1967. While fighting was never particularly intense, the War of Attrition did cause significant casualties. 260 Israeli soldiers were killed, and another 687 were wounded. Egyptian casualties numbered in the thousands, although precise numbers are unavailable (Clodfelter 2008, 616).

The War of Attrition emerged out of Egypt's defeat in the 1967 Arab-Israeli War. During the 1967 War, Egypt had lost control of the entire Sinai Peninsula (up to the Suez Canal). Moreover, the Egyptian military had been routed, which Egyptians perceived as a humiliating defeat. Following these losses Egypt wanted both to regain control of the Sinai Peninsula and restore their belief in their military capabilities. However, Egyptian leaders knew that in 1967, their military was not capable of directly recapturing the Sinai Peninsula. So, while Egyptian leaders felt the need to continue the conflict, they were unable to begin another conventional ground war. Thus, Egyptian began to use bombardment and small-scale raids across the Suez Canal, to pressure Israel without escalating to full scale war. (Korn 1992)

The War of Attrition can generally be divided into three phases. The first phase consisted of sporadic but gradually escalating incidents. These incidents included artillery bombardment, commando raids, and, most significantly, the sinking of the Israeli destroyer *Eilat*. This phase started immediately after the end of the Six Day War and lasted until early 1969. During this first phase, Israel constructed a number of fortified outposts along the Suez Canal to provide shelter for their soldiers. Egypt found the construction of these outposts provocative, as they indicated Israel's intent to retain control of the Sinai Peninsula for a long time, if not permanently. (Korn 1992, 75-120, especially 90, 93-99)

In March 1969, the Egyptian leadership deliberately escalated the conflict by bombarding Israeli positions with both increased intensity and frequency. Israel responded in kind, initially with their own artillery, and then with aerial attacks near the canal and commando raids into Egyptian territory. This phase lasted for the remainder of 1969, and saw a significant increase in the casualty rate for both sides. (Korn 1992, 108-110, 116-120, 166-176; Bar-Simon-Tov 1980, 43-115)

Faced with steady bombardment that created continuous casualties, Israel counter-escalated the conflict in January 1970 by launching a series of air attacks deep into Egyptian territory. Targets included military facilities within thirty kilometers of Cairo (Korn 1992, 176-188; Bar-Simon-Tov 1980, 117-136). To counter these attacks, Egypt sought assistance from the Soviet Union, who deployed fighter aircraft, advanced surface to air missiles (SAMs), and personnel for both (Korn 1992, 189-198, 225; Bar-Simon-Tov 1980, 137-139, 145-166; Ginor and Ramez 2017, 113-160). The Soviet deployment posed both a direct risk to Israeli aircraft engaged in the raids, and an indirect risk that continued fighting would lead to a more extensive Soviet intervention. Israel thus halted the deep air attacks, while continuing reprisals against Egyptian bombardment along the canal (Korn 1992, 203-204, 225-234; Bar-Simon-Tov 1980, 166-170).

At this point, the United States stepped in to facilitate a cease-fire to end the war. Both sides agreed to stop firing on the opposing forces. In addition, they agreed not to do anything to change the military balance within fifty kilometers of the canal. Egypt soon breached this second provision by moving advanced SAMs near the canal. Finally, they agreed to begin negotiations for a long-term settlement of the disputes, although these negotiations never began. (Korn 1992, 235-272; Bar-Simon-Tov 1980, 175-185)

Causes of the War

The core element of the War of Attrition is Egypt's bombardment of Israeli positions along the Suez Canal, which naturally prompted local counter-bombardment. Egypt's initiation of the War of Attrition is best understood within the no-concessions equilibrium, as an attempt to screen for whether and when they would be capable of mounting a conventional attack across the

Suez Canal. However, Egypt may also have hoped that the situation was in fact in a concessions equilibria, and the costs of bombardment would be enough to induce Israel to return the Sinai Peninsula without a conventional ground war.

In addition to Egypt's bombardment of Israeli positions, it is also useful to look at Israel's decision to escalate by launching air attacks deep into Egypt. This was partly a simple response to Egypt's bombardment. However, the deep air attacks had the additional purpose of convincing Egypt to cease their efforts to regain the Sinai Peninsula, and even replace Nasser at their leader. Thus, the deep air attacks can be seen as a separate bombardment campaign, which Israel mistakenly thought of as in the concessions equilibria.

Egypt's bombardment clearly occurred within the no-concessions equilibrium, as Israel adopted a clear no-concessions policy. Prime Minister Golda Meir stated that "each Israeli casualty ... were like knives being turned in the heart of the entire nation ... but we didn't [give up] – because we couldn't afford to (Meir 1975, 381)." She goes on to state that only by maintaining their position and striking back would Egypt be deterred from further aggression. Thus, while Egypt may have been thinking about both equilibria, Israel was clearly playing the no-concessions equilibrium.

Egypt's actions are also consistent with the no-concessions equilibrium. In particular, one of Egypt's major purposes of the war of attrition appears to be to gain additional information on the military balance, while demonstrating Egyptian resolve to retake the Sinai Peninsula by force. After their defeat in the 1967 Arab-Israeli War, Egyptian leaders formulated a multi-stage plan to regain the lost territories. In the first stage of the plan, Egypt would rebuild and reorganize their military forces to make them capable of retaking the peninsula. The second stage would involve increasing military confrontations with the Israeli forces, such as through

bombardment. Finally, the Egyptian army would cross the Suez Canal in strength to militarily reclaim the Sinai Peninsula (see Asher 2009, 22; Korn 1992, 93).

The War of Attrition fulfilled the second stage of this plan. Within the broader strategic plan, it likely served two functions. First, it allowed Egyptian leaders to gather information about the relative strength of Egypt and Israel, helping them to determine when a conventional ground attack would be possible. Second, it served to signal Egyptian resolve to regain the Sinai Peninsula by force if necessary. Hopefully, this would induce Israel to cede the Sinai Peninsula preemptively before Egypt had a chance to invade.

The first purpose of the War of Attrition would be to help gather information on Israeli capabilities, helping to prepare for the eventual ground offensive. As noted, after the 1967 Arab-Israeli War, Egypt immediately began rebuilding their army and attempting to improve their military capabilities. In addition to directly rearming defeated military units, the Egyptian army intensively studied what had gone wrong during the war. They used this knowledge to reorganize and retrain their military, as well as significantly improving leadership by the army's officers (Korn 1992, 89-93; Asher 2009 13-20, 24-25). Sadat even claims that the Egyptian military had been trained on new weapons supplied by the Soviet Union within five months of their defeat (1978, 185), although obviously this must be taken with a grain of salt. The War of Attrition would thus be a relatively low-risk way to test Egyptian growing capabilities. This would first allow them to identify additional deficiencies that needed to be improved, in essence turning the War of Attrition into another training session (Asher 2009, 23). It would also help Egypt determine at what time they could launch a conventional war with a reasonable chance of success.

One particular deficiency that Egypt needed to rectify was their inability to contest Israeli air superiority, which was a major factor in their defeat in the 1967 war. Immediately after the end of the war, Egypt asked for Soviet help in reorganizing their air defenses, including the provision of new SA-2 missiles, effective against aircraft at long ranges and high altitudes (Ginor and Remez 2017, 17-20). However, during the early stages of the War of Attrition, these missiles showed that even the reorganized air defenses had little effect on Israeli air superiority. Accordingly, Egypt requested additional help in the form of advanced MiG-21 fighters, and SA-3 missiles optimized against low to medium aircraft. This request was granted, and the Soviets began deploying the aircraft in February, 1970 (Ginor and Remez 2017, 123-124, 156-160). The new equipment proved quite effective at combating Israeli air superiority, and the Israeli Air Force lost several fighters over the following months (Ginor and Remez 2017, 175-197; Korn 1992, 225-235). The knowledge of their improved air defenses played a crucial element in Egyptian plans for the 1973 Arab-Israeli War (Shazly 1980, 21).

Thus, it is likely that Egypt's primary aim in the War of Attrition was to test whether they had sufficiently improved both their ground and air-defense capabilities for a conventional offensive across the canal to be viable. However, Egypt likely also hoped that the War of Attrition would spur Israel to cede the Sinai Peninsula voluntarily. The War of Attrition could do this in two ways.

First, Egypt might have hoped that the situation was in fact in a concessions equilibria, and thus the threat of punishment alone might spur a negotiated settlement. Egyptian leaders believed that Egypt was both better able to absorb costs and could sustain war for a longer period of time. Because Egypt's population was substantially larger, even equivalent numerical casualties would represent a smaller proportion of the population, and thus would seem to have

less of an effect on popular opinion. Egyptian leaders also believed that their nationalist ideology, along with fighting over lost Egyptian territory, would make the Egyptian population less sensitive to casualties than Israel's (Bar-Simon-Tov 1980, 44-59; Korn 1992, 107-110). Given these factors, the Egyptian propagandist Mohamed Heikal boasted that Egypt could better sustain 500,000 casualties than Israel could sustain 10,000 (Ginor and Ramez 2017, 104).

However, as previously noted, the situation was in fact in the no-concessions equilibrium. Thus, the bombardment would also serve to demonstrate Egyptian resolve to escalate the situation to a ground war if needed. As noted, Egypt did in fact see the War of Attrition as part of a longer strategy, likely culminating in a military offensive to retake the Sinai Peninsula. However, any conventional offensive to retake the peninsula would be difficult and costly to both sides. If Israel could be convinced that Egypt had the ability and willingness to escalate the conflict, they might be convinced to negotiate a settlement. It is unclear the extent to which using attrition as a costly signal of Egyptian capabilities and resolve drove Egyptian decisions, but it was likely part of their calculations. (see Asher 2009, 27-28; Bar-Simon-Tov 1980, 57 for some supporting evidence)

Israel's deep bombing raids near Cairo partially represent a second bombardment conflict. As noted above, in early 1970, they decided to escalate the bombing by attacking targets deep within Egypt. These raids were intended primarily to increase Egyptian costs for continuing the conflict. In combination with Israel's no-concessions policy, Israel hoped that they would induce Egypt to accept a ceasefire (see Dayan 1976, 449; Meir 1975, 382, 384). To the extent that the deep bombing raids were primarily in response and retaliation to Egypt's bombardment along the canal, they would simply increase Egypt's costs within the Egyptian initiated bombardment war, reinforcing Egypt's inability to extract concessions.

A secondary reason for the deep bombing raids appears to have been to replace Nasser as President of Egypt as some Israeli leaders believed that Nasser could not be trusted. Some Israeli leaders hoped that showing the Egyptian people the costs of the War of Attrition would induce a revolution or coup (see Eban 1992, 483-484; Bar-Simon-Tov 1980, 120-125). To the extent that the bombing raids were an attempt to replace Nasser, they would constitute a separate bombing campaign. Since there was never any suggestion of a ground invasion to replace Nasser, Israel had to be hoping that they were in a concessions equilibria. However, this appears to have been a mistake on their part, and the situation was quickly revealed to be in the no-concessions equilibrium when the bombing had no effect on Nasser's regime. However, replacing Nasser has to be seen as a distinctly secondary rationale for the bombing missions. Neither Prime Minister Meir (1975, 382, 384) nor Defense Minister Moshe Dayan (1976, 449) mention replacing Nasser as a reason for the raids. Accordingly, Israel's primary strategy was simply to maintain a policy of not agreeing to substantive concessions, while engaging in retaliatory bombardment to demonstrate to Egypt that continuing the war would be mutually costly, and thus irrational.

Why the War Ended

The War of Attrition ended on August 7, 1970 as both sides accepted a cease-fire agreement. Both sides agreed to stop firing on the other, and agreed not to change the military balance within 50 km of the Suez Canal. In addition, there were hopes that further efforts would lead to a wider political settlement to the conflict. However, Egyptian forces violated the provision not to change the status quo by moving additional SAM batteries near the canal. Few additional negotiations took place before the next war. (Korn 1992, 259-272)

The end of the war can be explained by two factors. First, both sides realized that they were in the no-concessions equilibrium, and threatening further bombardment alone would not change the status quo. In addition, Egypt appears to have realized that bombardment would be unsuccessful at convincing Israel that Egypt had the military capability to retake the Sinai Peninsula in the near term, and thus would be ineffective at inducing Israel to negotiate under the threat of War. The second factor is that Egypt had also gained the information they needed on their relative capabilities. Thus, Egypt could begin planning the conventional war, and further fighting was not needed. At the same time, it took US pressure on both sides to actually agree to a ceasefire, representing a precipitating event as I hypothesized.

By the time of the ceasefire, the War of Attrition had clearly failed to make either side offer substantive concessions, making it clear that the situation was in fact in the no-concessions equilibrium. Even after a year and half of bombardment and hundreds of casualties, Israel had not made any move to negotiate. Instead, they had responded with increasing levels of force. Even the introduction of advanced air defenses and a dogfight with Soviet pilots had not seemed to change Israel's calculus. Thus, Egypt could conclude that continued threats were unlikely to be successful and the situation was in the no-concessions equilibrium.

In addition, Israel had not become concerned that Egypt was about to attack on the ground, and had not made any offers to negotiate based on the possibility of an additional war. In contrast, Israeli intelligence was quite confident that Egypt was not ready for another war, and was completely surprised when Egypt did attack in 1973 (Bar-Joseph 2005). Thus, the War of Attrition had also failed as a costly signal that Egypt was ready to mount a ground attack. Thus, it had become clear that further bombardment would not be useful at achieving Egypt's political goals.

Similarly, Israel's deep bombing raids had also failed to shake the Nasser government. Neither had Egypt offered any concessions to get the bombing to stop. If anything, Nasser's government appeared more secure (Bar-Simon-Tov 1980, 140). Thus, it had also become apparent that Israel's attempted to change the regime through bombardment was also in the no-concessions equilibrium. Since Israel was otherwise satisfied with the pre-war status quo, they thus also had little reason to continue the war.

In addition to realizing that continued bombardment would be ineffective at inducing concessions, either through the direct threat of bombardment, or serving as a costly signal for a ground war, the bombardment had also given Egypt the information they needed to assess their chances in a ground war. In particular, Egypt had realized that the deployment of new SAM systems could conceivably neutralize the Israeli air force, enabling a ground offensive across the Suez Canal. Shortly before the cease fire, Israeli aircraft had lost several F-4 Phantom and A-4 Skyhawk fighters to SAM missiles (Korn 1992, 225-234). These represented the most modern fighters in Israel's arsenal, showing that even they were vulnerable to the air defenses. Israeli air superiority, and thus their ability to use their air force as "flying artillery" had been key to their victory in the 1967 war. Neutralizing this advantage was thus key to enabling an Egyptian ground offensive to reclaim the Sinai Peninsula.

Egypt could thus begin preparing for the ground offensive, and continuing to incur the costs of bombardment would serve little purpose. In discussing the ceasefire, Egyptian leaders made statements that they were negotiating from a position of strength, and that the overall strategic balance had shifted in their favor (Bar-Simon-Tov 1980, 179-180; Korn 1992 251-252). While undoubtedly partly propaganda, these statements would also be consistent with a belief

that Egypt could in fact begin preparing a ground offensive.⁴⁸ In addition, Egypt carefully limited the initial ceasefire to three months, giving them the opportunity to attack when they were ready (Korn 1992, 254).

The War of Attrition thus ended with the resolution of uncertainty. Both Egypt and Israel had realized that further bombardment would be ineffective. In addition, Egypt had gained enough information about their improved air defenses to feel confident in beginning to plan a ground attack to retake the Sinai Peninsula.

However, it is notable that the actual end to the conflict came through American mediation and pressure. US Secretary of State Rogers decided to push for an end to the war, and negotiated with both sides an acceptable ceasefire (Korn 1992, 235-263). The U.S. also promised to provide additional fighter aircraft to Israel as an extra inducement to sign the ceasefire (Korn 1992, 255). The U.S. mediation efforts are the type of precipitating event that may be necessary to end the war. Each day of bombardment incurred relatively few casualties, and so there was limited reason to agree to a ceasefire at any particular time. Israeli aircraft losses were somewhat more potent at conveying information, and may have helped induce Israel to sign the ceasefire (Korn 1992, 256). However, Israel was largely the status quo side. Egypt did not have any particular points in time that would make it clear when they had gathered enough information to end the war. Thus, the Rogers mediation efforts served as a precipitating event, prompting both sides to consider whether ending the war was in their interests.

⁴⁸ The actual attack did not occur for another three years. This is partly because Nasser's death interrupted the planning, and partly because developing the actual operational plan proved quite difficult.

Conclusion

The War of Attrition, lasting predominantly from March 1969 until August 1970 occurred for a couple reasons. First, Egypt hoped that they could convince Israel that Egypt could inflict unacceptable costs on Israel. However, Israel generally adopted a no concessions policy, and Egypt never really expected them to concede without further fighting. Thus, Egypt's primary purpose in fighting the war of attrition was to gain information on whether their rebuilt military could compete with the Israeli forces. The introduction of advanced SAM systems acquired from the Soviet Union showed that Israeli air superiority could be neutralized, thus enabling a crossing of the canal once these systems had been emplaced. Thus, Egypt became willing to settle the war. Nevertheless, war termination required the catalyst of the Rogers initiative given the low marginal stakes of continued fighting.

Vietnam War Air Campaigns

The fifth bombardment campaign I will examine is the US air campaigns in the Vietnam War. The Vietnam War, and the broader conflicts in Southeast Asia, represent a complicated conflict with many overlapping parts. The primary element of the Vietnam War is the conflict between South Vietnam and the United States (among others) against the Viet Cong guerillas and regular North Vietnamese army. This conflict within South Vietnam is best categorized as a Vietnamese civil war, with substantial international support, and so will not be further discussed. However, alongside the civil war in South Vietnam,⁴⁹ the United States conducted extensive air campaigns against North Vietnam from 1964 through 1968 and in 1972. While these were partly

⁴⁹ The Correlates of War also codes separate Wars in Laos and Cambodia that were intimately connected to the Vietnam War, as they were primarily over supply routes to Viet Cong and North Vietnamese guerillas in South Vietnam. I have gone ahead and treated these as conventional ground wars for the analysis in Chapter 4.

to support the fighting in South Vietnam by interdicting supply routes, they had the primary aim of coercing North Vietnam to cease military support for the Viet Cong. These air campaigns can thus be seen as a relatively separate conflict that would be categorized as a bombardment war. I will focus on the bombing of North Vietnam, as US bombing missions in South Vietnam, Laos and Cambodia were more tactical efforts to stem the flow of supplies into South Vietnam.

Conflict Overview

As noted above, the air campaigns were rooted in the broader Vietnam and Southeast Asia conflicts. This broader conflict thus led to two major air campaigns against North Vietnam: Operation Rolling Thunder from 1964-1968⁵⁰, and Operation Linebacker II in 1972.

The Vietnam war overall was over the status of South Vietnam. When France withdrew from Vietnam in 1954, Vietnam was split into two North and South Vietnam. The communist Viet Minh guerillas took charge of North Vietnam, while South Vietnam remained non-communist. Elections were supposed to take place in 1956 to determine the leadership of a reunited Vietnam, but these elections never occurred. After this, a communist insurgency (the Viet Cong) within South Vietnam developed, with the aim of both installing a communist government in the south and eventual reunification with the north under communist leadership. The Viet Cong were both heavily supported by North Vietnam, and to a large extent took direction from the North Vietnamese government. (Kort 2018; Sarkees and Wayman 2010, 155-156)

⁵⁰ Officially, Operation Rolling Thunder did not begin until 1965. However, the few bombing raids in late 1964 can be seen as an immediate precursor to Operation Rolling Thunder, escalating nearly seamlessly to the later campaign. I will thus treat them as part of the Rolling Thunder campaign.

The United States became increasingly involved in the conflict throughout the 1960s, before drawing down and ultimately withdrawing from the conflict in the 1970s. The United States began by providing substantial material assistance to South Vietnam, and increasingly deployed advisors to train and support South Vietnamese forces (Kort 2018, 98-101; Turley 2009, 30-33, 58-62). In August 1964, there were two incidents where the USS *Maddox* believed they had been attacked by North Vietnamese torpedo boats (McNamara 1996, 127-142).⁵¹ In response, the US bombed targets in North Vietnam. A Viet Cong attack on a US air base in South Vietnam in February 1965 led to further retaliatory air strikes. US ground forces were introduced shortly thereafter, while US air attacks against North Vietnam escalated to a continuous air campaign, named Operation Rolling Thunder. Operation Rolling Thunder continued until 1968, with several short bombing pauses to signal a willingness to negotiate. The campaign was finally terminated in November, 1968 hopefully to facilitate peace talks. (Turley 2009, 84, 123-132; Kort 2018, 123-139; Frankum 2005, 15-66)

Following the Easter Offensive in 1972, the United State resumed bombing North Vietnam. Operation Linebacker I lasted from May to October 1972, and was tactically focused on interdicting supplies to North Vietnamese forces in South Vietnam. At this point, peace negotiations had nearly led to an agreement to wrap up American involvement in the war, and so the bombing campaign ended. However, after the South Vietnamese government rejected the initial agreement draft, the North Vietnamese government also backed away from their proposed concessions. To bring North Vietnam back to the bargaining table, an intense air campaign - Operation Linebacker II was launched in December and lasted for 11 days. Shortly after the end of Linebacker II, a peace agreement was signed in January 1973, ending US involvement in the

⁵¹ The first attack occurred, but without orders from the North Vietnamese government. The second attack apparently did not occur, but US decision makers believed it had.

conflict. Fighting between South and North Vietnamese forces continued and then escalated, leading to the North's conquest of South Vietnam in 1975 without further US involvement.

(Frankum 2005, 149-166; Turley 2009, 187-196)

Causes of the Air Campaigns

Because they were tied to the broader conflict in Vietnam and Southeast Asia, each of the bombing campaigns had multiple objectives. Strategically, they aimed to coerce North Vietnam into ceasing support for the guerilla forces in South Vietnam. This would be achieved by both imposing, and threatening to impose, costs on North Vietnam as well as signaling US commitment to South Vietnam. At the same time, the bombing campaigns had a narrower operational objective of limiting the ability of North Vietnam to supply the guerilla forces in the South by interdicting supply routes and destroying production and storage facilities. Only the strategic element fits in with the theory of bombardment wars, as the operational goal cannot be separated from the outcome of the war in South Vietnam. Below, I will discuss how these goals and North Vietnam's response caused first the Rolling Thunder campaign from 1964-1968, and then the Linebacker campaigns in 1972. (see Frankum 2005, 19-21, 154-157, 163-166; McNamara 1996, 135, 151-153, 171)

Throughout the Rolling Thunder campaign, North Vietnam clearly adopted and followed a no-concessions policy. In April 1965, shortly after the beginning of the full Rolling Thunder campaign, North Vietnam adopted the Four Point Plan stating its terms for an end to the conflict. The first point included the US ceasing all acts of war against North Vietnam as a precondition for peace. Indeed, North Vietnam generally refused any formal negotiations while the bombing campaign lasted. This specific refusal to negotiate while the bombing continued was part of a

broader North Vietnamese belief that they had an advantage in dictating the terms of the settlement, as North Vietnam was intimately connected to the outcome of the conflict in a way that the United States was not. It is thus clear that at least North Vietnam believed, ultimately correctly, that the situation was in the no-concessions equilibrium. Simply refusing to make any concessions would eventually lead to the United States ceasing the bombing campaign. (Guan 2002, 81-83, 87-90, 109-110; An 1998, 83, 85-86, 89, 98-99, 108-109, 111, especially 115-116, especially 309-310; McNamara 1996, 291)

If the situation was the no-concessions equilibrium, why then did the United States actually initiate the Rolling Thunder bombing campaign? First, the primary explanation that I offered in the previous chapter is not viable – the campaign is not plausibly a signal of US intent to initiate a ground invasion or otherwise conduct actions that would more directly achieve American goals. The US never intended to invade North Vietnam, nor did they try and bluff that such an invasion was possible. On the other side, North Vietnam was never seriously worried that the US would invade. (Guan 2002, 90; An 1998, 86, 101)

Neither does it make much sense that the air campaign would signal American commitment to militarily defending South Vietnam, especially beyond the first few months. The US deployment of ground forces in South Vietnam, especially once these forces started to suffer casualties, would serve as a far more significant signal of resolve. The air campaign was initiated at nearly the same time as the introduction of US ground forces to South Vietnam (Turley 2009, 84-85). So, the initial air strikes may have helped signal US commitment. However, the continuation of air campaign after significant US forces arrived in theater cannot be explained as a rational costly signal.

A second potential explanation would be that the Rolling Thunder campaign was not actually intended to coerce North Vietnam. Many of the targets were either supply depots, or key transportation infrastructure such as bridges (Frankum 2005, 20-67, especially 34-35, 54, 58). Destroying these targets would limit the ability of North Vietnam to supply guerilla forces in the south. While this would be a logical explanation, the evidence is clear that US decision makers did intend the Rolling Thunder campaign to directly coerce North Vietnam (Frankum 2005, 20; Kort 2018, 125, 127, 130; McNamara 1996, 171-172, 219-220). In particular, the pace of the campaign was intended to provide a constant sign of US capabilities and resolve, while bombing pauses were intended to signal a willingness to negotiate. Thus, there was clearly a coercive element to the US strategy in the Rolling Thunder campaign.

Finally, it is possible that US decision makers erroneously thought that the situation was one of the concessions equilibria, rather than a no-concessions equilibrium. Two of the elements that would make a concessions equilibria likely are present in this case. First, the US is a major power, while North Vietnam was not. Second, the US could point to North Vietnamese sponsorship of the Viet Cong guerillas as a violation of international sovereignty norms. Thus, the US could understandably believe that threatening to destroy Vietnamese industrial targets, and thus impose severe costs on North Vietnam, could induce North Vietnam to cease supporting the South. All that would be necessary would be to signal the ability and willingness of the US to inflict this punishment by bombing select targets. However, as previously noted, this belief that concessions were possible turned out to be erroneous. North Vietnam had in fact adopted a no-concessions policy. As I will show in the next section, this ultimately led to the US giving up on the Rolling Thunder campaign.

The situation was quite different when the Linebacker campaigns occurred in 1972. At this point, North Vietnamese regular forces had taken over the bulk of the fighting in South Vietnam. As these regular forces included a larger amount of heavy equipment, they were more vulnerable to supply interdiction (Turley 2009, 185; Kort 2018, 188-192; Frankum 2005, 168). Second, the US was attempting to disengage from the conflict, and so was fairly willing to sign any agreement that avoided the appearance of outright defeat (Turley 2009, 172-179, 189-196). Finally, North Vietnam had also wearied of the long war, and so was at least somewhat more conciliatory (An 1998, 163-164). It is in these changed circumstances that the US renewed bombing of North Vietnam.

Linebacker I occurred in response to the North Vietnamese Easter offensive of 1972, a major conventional attack to wrest territory from the South Vietnamese government. In support of the South Vietnamese, the US resumed bombing North Vietnam. In contrast to the Rolling Thunder offensive, Linebacker focused on denying supplies to the North Vietnamese forces. It was thus largely an operational level effort in direct support of the war in the south. Linebacker I does not need to be considered further, as it did not have independent strategic aims. However, the defeat of the Easter Offensive set the stage for Linebacker II, a more directly coercive campaign. (Frankum 2005, 156-163; Tilford 1991, 228, 234, 248)

Linebacker II had the explicit aim of coercing North Vietnam to return to the negotiating table while reassuring South Vietnam that the proposed agreement was acceptable (Frankum 2005, 163-166; Kort 2018, 194-195; Turley 2009, 192-194). Interestingly, North Vietnam had already agreed to every substantive part of the agreement the US sought. However, South Vietnam's reluctance to sign had led North Vietnam to back away from its initial commitments (Turley 2009, 190-192, 194-195; An 1998, 173-186). Through a short, intense bombing campaign, the

US thus sought to both convince North Vietnam to agree to the initial draft while also reassuring South Vietnam that the agreement was acceptable. Because of the changed circumstances, the Linebacker II campaign can be explained as a costly signaling device against both North and South Vietnam.

As previously noted, North Vietnam had previously been satisfied with the entire substantive portion of the draft agreement. The draft agreement provided for the withdrawal of all US forces from Vietnam, while explicitly allowing North Vietnamese forces to remain in South Vietnam. While North Vietnam would not at this point gain their goal of installing a communist government in the South, the agreement would set the conditions for eventually overthrowing the South Vietnamese government and reuniting the country. Thus, any delay in signing the agreement would only delay North Vietnamese success by continuing US military support for the South Vietnamese government. The Linebacker II campaign could thus easily serve as a demonstration that the US was willing to continue providing the South Vietnamese forces with airpower support. It thus would be rational for the US to execute the Linebacker II campaign as a costly signal to demonstrate that the US continuing commitment.

The Linebacker II campaign also could have been a rational effort to convince the South Vietnamese government to sign the agreement. The South Vietnamese government was understandably upset that the agreement would allow North Vietnamese forces to remain in South Vietnam while ceasing US military support. The Nixon administration had made private commitments that they would provide airpower support to South Vietnam if the government was in danger of being overrun (Turley 2009, 190-194). However, The South Vietnamese government reasonably doubted the credibility of this commitment. By bombing North Vietnam, the US showed that the US was willing to continue to provide airpower support if needed. Thus,

the Linebacker II campaign also served as a costly signal of US resolve to continue supporting South Vietnam if needed.

Why the Air Campaigns Ended

As I discussed in the previous section, the best explanation for the Rolling Thunder campaign is that the US erroneously thought that the situation represented a concessions equilibrium. US leaders eventually realized that the bombing campaign was not going to lead to North Vietnamese concessions. However, it still took considerable time to end the bombing campaign. The length of the bombing campaign can be explained by two factors. First, the operational benefits in reducing supplies to the guerillas in the South may have made it seem worth pursuing, even if the bombing campaign wasn't going to successfully coerce North Vietnam. Second, the low marginal cost of continuing the campaign took several precipitating events to lead decision makers to cease the bombing – in particular the Tet Offensive, President Johnson's decision not to seek reelection, and ensuing events.

American decision makers did realize that the bombing campaign was unlikely to directly induce North Vietnam to make concessions, in some cases fairly quickly (Tilford 1991, 108, 111; McNamara 1996, 179-180, 182-183, 213-214). Decision makers also eventually concluded that the campaign was not having a significant effect on North Vietnam's ability to supply guerillas in South Vietnam. Without much heavy equipment, the guerillas' supply needs were limited. Many of these supplies, such as food and clothing, could be obtained locally from the South Vietnamese population. Therefore, even a successful interdiction campaign would have limited impact on the guerilla war in South Vietnam. Moreover, the limited supply needs made it nearly impossible to successfully interdict the flow of needed supplies, such as ammunition,

into South Vietnam. At least some decision makers realized these facts relatively early on, and certainly before the campaign actually ended in 1968. (Tilford, 1991, 111-113, 115, 120-121, 133-135; Special National Intelligence Estimate 1965; McNamara 1996, 228, 244-245, 265, 287-288)

A partial explanation for why the US continued the campaign, even believing it was unlikely to have positive impacts, is that continued bombing had relatively low marginal cost. Overall, the US lost over 1,200 air crew killed, wounded or captured and about 929 aircraft over North Vietnam between 1965 and 1968. This amounts to less than less than one per day during the campaign (Clodfelter 2008, 745). In comparison, the US suffered about 30,000 killed and 102,000 wounded in ground combat between 1965 and 1968, the approximate time of the Rolling Thunder campaign (Clodfelter 2008, 720, 763). Thus, given the scale of the overall conflict, continuing the bombing campaign had relatively small direct costs.

The military benefits of interdicting supplies to the south would have further reduced these costs. Given that the bombing had a limited effect on the ability of North Vietnam to continue supplying the guerillas, these benefits were likely small, and probably did not outweigh even the relatively small marginal costs of continuing the bombing campaign. However, they would have reduced the marginal costs, making it easier to keep the bombing campaign underway in the hopes that it would work.

Given these very low marginal costs of continuing the Rolling Thunder campaign, several precipitating events were needed to spur decision makers, and ultimately President Johnson, into suspending the bombing campaign. The first important event was the Tet Offensive in South Vietnam. Viet Cong guerillas supported by some North Vietnamese soldiers attacked South Vietnamese and US positions en-masse. While decisively defeated, the Tet

Offensive represented a significant moment psychologically. In particular, it showed that previous counterinsurgency operations had not significantly degraded the capabilities of the guerillas. It also showed that the bombing had not succeeded in significantly limiting supplies to the guerillas. (Tilford 1991, 149-150; Frankum 2005, 59)

Following the Tet Offensive, President Johnson both decided not to seek reelection, and declared a cessation of bombing above the 20th parallel on March 31 and then the 19th parallel on April 3. The decision to limit bombing to below the 19th parallel excluded most of North Vietnam, including Hanoi and the port of Haiphong, and thus almost all of the major targets in Vietnam. This in turn would have ended any coercive element to the Rolling Thunder campaign. Thus, the Tet Offensive, even though a military failure, created pressure to reevaluate US military strategy in Vietnam, and led the US to cease any coercion attempts. (Tilford 1991, 152-153; Frankum 2005, 61)

A second precipitating event was Clark Clifford's replacement of Robert McNamara as Secretary of Defense. McNamara had clearly soured on the overall war, and had become increasingly marginalized in making decisions. In contrast, Clifford had been relatively hawkish. However, upon taking office he quickly realized the limitations of the bombing campaign. This addition of a new voice in favor of curtailing the bombing, and especially one that had previously been hawkish, likely helped prompt President Johnson to also reevaluate the situation. (Tilford 1991, 149-152)

The third precipitating event was North Vietnam's offer to negotiate if the bombing was halted. Following the Tet Offensive, The US and North Vietnam began tentative peace talks in Paris. However, North Vietnam refused to engage in substantive discussions while still being bombed. With the election approaching, Johnson felt the need to make enough concessions to

get negotiations started for the next President. Thus, North Vietnamese insistence on a complete bombing halt, combined with the upcoming election, served as a second precipitating event.

(An, 1998, 149-152)

In contrast to Operation Rolling Thunder, Operation Linebacker II was short and intense. As I showed in the previous section, Linebacker II also represented a case where the parties were largely playing the concessions equilibrium, as the US sought to compel North Vietnam to agree to the already negotiated terms, while North Vietnam wanted to wait in the hopes that the incoming US Congress would cut off the war over Nixon's objections. Because the concessions equilibrium existed, the primary decision on ending the bombing campaign was North Vietnam's. Indeed, the campaign did end almost immediately after North Vietnam indicated that they would return to negotiations. Since essentially all issues had already been agreed, this led quickly to a final peace agreement.

Why then did North Vietnam agree to resume negotiations? The beginning of the air campaign likely did serve as a costly signal that the US was willing to continue the war if North Vietnam did not accept the agreement. As noted above, the final agreement was essentially identical to a draft agreement that North Vietnam had already agreed to in October (An 1996, 173-186, especially 184-185). Since North Vietnam had already decided that these terms were acceptable, there would have seemed little to gain in prolonging the war, while continuing would incur further war costs. The similarity of the final and draft agreements also leaves some ambiguity about the role of the Linebacker II campaign in forcing a return to negotiations. It is certainly possible that North Vietnam would have returned to negotiations and accepted a similar treaty without the bombing campaign, having merely wanted to signal their displeasure with the US and South Vietnam's attempt to renege on the draft agreement.

While the first few days of bombing likely conveyed most of the intended signal, North Vietnam still needed some precipitating event to decide to resume negotiations. The initial few days of bombing had destroyed most of the intended targets, so it is unclear what the marginal cost to North Vietnam of another night of bombing would be. On December 26th, the US bombed North Vietnamese air defenses, including fighter airfields, SAM sites, and SAM storage and assembly facilities. In combination with the large expenditure of SAMs to combat earlier raids, these strikes degraded North Vietnamese air defenses. This showed that the US was in fact willing to conduct a lengthy air campaign, as degrading North Vietnamese air defenses would make it easier to conduct further bombing raids. North Vietnam agreed to return to negotiations that same day, and the US halted the bombing campaign shortly afterwards. Thus, attacking the air defenses may have helped precipitate the return to negotiations and the end to the air campaign. (Tilford 1991, 261-262)

Conclusion

The two air campaigns in the Vietnam War, Rolling Thunder and Linebacker II, were intended to directly induce North Vietnam to make concessions by ceasing to support the guerilla war in South Vietnam, and then agree to a ceasefire. Nevertheless, the Rolling Thunder campaign was clearly in the no-concessions equilibrium, as North Vietnam adopted a no-concessions policy. This campaign appears to have occurred because the United States believed that it was in a concessions equilibria. This belief was reasonable, as the United States was a great power, and was attempting to enforce the norm against the use of force to achieve political objectives. The Linebacker II campaign was in a concessions equilibrium, as North Vietnam

was willing to make concessions. This worked because North Vietnam had previously agreed to all of the meaningful demands, and just needed inducements to return to the bargaining table.

In the Rolling Thunder campaign, the US did pretty quickly realize that North Vietnam would not make concessions. In addition, they seem to have concluded that the air campaign would not have significant direct effects at eliminating the ability of North Vietnam to supply the guerilla forces in South Vietnam. However, the campaign continued because while costly in absolute terms, the marginal costs were small relative to those the U.S. was incurring in its counterinsurgency efforts in South Vietnam. Ultimately, ending the campaign required precipitating events in the form of the Tet Offensive, the upcoming election, and Clark Clifford replacing Robert McNamara as Secretary of Defense. The Linebacker II campaign ended quickly, largely because North Vietnam did not have to make substantial concessions. However, even the modest concession of returning to negotiations was spurred by US destruction of North Vietnam air defense sites, which may have served as a signal that the US was gearing up for another lengthy air campaign.

Gulf War Air Campaign

The final case I will examine is the coalition air campaign during the Persian Gulf War. As mentioned in Chapter 5, the coalition conducted a thirty-eight-day bombing campaign against Iraq before the beginning of the ground offensive. While this was partly a preparation for the ground offensive, many coalition planners intended the air campaign to have independent effects and hoped that the air campaign would induce Iraq to concede without requiring a conventional ground offensive. The length and intensity of this air campaign thus merits including it as a potential case of a bombardment war. This case is also notable and useful because it is the only

case that failed to achieve its coercive objectives, but was also immediately escalated to a conventional ground war.

Conflict Overview

Because I discussed the overall Gulf War conflict in Chapter 5, it is not necessary to provide a summary of the overall conflict. However, I will briefly describe the central elements of the bombardment campaign.

Planning for the air campaign began soon after the Iraqi invasion of Kuwait. US Air Force officers were first tasked with developing an initial plan on August 9, 1990. The initial plans would undergo significant modification and refinement over the coming months. On January 17, 1991 the coalition initiated the air campaign. Initial targets focused on Iraqi air defenses and airfields, ensuring that the coalition maintained air superiority for the remainder of the war. In addition, the coalition struck command and control facilities to make it difficult for the Iraqi leadership to control their forces in the field. Third, the coalition struck Iraqi infrastructure, including electrical generation and oil production facilities as well as a number of bridges. Fourth, the coalition targeted Iraqi forces in the field, particularly artillery pieces and armored vehicles. Finally, the coalition attempted to destroy Iraqi Scud short-range ballistic missiles, both to limit Iraq' ability to target Israel, Saudi Arabia, and coalition forces, and to degrade their ability to use chemical weapons. While all targets were struck simultaneously, early emphasis was placed on gaining air superiority and targeting command and control facilities. This emphasis shifted towards targeting Iraqi ground forces as the air campaign proceeded. (Allison 2012, 104-110, 117-118; Kuehl 1996, 113-118; Deptula 1996, Gordon and Trainor 1995, 75-122 313, 321)

Iraqi forces did attempt to fight back. Especially early in the campaign, the Iraqi Air Force scrambled a number of fighters to intercept coalition aircraft. While Iraqi air defenses did shoot down a number of coalition aircraft, their air defenses had limited effect and the coalition quickly gained air superiority. Iraqi jet fighters managed to shoot down only one coalition aircraft, with surface to air missiles destroying another thirty-seven (Cordesman and Wagner 2013, 365). In addition to directly trying to fight the coalition air campaign, Iraq retaliated by launching a number of Scud missiles at Israeli cities and Saudi Arabia. Coalition efforts to destroy the missiles before they were launched met with only limited success. (Allison 2012, 112-120; Malovany 2017, 543-555)

Ultimately, the air campaign escalated into a major ground war when the coalition initiated their offensive on February 24.⁵² While coalition air strikes continued through the end of the ground war, they became primarily focused on supporting the coalition ground forces and interdicting the movement of Iraqi military forces. The coalition bombardment did cease with the declaration of the coalition ceasefire on February 28.

Causes of the Air Campaign

As I mentioned above, the coalition leaders had two main intents with the Gulf War Air Campaign. First, the air campaign served as a prelude to the ground war by degrading Iraq's military capabilities. This element of the air campaign did not intend to achieve separate strategic effects, and can be largely regarded as part of the ground war. Second, some leaders of the coalition did intend and believe that the air campaign would serve a separate strategic purpose. By demonstrating coalition capabilities, these leaders hoped that the air campaign

⁵² The Iraqi offensive at Khafji also represents a ground offensive, although it had only a limited effect on the overall war.

would induce Iraq to voluntarily withdraw from Kuwait and otherwise agree to coalition demands without requiring a ground offensive. This second intent of the air campaign would serve as a separate bombardment war, albeit one that ultimately transforms into a ground war.

The coalition intended to shape the battlefield for the ground war by destroying Iraqi equipment, and communications facilities. The coalition aimed to destroy 50% of Iraqi tanks, armored vehicles and artillery pieces (Clancy and Horner 1999, 275). In addition, the coalition targeted Iraqi command and control facilities, making it more difficult for Iraqi generals to command their forces. Both the destruction of armored vehicles and degradation of command and control systems would make it more difficult for Iraqi forces to maneuver effectively to counter the coalition's flank attack. This would give the coalition a vital advantage in the ground war. (Clancy and Horner 1999, 272-276)

In addition, some coalition leaders, and especially those planning the air campaign, believed that the air campaign would induce Iraq to concede without the necessity of a ground invasion. These planners believed that Iraqi leaders would be overwhelmed by the demonstration of coalition power, especially if this demonstration was delivered instantaneously. Thus, Iraqi leaders would decide to give up without a fight. In reference to this strategic intent, the air campaign was initially named "Instant Thunder", in reference to the "Rolling Thunder" air campaign in Vietnam (Gordon and Trainor 1995, 80). The planners believed that the Gulf War campaign could have the strategic effects hoped for in the earlier campaign if the main effort occurred rapidly, rather than spread out over months (Gordon and Trainor 1995, 77-94; 186-191; Kuehl 1996 111-115). While other leaders, including President Bush, were skeptical that the air campaign would be successful on its own, they likely did hope that it would convince Iraq to withdraw from Kuwait without a ground war (Gordon and Trainor, 1995, 139-140).

Overall, it appears that the coalition planners recognized that they were in the no-concessions equilibrium. In particular, the final plans envisioned a possible ground campaign following the air campaign. Accordingly, the air campaign would demonstrate the coalition's enormous military superiority, and thus the coalition's ability to easily win a ground war. Both the intensity of the initial air campaign and the targeting of command facilities and military units were more suited to demonstrate military superiority than the ability to inflict costs on the Iraqi government. Thus, it seems that coalition planners realized that Iraqi calculations would not be significantly affected by simply inflicting costs. Since the coalition made little attempt to induce Iraq to concede through inflicting costs, it seems that they recognized that Iraq was playing a no-concessions strategy as if the overall situation was in the no-concessions equilibrium.

The air campaign thus occurred because Iraq did not believe that the coalition had the capabilities to win the ground war with relatively low casualties or the resolve to suffer high casualties. I described this uncertainty as contributing to the overall Iraqi strategy in Chapter 5. Since Iraq was uncertain about coalition capabilities or resolve, they thus initially refused to vacate Kuwait peacefully. While much of the air campaign was simply preparation for the ground war, one aim of the air campaign was thus to show that the coalition could seriously degrade Iraqi capabilities, even without a costly ground offensive. The coalition hoped that this shock would lead Iraq to concede without requiring a ground campaign. In addition, coalition aircraft had to risk fire from Iraqi air defenses. In fact, the coalition lost thirty-eight aircraft in combat, with many of their crew killed or captured (Cordesman and Wagner 2013, 265). This would also help demonstrate the coalition's willingness to suffer casualties in order to liberate Kuwait.

Why the Air Campaign Escalated to a Ground War

However, the initiation of the coalition's ground offensive on February 24, 1991 showed that the air campaign failed to convince Iraq that the coalition was resolved to liberate Kuwait and had the capabilities to do so without major losses. Why did Iraq fail to realize both the coalition's ability to liberate Kuwait in a ground war with low casualties and their resolve to do so even if casualties were significant? Also, why did the coalition decide to escalate to a ground war rather than continuing the bombardment in hopes of a settlement?

I would argue that Iraq failed to learn the coalition's capabilities and resolve from the air campaign because the information conveyed had little relevance for Iraq's strategy. As noted in Chapter 5, Iraq believed that the coalition would suffer mass casualties in attacks on the Iraqi army's static defenses, including entrenched positions and minefields. Furthermore, Iraq believed that the coalition was unwilling to sustain these casualties.

However, the bombing would not actually show that the coalition could successfully attack without incurring significant casualties. The coalition had difficulty destroying Iraqi armored vehicles and artillery, and often overestimated their bombing effectiveness. While the coalition became more effective at destroying Iraqi vehicles over the course of the air campaign, Iraqi defenses remained at least partially intact (Press 2001, 30-38; Cordesman and Wagner 2013 464-467, 469, 474-476). Moreover, because of its limited effectiveness against the Iraqi defenses, the bombing would have difficulty conveying that the coalition would mount an offensive without incurring significant casualties.

The bombing of Iraqi command and control systems was somewhat more effective, although even this had limited effect. Even after the shock of the coalition's flank attack and in the face of continued bombing, the Iraqi Republican Guard divisions managed to redeploy to

meet the coalition advance (Press 2001, 28-29; Cordesman 2013, 461-462; Winnefeld, Niblack, and Johnson, 1994 130-131, 158; Gordon and Trainor, 1995, 387). This demonstrates that their command and control systems remained sufficiently intact, even if somewhat degraded.

Moreover, degrading the command and control systems would have little impact on Iraqi military strategy. Given Iraq's reliance on inflicting massive casualties by relying on fixed defenses, Iraqi forces would not need to maneuver much, and thus would not need to rely heavily on intact command and control systems – Iraqi forces just had to stay put and fight.

In addition, the bombing could not convey much information on the coalition strategy, and in fact the coalition would not want it to. The coalition's central strategy was to avoid Iraq's prepared defenses by attacking far to the west. Thus, they would outflank the prepared defenses, and meet Iraqi forces in the open, where coalition maneuver units and airpower would give the coalition a decisive advantage. It is difficult to see how bombing could convey the ability and intent of the coalition to outmaneuver and avoid Iraq's fixed defenses. At the same time, the success of this strategy relied at least in part on keeping it secret, and thus the coalition would not have wanted to convey this strategy even if they could. Thus, the coalition took care to keep the movement of their forces west in preparation for the offensive secret until the offensive actually began. (Schubert and Kraus 1995, 107-108, 143-146; Allison 2012, 102-103)

Nor could bombing effectively show the coalition's willingness to sustain casualties. While the coalition suffered aircraft losses and casualties during the bombing, these were small relative to the losses Iraq expected to inflict in the ground war. As noted above, the coalition lost thirty-eight aircraft, with associated casualties among the air crew (Cordesman and Wagner 2013, 265). While not insignificant, these numbers pale compared to the hundreds or thousands of casualties Iraq believed an attack into their prepared defenses would cost (see Chapter 5). In

addition, since Iraqi air defenses had been degraded, additional aircraft losses would likely be relatively low. Of the thirty-eight aircraft the coalition lost, seventeen were shot down in the first week (Malovany 2017, 547). Thus, continuing the bombing did, and would do, little to convey the coalition's resolve.

Why then did the coalition decide to escalate the war, rather than continuing the air campaign? First, as noted above, coalition leaders had always anticipated a ground offensive being necessary. The coalition was in fact resolved to expel Iraq from Kuwait, even if doing so required a ground offensive. The coalition clearly knew that they would win a ground war given their military superiority. Moreover, coalition leaders (especially US President Bush) had resolved to liberate Kuwait even if doing so inflicted substantial casualties, as they believed that it was necessary to reestablish norms against invading other countries after the Cold War. Accordingly, the coalition did not need to gain any information from the bombardment, and was at most hoping that the air campaign would induce Iraq to withdraw from Kuwait peacefully. Given this, the timing of escalating was driven as much by operational military factors as by broader strategic considerations. (Gordon and Trainor 1995, 139-140, 337; Allison 2012, 96-97)

Second, the coalition likely realized that further bombing would only convey a limited amount of further information. After about a month of bombing, it would seem clear that further bombing would have limited informational content, for several reasons. The bombing was explicitly designed to start with high intensity, and to target the most important command and control systems early (Gordon and Trainor 1995, 187-189). Thus, the greatest informational content of bombing would have occurred early. Further bombing, confined to less individually important targets, such as tanks and artillery pieces, would have diminishing informational content. In addition, the risks to coalition aircrew were decreasing as the coalition effectively

eliminated the Iraqi air force and degraded their air defenses (Malovany 2017, 544-548). Thus, continued bombing would also convey little information about the coalition's willingness to risk casualties.

Third, the coalition was facing time pressure to conclude the war quickly from several major sources. The upcoming summer heat would make combat more difficult. Temperatures in the Saudi and Iraqi deserts can climb to extreme temperatures. This would make the physical exertions of maintaining an offensive difficult, as soldiers would quickly tire. The difficulty of maneuvering in the heat would be compounded by the requirement that soldiers wear clothing protecting against chemical weapons, which the coalition feared Iraq would use. If the attack was not initiated by the end of March, it is possible that the coalition would have had to wait several more months for the weather to cool down. (Gordon and Trainor 1995, 131)

The second time pressure came from the physical and political difficulties of maintaining large forces in the theater. As noted in Chapter 5, the coalition deployed hundreds of thousands of troops to Saudi Arabia in preparation for the war. These forces had to be supported with food, water, fuel and other supplies. Moreover, all of these logistical arrangements had had to be created from scratch, as there were few roads or other facilities that could be used. While the coalition had been immensely successful in supporting their forces, further delays might make this difficult. (Cordesman and Wagner 2013, 102-105, 683-687, 689)

In addition, coalition leaders might have worried that delays could compromise the cohesion of the coalition. In addition to US and UK forces, a number of other countries, including Egypt, Saudi Arabia, and even Syria had contributed substantial combat forces. A number of other countries had contributed smaller combat or support elements. Many of these countries were not normal allies, and were largely united by the perceived common threat of

Iraq. Coalition leaders naturally worried that if the perceived threat posed by Iraq diminished with the lack of further action, some countries would begin leaving the coalition. This would diminish coalition combat power. More importantly, a fracturing of the coalition could compromise the perceived legitimacy of coalition efforts to liberate Kuwait as an enforcement of international norms. (Gordon and Trainor 1995, 131, 326-327, 334; Allison 2012, 66-67)

Together these factors mean that after a month of bombing, the coalition likely perceived that further bombing would be unlikely to convey sufficient additional information about the coalition's capabilities or resolve for Iraq to concede without a ground invasion. The expected benefits of continuing the bombing were thus relatively minor, as it was unlikely to actually avoid a ground invasion. At the same time, the potential costs of waiting to mount a ground invasion were increasing. The coalition thus concluded that the additional costs of waiting likely exceeded the expected utility of continuing the bombing to avoid a ground invasion. They thus went ahead and initiated the ground offensive.

Conclusion

The air campaign during the Gulf War is unique in that it is the only bombardment campaign to escalate into a conventional ground war. While the primary purpose of the air campaign was to prepare the battlefield for the ground campaign, many of those planning the air campaign did hope that it would convince Iraq to withdraw without the need for a costly ground campaign. The strategic intent of the air campaign would thus have served as a costly signal that the coalition was serious about liberating Kuwait by force if necessary, and had the capability of doing so. This is consistent with the situation being in the no-concessions equilibrium, with the campaign signaling the potential for a ground war.

The campaign was ineffective as a signaling device, as it could not convey much information about whether Iraq's strategy would be effective. Iraq hoped to use defensive advantages to inflict significant coalition casualties, and thus convince the coalition to give up or accept a negotiated settlement. The coalition's low costs of bombardment made it difficult to convey the coalition's willingness to accept casualties, while bombing conveyed little information about the ability of Iraq to inflict significant casualties on the coalition ground forces. Thus, the war eventually escalated to a ground war. The coalition leaders appear to have realized that bombardment was unlikely to convey the necessary information, and authorized the beginning of the ground offensive. The actual timing of the ground offensive was dictated by a mixture of military and political considerations, particularly the desire to finish the war before the summer heat and the need to maintain coalition unity. These could at least conceivably serve as precipitating events at prompting leaders to realize the ineffectiveness of bombing to convince Iraq to voluntarily withdraw from Kuwait. The willingness to quickly escalate was probably also due to preexisting beliefs that a ground invasion would be necessary, with the primary purpose of the campaign to prepare the battlefield for the invasion.

Conclusion

This chapter has empirically examined why bombardment wars end. Because there are only a limited number of bombardment wars, quantitative empirics would not provide valid tests. I have therefore conducted case studies on every bombardment war in the dataset, including the 1st and 2nd Taiwan Straits Crises, the Egyptian-Israeli War of Attrition and the Kosovo War. In addition, the Vietnam War and the Gulf War have air campaigns that can be at least partially separated from the other conflicts, either spatially (in the Vietnam War) or temporally (in the

Gulf War). In order to increase the number of cases examined, I include both in my analysis. For each case, I examined whether they were in the concessions or no-concessions equilibrium, and whether it appeared that private information caused the war according to the relevant equilibrium. I then discussed whether the war seemed to end with the revelation of this private information. In doing so, I looked for whether precipitating events helped prompt the combatants to settle given the low marginal costs of bombardment.

Both the 1st and 2nd Taiwan Straits Crises were attempts by communist China to signal the likely consequences of a US intervention to protect Taiwan and an effort to screen whether the US would intervene to protect Taiwan. This is clearly in the no-concessions equilibrium, as China was using the bombardment as a costly signaling and screening device about the likely effects of a ground invasion. The bombardment did in fact reveal the United States' level of commitment: that the US was willing to defend Taiwan itself, but was not eager to defend the offshore islands. Upon realizing this, China ceased their bombardment in the 1st crisis. After the 2nd crisis confirmed this limited level of US commitment, China changed their strategy, allowing Taiwan to keep control of the offshore islands to maintain their links to the mainland, and potentially enable the eventual reunification. While neither case displays a clear precipitating event, the continuation of bombardment in the 1st crisis after much of the information was revealed displays the relatively low marginal costs of bombardment. The bombardment in the 2nd crisis was particularly intense, eliminating the need for a precipitating event to trigger reevaluation.

The 1999 Kosovo War was generally in a concessions equilibrium, and the bombing conveys information about NATO's ability to inflict costs on Serbia and resolve to do so unless Serbia makes concessions about the future of Kosovo. A concessions equilibria was more likely

as NATO is an IGO, led by the sole superpower, and the bombing was intended to enforce human rights norms. However, the conflict appears to have begun with Serbia's belief that the situation was in the no-concessions equilibrium, and that NATO bombing would quickly cease. The conflict did end with the bombing conveying NATO's capability to inflict costs and resolve to do so. However, the low marginal costs of bombing made it difficult to convey this information, as the war lasted seventy-eight days despite NATO's massive superiority. In addition, conflict settlement needed a precipitating event with Russian diplomats visiting Serbia and suggesting that Serbia make concessions.

The final full bombardment war was the Egyptian-Israeli War of Attrition in the late 1960s. The War of Attrition appears to be primarily in the no-concessions equilibrium, with Egypt working to develop and test new capabilities that would allow them to militarily retake the Sinai Peninsula. However, there are some indications that Egypt also hoped that bombardment would directly induce Israel to make concessions. However, as the War of Attrition was part of a broader plan culminating in a conventional offensive, this is clearly secondary. In addition, Israel clearly adopted a no-concessions policy. The War of Attrition did convey the relevant information to Egypt, particularly that their new air defense systems could potentially neutralize Israeli air superiority. However, war termination also required a precipitating event in the U.S. Secretary of State Roger's mediation attempts, which also included a degree of pressure to settle the conflict.

The Vietnam War comprised two air campaigns: Rolling Thunder from 1965-1968 and Linebacker II in late 1972. The first was clearly in the no-concessions equilibrium, although the United States appears to have mistakenly believed that it was in a concessions equilibria, and intended bombardment to directly induce concessions. Linebacker II was in a concessions

equilibria, and North Vietnam did return to the negotiating table. However, few substantive concessions were demanded, making this a very easy case for bombardment directly inducing concessions. US decision makers did quickly conclude that the Rolling Thunder campaign was in the no-concessions equilibrium. However, it continued for several years because the marginal costs were low relative to those the US was suffering in South Vietnam. The campaign only ended with the precipitating events of the Tet Offensive, upcoming presidential election, and change in the Secretary of State. The Linebacker II campaign ended quickly as North Vietnam realized that the US was serious about forcing a return to negotiations, and the concessions demanded were insignificant. However, the destruction of air defense sites may have served as a precipitating event.

The final case I examine is the coalition's air campaign during the Gulf War prior to the final ground offensive. This is also the only bombardment campaign that escalates into a ground war. Because the coalition was willing to escalate, and Iraq never seriously offered to make concessions, it is pretty clear that this war was in the no-concessions equilibrium. The bombardment campaign was partially a preparation for the ground war, but also intended to signal the coalition's willingness and ability to use force to liberate Kuwait. It was ineffective at signaling this, as the bombardment had limited relevance for Iraq's strategy of using defensive advantages to inflict enough casualties to convince the coalition to give up. The coalition leaders realized that bombing would not be effective at convincing Iraq to withdraw, and thus initiated the ground invasion. The actual timing of the invasion may have been due to concerns about needing to keep the coalition together and the difficulty of operating in the summer heat, which served as precipitating events.

The results are consistent with the theoretical expectations, although likely more research needs to be done. Most of the cases can be clearly identified as being in a concessions or no-concessions equilibrium, although in at least one the different sides seemed to have different impressions about which equilibrium was being played. Similarly, the intent of the bombardment as a signaling or screening device appears clear in the cases, and generally aligns with the expectations for the given equilibrium. The cases in a concessions equilibria seem to be signaling the costs of the bombardment themselves. The cases in the no-concessions equilibrium seem to be signaling or screening whether a ground attack was plausible. In addition, the wars seem to end when the relevant information is revealed. However, many of the cases also display some sort of precipitating event to actually trigger war termination. This is expected, given that bombardment has relatively low marginal costs, and so it would be unclear when it has revealed sufficient information to end the war.

Conclusion

In this dissertation, I have attempted to explain why wars end by examining how the actual process of fighting influences states' decisions about war and peace. I then examined these explanations using a mixture of quantitative and qualitative empirics. Below, I will summarize these findings. I will then discuss what they mean for our understanding of war more broadly, and offer some suggestions for future research.

Summary of Findings

Broadly, my analysis was divided into three parts. The first (Chapters 1 and 2) developed the basic framework for the analysis. The second (Chapters 3 through 5) and third parts (Chapters 6 and 7) then developed theoretical explanations for how ground and bombardment wars end, and empirically examine these explanations.

Throughout the entire dissertation, I have worked within the general bargaining model of war framework. The bargaining model is based on the observation that there should always exist a negotiated settlement that both sides prefer to war, as long as states are rational, not risk acceptant, and war is costly. The bargaining model thus suggests that war can occur for two reasons. First, private information about the relative capability or resolve of the combatants may prevent them from recognizing the mutually preferred settlement. Second, bargaining over indivisible objects that influence bargaining power or first strike advantages may prevent one side or the other from credibly committing to fulfill the agreement.

Theoretically, wars should end when these causes are removed. So, wars may end when the private information about relative capabilities or resolve is revealed by combat and

negotiation attempts. Alternatively, wars may end when commitment problems are resolved. I empirically examined these basic bargaining explanations for war in Chapter 2, and found that they do not adequately explain war termination. In wars caused by private information, the war should end with a truly negotiated settlement once this information has been revealed. Thus, a number of wars should end in settlements intermediate between the two sides' war aims and in settlements where one side makes preemptive concessions from the battlefield situation on the ground. However, relatively few wars involve either intermediate bargains or preemptive concessions. Therefore, it appears that information revelation is unlikely to explain war termination.

Alternatively, wars may end with the resolution of commitment problems. Commitment problems could be resolved in one of four ways: the elimination of one state, regime change against one state, the capture of indivisible strategic territory, or shortly after a surprise attack that begins the war. However, only about twenty-five percent of wars include one of these four factors. Commitment problems may have caused these wars, and the resolution of commitment problems may explain their end. However, the end of three quarters of wars cannot be explained through the resolution of commitment problems. Moreover, because commitment problems are not resolved, they also cannot be the cause of these wars. Even combined with the most generous number of wars that could be explained through the revelation of private information, over half of wars are not adequately explained by the basic bargaining model explanations.

In Chapter 1, I also argued that we need to include military and battlefield factors more explicitly in our analysis of why wars begin and end. Combat is what makes war unique from other forms of political contestation. The actual and likely outcome of battlefield encounters thus would play a major role in states decisions about whether to fight.

The first major implication of considering military and battlefield factors is that there are in fact two fundamentally different types of war, as different strategies create fundamentally different bargaining dynamics. In most wars, which I label ground wars, the combatants fight to take and hold territory through intense ground combat. In these wars, it is possible for the combatants to directly or indirectly achieve their war aims. They can directly capture territory or seize the opponent's capital and replace their regime. Thus, fighting represents an alternative way to achieve their war aims if negotiations are unsuccessful. Ground wars comprise the vast majority of the cases studied, representing sixty out of the sixty-five wars in my dataset.

The remaining wars are fought primarily through artillery or air bombardment, and are accordingly labeled bombardment wars. Bombardment cannot directly achieve any of the combatants' war aims, and merely inflicts costs on the combatants. While bombardment can inflict casualties and destroy things, it cannot capture territory, and cannot directly change the policies of the opposing government. Thus, the combatants are relying on their opponent voluntarily making concessions in order to achieve their war aims. This inability to directly achieve anything through bombardment wars creates a fundamentally different bargaining situation from ground wars, where combat can directly achieve the combatants' war aims. I thus develop separate theories for each type of war, which are examined separately.

The second part of the dissertation (Chapters 3 through 5) develops and empirically examines a theory for why information revelation does not quickly end ground wars. I argue that defensive advantages create short-term commitment problems that pose a barrier to war termination until one side has achieved their war aims. I examine this theory with both quantitative empirics on campaign outcomes and a set of case studies.

It is generally well accepted that defenders have military advantages. It has been commonly suggested that attackers need three times the defender's forces to be able to successfully attack. Moreover, we can expect these defensive advantages to increase the longer the defender has occupied their current position. Defenders can use this time to dig entrenchments and otherwise construct fortifications to conceal and protect their forces. Defenders can also clear fields of fire, pre-sight artillery and other weapons, and preposition reserve forces. All of these factors would make it even harder to successfully attack a prepared position than a position that has not been improved.

The improved defensive advantages pose two short-term commitment problems. First, unsatisfied states have incentives to attack immediately, rather than negotiate and give the defender a chance to improve their position. Second, defenders would prefer not to cede their prepared positions in a settlement, even if this means that the war will continue.

However, I argue that these barriers to war termination are reduced once one side has achieved their war aims. Once one side has achieved their war aims, they no longer have any reason to attack, and so are willing to negotiate even when doing so allows the other to increase their defensive advantages. In addition, the defender would not be required to cede territory in exchange for peace, and thus would not have to give up their prepared positions. In fact, defensive advantages would reinforce war settlement when one side has achieved their war aims, as defensive advantages would make it harder to reverse the battlefield outcome. In addition, war termination may be particularly likely when it is the stronger side that has achieved their war aims, as the weaker side would find it even more difficult to overcome the defensive advantages and reverse the battlefield outcome.

I examined this theory with a statistical analysis of campaign outcomes. As expected, wars are considerably more likely to end when one side has achieved their war aims. There is also some tentative evidence that wars are more likely to end when the stronger side has achieved their war aims, although these results are not statistically significant. Overall, about 80% of campaigns that are predicted to end the war in fact end the war, while the war continues in 90% of those where the theory expects it to continue. In addition, I examined three case studies of the 1973 Arab-Israeli War, the Iran-Iraq War, and the 1991 Gulf War. In each, defensive advantages plausibly play a role in why the war continues, and then ends when one side has achieved their objectives.

The third part, (Chapters 6 and 7) develops and empirically examines a theory for why bombardment wars end. As bombardment wars have not been extensively studied previously, it was necessary to develop a theory for why they begin before developing a theory for how they end. Because bombardment cannot significantly shift the power balance in most cases, bombardment wars cannot be caused by commitment problems. Thus, bombardment wars must occur due to private information, and with bombardment serving as some sort of signaling or screening device. It is possible that the threat of bombardment would convince the target to make concessions to avoid the costs of future war. In this case, actual bombardment serves to signal and screen for the costliness of bombardment itself and how much each side cares about these costs. However, there is also always an equilibrium where the threat of bombardment is never successful at inducing concessions. In this case, I suggest that bombardment serves to reveal information about whether the revisionist has a credible threat of a ground invasion. In general, I believe that the second explanation is more likely, although the first can occur.

In either case, the bombardment would end once sufficient information is revealed by bombardment. In the first case, bombardment simply needs to reveal each side's costs of bombardment and how much each side cares about these costs. In the second, bombardment helps reveal information about each side's military capabilities and resolve, establishing the likely outcome of a ground invasion, and whether the revisionist could credibly threaten one. However, in each case, bombardment may have difficulty revealing this information, although it would still be cheaper than fighting a ground war. Individual acts or days of bombardment inflict only limited costs on each side. Because signals must be costly to reveal information, these individual days of bombardment reveal relatively limited information. Thus, it may take a substantial amount of bombardment to reveal sufficient information to end the war. In addition, it may be somewhat unclear exactly when the bombardment has revealed the relative information for one side or the other to give in. Thus, I suggest that bombardment wars may often require some precipitating event to spur leaders to reevaluate whether to continue the conflict. Precipitating events can take many forms, including diplomatic messages or unusual bombardment events. In either case, the event may not have much information value itself, but forces the leader to examine what has happened in the bombardment campaign as a whole, and thus recognize how much information has been revealed.

There were not enough bombardment wars for quantitative results to give a robust test of this theory. I thus conducted case studies of each of the bombardment wars in the relevant population. The findings were generally consistent with the theory. Bombardment does seem to reveal information. In addition, several of the bombardment wars needed some form of precipitating event to end, particularly pressure on one of the combatants by great power states.

Implications for Conflict Research

These findings have a number of implications for research programs into international conflict. In addition, they suggest several avenues for future research. Below, I will discuss the implications first for other research into conflict termination, and then will discuss implications for research into conflict initiation and recurrence.

Implications for Research on Conflict Termination

In my dissertation, I examined how military factors and the actual process of fighting impacts war termination. In particular, I have suggested that defensive advantages pose a barrier to war settlement in ground wars, while the low marginal costs of bombardment may require precipitating events to prompt war termination. However, these are obviously not the only factors that impact war termination. Future research can examine how these elements interact with a number of other factors.

In particular, it would be interesting to examine whether and how other factors impact how much defensive advantages inhibit war termination. For instance, do certain geographical features, such as terrain or geographic size mean that defensive advantages have a bigger or smaller effect? Similarly, the structure or different states' militaries may change how big an affect defensive advantages have on war termination. Finally, how might psychological factors or domestic politics interact with defensive advantages to affect war termination?

One particularly interesting direction for future research would examine whether there is anything that other states or international organizations could do to help states overcome the commitment problems posed by defensive advantages. Commitment problems have been previously cited as a potential barrier to civil war settlement (e.g. Walter 1997), yet Tir and

Karreth (2018) have found that some intergovernmental organizations can provide sufficient incentives to live up to an agreement to overcome these commitment problems. Can other states or international organizations similarly provide incentives to live up to an agreement that would help overcome the commitment problems posed by defensive advantages? Under what conditions might they be able to push states into a negotiated settlement before one side has achieved their war aims. Some wars do show some evidence of powerful states having these effects, such as British pressure on Germany to evacuate the Baltic states during the War of Latvian independence, and US pressure on Israel to evacuate the Sinai Peninsula after the 1956 Sinai War (see Sarkees and Wayman, 2010). However, international pressure seems to be either absent or ineffective in many wars. Future research can examine whether and under what conditions international involvement might be able to overcome the barriers defensive advantages pose to war termination.

My analysis of bombardment wars poses two major areas for future research. First, I showed that what information is being conveyed by bombardment depends on whether the combatants are in a concessions or no-concessions equilibrium. While I suggested that the no-concessions equilibrium seems more likely, future research can further examine the international, domestic, and ideational factors that would determine which equilibrium is most likely to occur in different situations. This research would have significant implications for understanding both the causes of bombardment wars and why they end.

Second, future research can examine what types of precipitating events may be most likely to actually end bombardment wars. In the dissertation, I just showed that precipitating events may be necessary to prompt bombardment wars to end, as the marginal costs of each day of bombardment are relatively low. Precipitating events could be a wide variety of factors, both

within the war, such as especially heavy bombardment, or external, such as diplomatic communications from third parties. However, some events might be particularly effective at prompting a reevaluation of what information bombardment has revealed. Future research might look into what these particularly effective precipitating events are. Such research might also have practical applications, as it could help the international community identify how they might be able to trigger such precipitating events, ending wars more quickly than they otherwise would.

This research may also have implications for examining how civil, extra-state, and non-state wars end. As I noted in Chapter 1, I confined my analysis to interstate wars. In general, this makes sense, as other forms of war may follow different bargaining processes. In particular, the emergence and existence of combatants is much more endogenous to the conflict in these other forms of war. In addition, civil, extra-state, and non-state wars are also more likely to center around irregular or guerilla tactics and strategies, in contrast to the conventional ground combat prevalent in interstate wars.

These factors make it impossible to directly map the findings about how interstate wars (both ground wars and bombardment wars) end onto explaining how civil, extra-state, and non-state wars end. However, they may still have some implications. First, while many civil wars center on guerilla or other unconventional tactics, some civil wars do employ large, conventional forces. For instance, all sides in the Bosnian civil war organized at least some of their forces on conventional lines, including with heavy equipment and artillery. In addition, at many points these forces fought to seize and hold territory (Kalyvas and Sambanis 2005, 212-214).

Defensive advantages would exist in civil wars fought between conventionally structured forces, just as they do in interstate ground wars. It is likely that these defensive advantages would also pose a barrier to war settlement in conventional civil wars. Future research can examine the

extent to which defensive advantages actually pose a barrier to settlement in civil wars involving conventionally structured forces.

As noted, most civil wars seem to center around guerilla or more unconventional combat, where the rebels or other non-state forces largely avoid major combat to take and hold territory. While not an exact analogy, there may be some similarities between unconventional civil wars and bombardment wars. Like in bombardment wars, it would be difficult or impossible for groups using guerilla or other unconventional tactics to directly achieve their war aims on the battlefield. The compellence framework that I developed may have implications for understanding these wars, although these civil wars are considerably more complicated than the relatively straightforward bombardment wars. One direct implication is that civil wars may have relatively low marginal costs, as fighting for one more day may impose either relatively little risk of one side being defeated, and similarly incurs relatively limited casualties and other costs. The precipitating events that I suggested may be necessary to end bombardment wars, may also play a role in when combatants decide to try and negotiate an end to civil wars, assuming some negotiated settlement is possible.⁵³

Implications for Conflict Research More Broadly

The dissertation also has implications for research into international conflict more broadly, and particularly research into war initiation and recurrence.

The first major insight is that there are two fundamentally different forms of interstate war. Incorporating the actual process of fighting revealed that ground wars, where military

⁵³ As noted, Walter (1997) and others have suggested that commitment problems may pose a significant barrier to settlement in civil wars. For precipitating events to play a role in conflict settlement, these commitment problems would have to be overcome.

action could directly achieve the combatant's war aims and bombardment wars, where combat cannot directly achieve anything, represent fundamentally different bargaining frameworks.

Future research into the causes of war, especially that using the bargaining framework, needs to recognize these distinctions.

Within ground wars, the finding that defensive advantages pose a barrier to war settlement may have several implications for how we understand war onset. First, it means that when deciding to begin a war, states should expect the war to continue until one side has achieved their war aims. While one side may achieve their war aims fairly quickly, each side should not expect for the war to rapidly end in a negotiated settlement. Future research can examine the extent to which states realize the likely length of war and how this impacts their calculations for conflict.

In addition, defensive advantages would exist in peacetime as well as during war. They may be even larger, as states may have had years to fortify their borders, constructing even more elaborate fortifications. This has a couple implications for future research into conflict. Do these defensive advantages pose a commitment problem that might cause war in the first place? In other words, would states be reluctant to agree to a negotiated change in their borders that might mean they lose these long prepared defensive advantages? Research can also examine how states' strategies to overcome their opponent's defensive advantages influences war initiation. First strike advantages and surprise attacks may thus play a critical role in war initiation, as they would provide a plausible means of overcoming an opponent's defensive advantages and achieving something that negotiations cannot.

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Appendix A

Formal Model of Defensive Advantages in Ground Wars

In Chapter 3, I argued that there is an incentive for attackers to attack immediately rather than pause and negotiate and an incentive for defenders to avoid ceding established lines in return for peace. Both of these mechanisms rely on commitment problems created by defensive advantages increasing the longer the defender occupies a given position. Thus, in both cases, the decision over whether to fight or settle affects the immediate chances of winning the war. This is the basic mechanism in commitment problems as a source of war, as shown in Fearon (1995) and Powell (2006). Since the basic logic of commitment problems has been well established, and my primary innovation was applying this basic logic to situations during war and where defensive advantages increase over time, I did not believe it necessary to develop a formal model in the primary text.

However, even though the basic logic follows well established mechanisms, formalizing the unique elements does provide a couple of interesting insights. First, the possibility of defensive advantages changing as a result of negotiation attempts can hinder war termination even if there is uncertainty that those changes will occur. Second, the commitment problems created by changing defensive advantages can also hinder information revelation if there exists private information about capabilities or resolve. As noted, negotiations are often more effective at revealing private information than battle outcomes. By preventing negotiations from occurring, the possibility of changing defensive advantages also prevents those negotiations from revealing information.

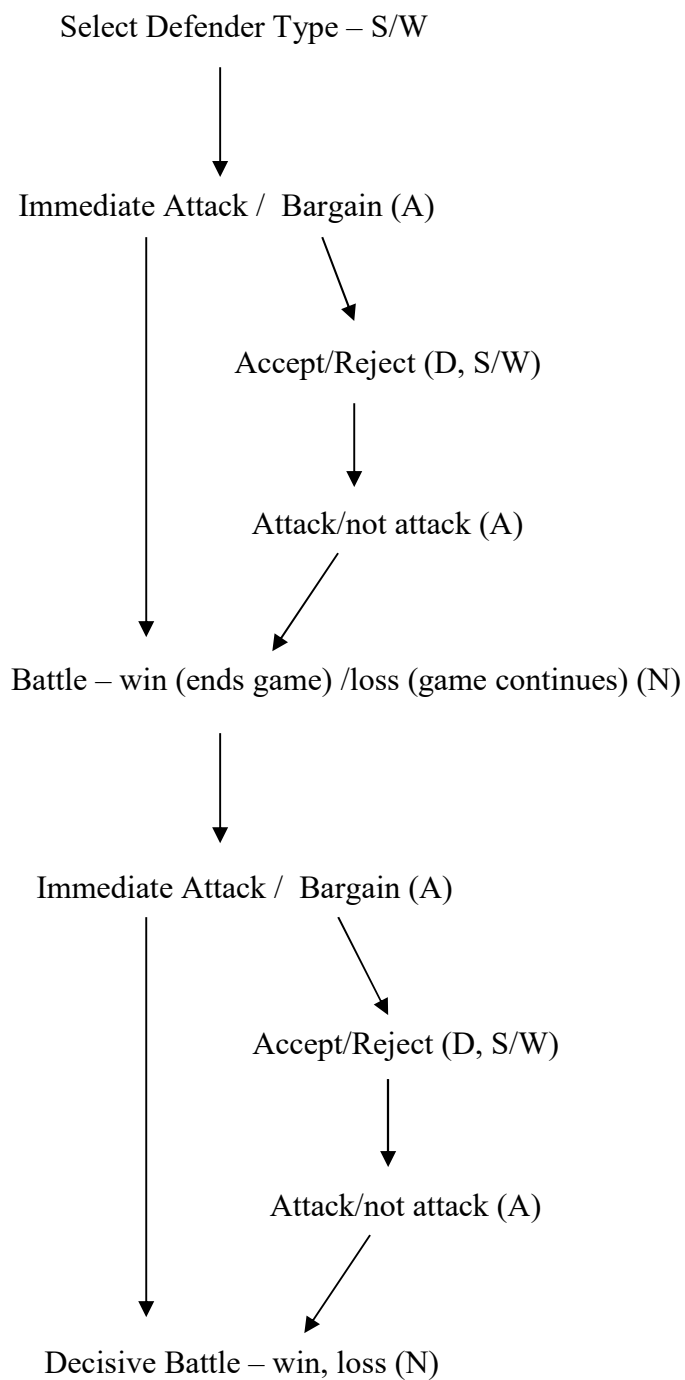
The Model

To show these additional findings, I construct and solve the following basic model. I will construct this model based on my first mechanism (an attacker wishing to attack immediately rather than give a defender the chance to prepare). The model can be straightforwardly reinterpreted for the second mechanism, as I discuss below. In the model, I assume that there are two states, an attacker (A) and defender (D) involved in a conflict over some disputed good, with normalized value of 1. The disputed good is initially held by a defender. The defender is separated into two types, a strong and weak type. The defender's type is decided by nature at the beginning of the game, with the strong type occurring with probability σ , and the weak type with probability $1 - \sigma$. Furthermore, the strong type may be prepared or unprepared for an attack depending on whether the attacker attempts to bargain or attacks immediately. For modeling simplicity, I assume the weak type cannot improve their defenses. I also assume that the strong type has a better probability of winning a battle than weak type, whether or not they have had an opportunity to prepare their defenses. The defender knows whether they are the strong or weak type. However, the attacker is not informed whether they face the strong or weak type of defender, but will be aware whether the strong D has had a chance to prepare their defenses given that this depends on A's actions.

A war may comprise two battles, depending on what happens. These are substantively identical except that the second battle is always decisive for modeling simplicity. In each phase, the attacker has the option of attacking immediately or attempting to negotiate. If the attacker attempts to negotiate, they make an offer to divide the territory, claiming t proportion, with the defender retaining the remainder $(1 - t)$. The defender may accept the offer, in which case the offer is implemented and the game ends. If the defender rejects the offer, A has the choice of

attacking, in which case a battle is fought, or not, in which case the game ends. If A wins the battle, I assume they both capture the disputed territory and decisively defeat the defender's army, ending the game. If A loses the first battle, then I allow A to go through the same negotiating or attack decision as before. As noted, I assume the second battle is decisive either way. If A wins, they get the entire territory. However, if D wins, A is assumed to be exhausted such that D keeps the entire territory. The basic model is shown in figure A.1 below.

Figure A.1:
Simplified Ground War
Game Tree



Both battles are decided probabilistically, with the only difference being the probability of winning. I assume that A always wins against the weak defender with probability π_W . In essence, I assume they do not have the skill or capability to improve their defensive position. The probability of winning against the strong defender varies depending on whether A decides to attack immediately or attacks after attempting to negotiate. If A attacks immediately, I assume that the strong defender has not had time to prepare their position, and so A's probability of winning is π_U . For simplicity, I assume this is true even if A lost the first battle. In other words, even a loss changed the battle lines enough that any previously prepared defenses are not relevant. However, if A attacks after attempting to negotiate, the strong defender has been able to construct fortifications, and so A's probability decreases to π_P , with $\pi_U > \pi_P$ by definition. For modeling simplicity, I also assume that $\pi_W > \pi_U$, so A has a better chance of winning against the weak type than against the strong type, whether or not the later has had a chance to prepare. Finally, I assume that any battle fought is costly, imposing costs of c_A and c_D on the attacker and defender respectively.

Model Solution

Since the model has a screening element, I will use the solution concept of perfect Bayesian equilibrium (PBE). Accordingly, the belief parameters β_1 and β_2 , describe A's belief that they are facing the strong type in stages one and two respectively, with A's belief that they are facing the weak type equaling $1 - \beta_1$, and $1 - \beta_2$. This PBE solution can be found through simple backwards induction. There are several different equilibria. One of these, which I will focus on here, involves A immediately attacking in both rounds. This is the most interesting

equilibrium for two reasons. First, this equilibrium coincides with my theoretical expectation that wars continue until one side has achieved their war aims. Second, this equilibrium matches the empirical observations in both Chapter 2 and Chapter 4 that wars tend not to end in negotiations. It also is the primary basis for the secondary findings detailed below. Proposition A.1 describes when A chooses to attack immediately in the second stage.

Proposition A.1: Second stage immediate attack

- *A will attack immediately in the second stage under the following conditions:*
- *If $\pi_P \geq c_A$, such that A has a credible attack threat against the strong type alone:*
 - *$\beta_2\pi_U + (1 - \beta_2)(\pi_W) - c_A > (\pi_P + c_D)$ such that A prefers war over making an offer that satisfies both types, and*
 - *$\beta_2\pi_U + (1 - \beta_2)(\pi_W) - c_A > \beta_2(\pi_P - c_A) + (1 - \beta_2)(\pi_W + c_D)$ such that A prefers immediate war over making an offer that satisfies only the weak type*
- *If $\pi_P < c_A$, and $\beta_2\pi_P + (1 - \beta_2)(\pi_W) > c_A$, such that A has a credible attack threat against the combined types (if it still believes that either type could exist), but not the strong type alone, A will attack immediately if:*
 - *$\beta_2\pi_U + (1 - \beta_2)(\pi_W) - c_A > (\pi_P + c_D)$ such that A prefers war over making an offer that satisfies both types, and*
 - *$\beta_2\pi_U + (1 - \beta_2)(\pi_W) - c_A > \beta_2(0) + (1 - \beta_2)(\pi_W + c_D)$ such that A prefers immediate war over making an offer that satisfies only the weak type*
- *If $\beta_2\pi_P + (1 - \beta_2)(\pi_W) < c_A$, and $\pi_W \geq c_A$, such that A only has a credible attack threat against the weak type, A will attack immediately if:*

- $\beta_2\pi_U + (1 - \beta_2)(\pi_W) - c_A > \beta_2(0) + (1 - \beta_2)(\pi_W + c_D)$ such that *A* prefers immediate war over making an offer that satisfies only the weak type
- If $\pi_W < c_A$, such that *A* has a credible attack threat against neither type if it attempts to bargain, *A* will attack immediately if:
 - $\beta_2\pi_U + (1 - \beta_2)(\pi_W) - c_A > 0$ such that an immediate attack is better than achieving nothing

Proposition A.2 then details the conditions under which *A* will attack immediately rather than try and bargain in the first stage, assuming that *A* will also attack in the second stage. While I assume the conditions in Proposition A.1 hold, it is also necessary to specify the off-path strategies of whether *A* would immediately attack the strong type if they played a separating equilibrium in stage 1. The combination of the two propositions determines the range in which *A* prefers to attack immediately in both stages.

Proposition A.2: First stage immediate attack

- *A* will attack immediately in the first stage under the following conditions:
- If *A* has a credible attack threat against the strong type alone in stage 2 ($\pi_P \geq c_A$):
 - If $\pi_U - c_A > \pi_P + c_D$ (such that *A* would immediately attack in stage 2 if they played a separating equilibrium in stage 1) and $\pi_P(1) + (1 - \pi_P)(\pi_U - c_A) > c_A$ (such that *A* has a credible attack threat against the strong type in stage 1)
 - $\beta_1(\pi_U + (1 - \pi_U)(\pi_U - c_A)) + (1 - \beta_1)(\pi_W + (1 - \pi_W)(\pi_W - c_A)) - c_A > \pi_P + (1 - \pi_P)\pi_U + (2 - \pi_P)c_D$ (such that *A* prefers to attack immediately than satisfy the strong type) and

- $\beta_1(\pi_U + (1 - \pi_U)(\pi_U - c_A)) + (1 - \beta_1)(\pi_W + (1 - \pi_W)(\pi_W - c_A)) - c_A > \pi_P + (1 - \pi_P)\pi_U + (2 - \pi_P)c_D$ (such that *A* prefers to attack immediately than satisfy the strong type) and
- $\beta_1(\pi_U + (1 - \pi_U)(\pi_U - c_A)) + (1 - \beta_1)(\pi_W + (1 - \pi_W)(\pi_W - c_A)) - c_A > \beta_1(0) + (1 - \beta_1)(\pi_W + (1 - \pi_W)\pi_W + (2 - \pi_W)c_D)$ (such that *A* prefers to attack immediately rather than satisfy the weak type)
- If $(\beta_1(\pi_P(1) + (1 - \pi_P)(\pi_U - c_A)) + (1 - \beta_1)(\pi_W(1) + (1 - \pi_W)(\pi_W - c_A))) < c_A$ (such that *A* does not have a credible attack threat against the pooled types), but $\pi_W(1) + (1 - \pi_W)(\pi_W - c_A) > c_A$ (such that *A* does have a credible attack threat against the weak type), *A* will attack if:
 - $\beta_1(\pi_U(1) + (1 - \pi_U)(\pi_U - c_A)) + (1 - \beta_1)(\pi_W(1) + (1 - \pi_W)(\pi_W - c_A)) - c_A > \beta_1(0) + (1 - \beta_1)(\pi_W + (1 - \pi_W)\pi_W + (2 - \pi_W)c_D)$
- If $\pi_W(1) + (1 - \pi_W)(\pi_W - c_A) < c_A$ such that *A* has a credible attack threat against neither type, *A* will attack if:
 - $\beta_1(\pi_U(1) + (1 - \pi_U)(\pi_U - c_A)) + (1 - \beta_1)(\pi_W(1) + (1 - \pi_W)(\pi_W - c_A)) - c_A > 0$

Finally, Lemma A.3 describes the belief parameters for different possible scenarios:

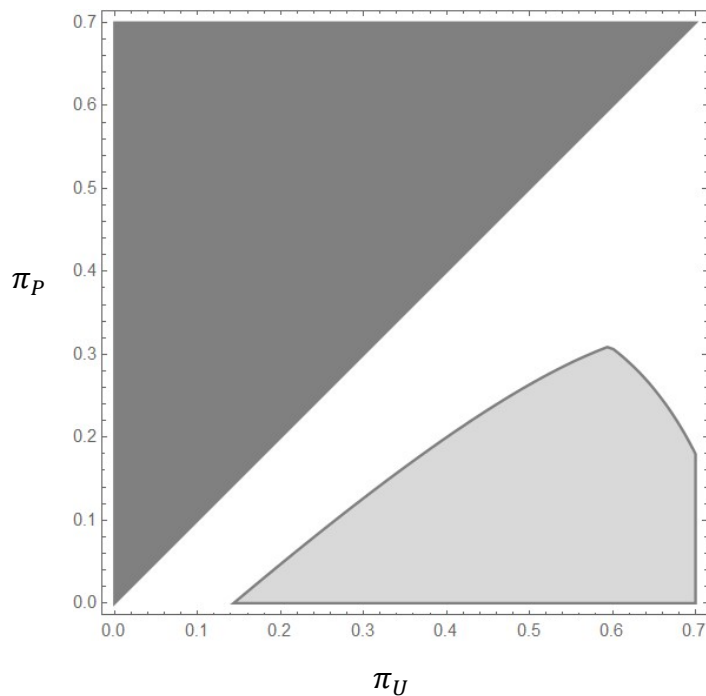
Lemma A.3: Belief parameters

- *A has the following belief parameters β_1 and β_2 , describing A's belief that they are facing the strong type in stages 1 and 2 respectively, with A's belief that they are facing the weak type equaling $1 - \beta_1$, and $1 - \beta_2$.*
- *$\beta_1 = \sigma$ (A has no additional information)*
- *If A attacks immediately in stage 1, $\beta_2 = \frac{(1-\pi_U)\sigma}{(1-\pi_U)\sigma + (1-\pi_W)(1-\sigma)}$*
- *If A makes an offer satisfying only the weak type, $\beta_2 = 1$*

Discussion

Figure A.2 displays the range of values for one set of parameter values. As can be seen, for these parameter values, the range in which the attacker attacks immediately in both battles is fairly large relative to that which is possible after making the assumptions about the relative probabilities of winning a battle ($\pi_W \geq \pi_U \geq \pi_P$).

Figure A.2:
The Range Where A Attacks Immediately
in Both Rounds



$\pi_W = 0.7, c_A = c_D = 0.05, \sigma = 0.5$, Dark gray triangle and areas outside plot range are impossible by assumption that $\pi_W \geq \pi_U \geq \pi_P$

This equilibrium occurs because of the basic commitment problem logic described above. In attempting to negotiate, A can choose either to satisfy both the strong and weak type or can choose to satisfy only the weak type, and fight the strong type. However, if A stops to negotiate, this gives B the chance to prepare their position. This means that if A goes ahead and attacks the strong type after attempting to negotiate, A has a lower chance of winning. If A decides to satisfy both types, the bargain is based on fighting a prepared type. Both the bargain that satisfies the strong type and the combined expected utility of satisfying the weak type and fighting the strong type may be worse than A's expected utility of attacking immediately. This is

true even though A potentially (if they satisfy only the weak type) or certainly (if they satisfy both types) avoids paying war costs.

As noted at the beginning of this section, the model reveals two interesting extensions to the basic model. First, the model shows that A does not need to be certain that D can effectively increase their defensive advantages in order to attack immediately rather than negotiate. Note that in the model, the weak type of D cannot increase their defensive advantages. However, A attacks without knowing whether they are facing the strong type, that can prepare, or the weak type, that cannot. As long as the strong type (which can prepare) occurs with enough frequency, the disadvantages of facing a prepared strong type can outweigh any potential gains from negotiating, regardless of whether negotiations would satisfy both types or only the weak type of defender. In essence, the mere possibility that D could improve their defenses can be enough to prompt A to attack rather than trying to negotiate.

The second interesting finding is that the commitment problem posed by the strong type preparing defenses also inhibits information revelation. As I have noted (based on Wagner 2000 and Filson and Werner 2002), one of the most effective ways of revealing private information is negotiations that separate types. Weak or unresolved types will accept settlements that are less favorable than strong types. In theory, by offering settlements that only satisfy the weak or unresolved type, the other side can quickly identify whether the other side is weak or strong based on whether they accept the settlement. However, in the equilibrium where A attacks in both rounds, no negotiations happen. Thus, one of the most important ways in which information is revealed is eliminated.

As noted, I have described the model based on the incentives an attacker has to attack immediately rather than allow the defender to prepare. However, the model can also be applied

to the second barrier, where the defender prefers to make no concessions even if doing so might result in peace as doing so would mean giving up a fortified position. The defender moving away from their fortified battle position would result in an equivalent power shift as an attacker choosing to negotiate rather than attack. The actual model would be slightly different, as it would be the other side that would then have to attack. However, they would have to be willing to attack anyway not to simply allow the war to end along the established lines. Therefore, the conditions under which war would continue are essentially identical to the written model. Accordingly, the substantive findings apply equally to both mechanisms.

Appendix B

Notes on Incorrectly Predicted Cases from Chapter 4

In Chapter 4, I ran crosstabs predicting which campaigns would end based on a couple of simple conditions. Below, I provide notes on what happened in each of the campaigns that were incorrectly predicted, and whether that case actually refutes my theory or was incorrectly predicted for non-problematic reasons. I start by reviewing campaigns that were predicted to end, but the war in fact continues. I then review campaigns where the war was expected to continue, but in fact ended.

War is Predicted to End, but Continues

- Greco-Turkish War initial campaign
 - Greece achieves their initial objectives, but escalates the war
 - This is not particularly consistent with the theory, but this is a fluid situation where each side's war aims were changing.
 - In the military personnel and CINC models this was actually correctly predicted to continue, but for wrong reason (expect Turkish counterattack, but Greece escalates)
 - Because of the fluid situation, this is not particularly consistent with the theory, but neither is it particularly concerning.
- World War II – Western Front
 - This is predicted to end after Battle of France
 - Germany is stronger and has achieved their objectives

- In fact, Germany did offer a negotiated end to Britain. However, Britain refused, probably counting on American intervention.
- This doesn't necessarily fit with theory, but also is a somewhat unusual scenario. In addition, joiners are expected to lead the war to continue, and it is plausible that hoped for future joiners would have a similar effect.
- Franco-Turkish War
 - Turkey counterattacks, although they are weaker, which is somewhat inconsistent with the theory.
 - However, France is not heavily committed to the conflict, and only deploys limited forces, with little political backing. Thus, the relevant power balance is not correctly represented by the CoW variables.
- Polish-Lithuanian War
 - I coded a Lithuanian counterattack, even though much weaker than Poland. However, sources seemed to disagree about whether this counterattack actually happened.
 - If the counterattack did occur, it is clearly inconsistent with my theory, as well as common sense. It could only be attributed to human stupidity.
- 2nd Sino-Japanese War
 - Japan continued the attack, even though they had achieved their initial war aims in Manchuria.
 - This is an unusual situation in that Japan's intent and aims were amorphous, and in fact driven heavily by junior officers in the theater. These subordinates seem to escalate without central direction.

- This is in fact correctly predicted for personnel / CINC measures, but wrong reason (the model would expect a Chinese counterattack)
- While not consistent with the model, the lack of central direction makes this an unusual case, and it is not particularly concerning
- Korean War
 - The war continues even after UN had achieved their territorial objectives in 1951. This is after the UN escalated by advancing into North Korea, China had intervened and then the UN fought back to 38th parallel. This represents both an escalation and then de-escalation of the UN war aims.
 - The war continues for odd reasons. The territorial issues are settled fairly quickly, and the largest remaining dispute is over whether POWs would be forcibly repatriated.
 - At the same time, the war decreases in intensity. The battle lines become fairly static with only limited attacks.
 - The change to non-territorial war aims means this case is neither particularly consistent nor particularly inconsistent with the theory.
 - Note that this last phase has some characteristics of a bombardment war. I decided to include it only as a ground war given the continued significant amount of ground combat, even though neither side was really trying to take territory, and military force could not resolve the POW dispute.
- Vietnamese-Cambodian War
 - The war doesn't end after Vietnam recaptures their territory from the initial Cambodian attack. Instead, Vietnam escalates and overthrows the Pol Pot regime.

- This is easily explained as credibility issues become apparent from the previous fighting, which can only be settled by regime change. (see Wolford, Reiter and Carrubba 2011 for a relevant explanatory model)
- The introduction of commitment issues and subsequent escalation of war aims makes this a somewhat odd situation.
- Ugandan-Tanzanian War
 - This is similar to the previous case
 - Tanzania doesn't settle the conflict after recapturing their territory. Instead, they escalate to overthrow Idi Amin.
 - Again, this is consistent with credible commitment issues becoming apparent by the earlier fighting.
 - Again, this is a bit of an odd situation
- Sino-Vietnamese border war
 - Chinese campaign in 1984 coded as local victory, but Vietnam counterattacks.
 - This is an odd war, and neither side's war aims are really clear.
 - China did not commit all of their forces to the conflict, and so Vietnam may have believed they had sufficient forces locally to counterattack.
 - Overall, this is not particularly consistent with my theory, but is a very odd case.
 - This conflict also bears significant resemblance to a bombardment war, but was included as a ground war due to the intense ground combat in 1984, even though neither side seems to really care about territory.
- Azeri-Armenian War

- Azerbaijan counterattacks in 3rd to last campaign after Armenia had fully achieved objectives.
- Azerbaijan weaker on military expenditures, but stronger on other measures.
Given that the two sides are pretty evenly matched, it is clear why Azerbaijan may have risked a counterattack. It is also unclear that Armenia was devoting all their forces to the fight (Armenia never really acknowledges involvement), which would have made an Azeri counterattack even more plausible.
- Thus, this is generally consistent with the theory.

War is Predicted to Continue, but Ends

- Estonian Liberation War
 - Predicted to continue on all three measures, as Russia is considerably more powerful. Russia would thus be expected to counterattack.
 - However, Russia is heavily distracted by their Civil War and can only devote limited forces to the conflict. It is thus perfectly consistent with the theory why they did not contest the outcome.
- Latvian liberation v Russia – last campaign
 - Predicted to continue on all three measures, as Russia is considerably more powerful. Russia would thus be expected to counterattack.
 - However, Russia is heavily distracted by their Civil War and can only devote limited forces to the conflict. It is thus perfectly consistent with the theory why they did not contest the outcome.
- Latvian liberation v Germany – last campaign

- Predicted to continue on all three measures of power. Germany is much stronger, and would be expected to counterattack.
- However, Germany is distracted by internal revolutions and did not devote significant forces. In fact, at times the German forces in Latvia appear to be operating independently of the central government.
- In addition, the Allied powers placed considerable pressure on Germany to respect the new Latvian government.
- Generally consistent with the theory. The influence of international pressure may be worth future research.
- Russo-Polish War
 - Predicted to continue on all three measures, as Russia is more powerful. Russia would thus be expected to counterattack.
 - However, Russia is heavily distracted by their Civil War and can only devote limited forces to the conflict. It is thus potentially consistent with the theory why they did not contest the Polish victory.
- Hungarian adversaries – Czechoslovak front
 - Hungary is weaker on all three power measures, but Czechoslovakia doesn't renew their attack.
 - This is not necessarily consistent with the theory, but could be explained in a couple ways. First, the Hungarian regime is ousted very shortly afterwards by Romanian attack in the same war. Perhaps Czechoslovakia believed this was the likely outcome, and then they could achieve their territorial aims without fighting. In addition, the initial attack may have been opportunistic, and so when it was

reversed, Czechoslovakia saw little reason to try and overcome Hungary's defensive advantages again.

- Greco-Turkish War
 - This was incorrectly predicted because the war did involve preemptive concessions, and the last campaign was only a partial Turkish victory. Greece ceded areas of Thrace that had not been captured.
 - British and French pressure likely played a major role in getting Greece to agree to the settlement. While not consistent with the theory, this case would be useful to explore further to see if international pressure could overcome the commitment problems created by defensive advantages.
- Franco-Turkish War
 - The final campaign is coded as a partial Turkish victory, as it seems that France voluntarily withdraws. In addition, France is clearly more powerful, and would be expected to counterattack against any Turkish victory.
 - As noted above, France is not heavily committed with only limited forces, and little political backing.
 - The partial withdrawal is not really consistent with theory. However, given French ambivalence about occupying part of Turkey, it is understandable why this case diverged from expectations.
- Polish-Lithuanian War
 - This war is coded as ending after Lithuania tries to counterattack, and is defeated without gaining anything. Lithuania does not try a second time to attack the much

more powerful Poland. As noted above, this counterattack may not actually have occurred.

- In this case, Poland had achieved their war aims, and the Lithuanian counterattack doesn't change anything. This is perfectly consistent with the theory. The inconsistency is that Lithuania tried to counterattack in the first place, which is discussed above.
- Manchurian War
 - The last campaign is coded as a partial Russian victory, with China making preemptive concessions.
 - This is not consistent with the theory.
 - However, the concessions demanded are not really territorial, although a Russian occupation of the railway would help them achieve these concessions. In addition, Russia is much stronger, while China is in the midst of a civil war. So, it is somewhat understandable why this might have ended in a negotiated settlement.
- 2nd Sino-Japanese
 - Japan is coded as weaker than China on the military personnel and CINC variables (but not the military expenditure variable). So, China would be expected to counterattack.
 - These are not representative of China's actual capabilities. China is in the midst of a civil war, and their military forces are not particularly effective. China may not even be able to counterattack.

- So, it is consistent with the theory why China did not counterattack to reverse Japanese gains.
- Chaco War
 - Paraguay had achieved their war aims, but coded as weaker on all three measures. So, Bolivia might be expected to counterattack.
 - The data likely misrepresents the situation. Paraguay had generally won more battles, and likely had enough qualitative advantages to offset Bolivia's quantitative superiority. Paraguay should be seen as the stronger opponent.
 - So, this is actually consistent with the theory
- 3rd Sino-Japanese
 - The last campaign is coded as a partial Chinese victory. The war ends with Japanese surrender after Hiroshima and Nagasaki.
 - While this doesn't fit the theory (Japan would not be expected to surrender), the use of nuclear weapons makes this a very unusual situation.
- Changkufeng
 - Japan is coded as being defeated in the initial (and final) attack. As Russia is the stronger state, the stronger state had achieved their war aims.
 - This is fully consistent with the theory.
- World War II – Pacific
 - Essentially the same as the 3rd Sino-Japanese War
 - The last campaign is coded as a partial US victory. The war ends with Japanese surrender after Hiroshima and Nagasaki.

- While this doesn't fit the theory (Japan would not be expected to surrender), the use of nuclear weapons makes this a very unusual situation.
- Russo-Finnish
 - The last campaign is coded as a Russian partial victory, as Finland does make preemptive concessions.
 - However, Finland had been pretty decisively defeated, although not to level to code it as a decisive Russian victory. They would have had difficulty continuing to fight much longer.
 - This generally fits theory if it is seen as a near decisive Russian victory. In addition, Russia is so clearly superior that continued resistance would make little sense.
- Franco-Thai
 - The only campaign is coded as a partial Thai victory. However, it is possible Thailand had in fact achieved their war aims. In addition, France is the stronger opponent, so would be predicted to counterattack.
 - On the second point, France had been conquered by Germany. So, the power measures not representative of their actual capabilities, as no reinforcements were available.
 - Any preemptive concessions that France made would be inconsistent with my theory.
- First Kashmir
 - Neither side fully achieves their objectives, as Kashmir is divided.
 - The conflict ends with a ceasefire in place along the final battle lines.

- This is perhaps partially consistent with the theory. A ceasefire in place means that neither side moves away from their prepared positions, although they party give up achieving their full objectives. Further research might look at when ceasefires in place represent an alternative outcome to one side achieving their war aims.
- 1948 Arab-Israeli – Jordanian front
 - Israel had not achieved all of their goals, particularly in that they failed to occupy enough of Jerusalem and the corridors to the city.
 - This again ends with a ceasefire in place along the final battle lines. As in the previous case, defensive advantages could partially explain this.
 - In addition, Israeli war aims were somewhat fluid. They had achieved primary goal (establishment of Israel), but not fully a major secondary goal (gain control of Jerusalem). So, maybe they were satisfied enough to allow a ceasefire in place.
 - While not really consistent with the theory, this is not completely inconsistent either.
- 1948 Arab-Israeli – v Syria
 - Syria has stronger CINC score (but not military expenditures or personnel). So, on that measure, they would be expected to counterattack.
 - This is pretty clearly not an accurate measure of the actual military balance. The other measures do correctly predict the war end.
 - In addition, Syrian commitment to the conflict may have been limited, further reinforcing their willingness to stop fighting rather than contest the Israeli victory.
 - Overall, this is consistent with theory

- 1948 Arab-Israeli v Egypt
 - Very similar to the previous case.
 - Egypt has stronger CINC score, but not military expenditures or capabilities.
 - This is not really representative of military capabilities, and Israel is pretty clearly the stronger party. In addition, limited Egyptian commitment further shifts the balance in Israel's favor.
 - Overall, this is consistent with the theory
- Korean War
 - Final Chinese attack is defeated. China is the weaker party, and the UN had achieved their primary territorial objectives. So, the stronger side had achieved their war aims.
 - This is fully consistent with the theory.
- 2nd Kashmir
 - The final campaign coded as partial victory, as India doesn't regain Kashmir, or even reach the pre-war line of control.
 - However, India had captured more Pakistani territory than Pakistan held in Kashmir. Therefore, India is in position to force a trade to restore the pre-war status quo.
 - This is potentially consistent with theory. Future research should examine when states can trade other things they have gained for things they have lost, and how defensive advantages play into such a trade.
- Six Day War – Golan Heights

- Syria has more military personnel, but overall is clearly weaker than Israel. The other power measures correctly predict this case.
- This is fully consistent with theory
- 2nd Laotian
 - The final campaign is a partial victory, as the war concludes with power sharing agreement.
 - While not consistent with the theory, this is a somewhat odd case. It is so much a civil war as an interstate war. In addition, this conflict is heavily by neighboring Vietnam War. The drawdown in that conflict would naturally have effects on the Laotian war as well.
- Football War
 - The only campaign is a partial victory. El Salvador then voluntarily withdraws to pre-war border.
 - This is a strange little war. One important piece is that El Salvador may have had difficulty continuing to advance or even maintain their position due to logistical problems.
 - I suspect there was also heavy US pressure to return to status quo ante.
 - This is not particularly consistent with the theory. However, this is another case where international pressure may play a role in overcoming defensive advantages.
- Yom Kippur – Golan front
 - This is not predicted to end because there are joiners during the final campaign (Iraq and Jordan). Joiners would predict the war to continue.

- However, the Iraqi and Jordanian intervention doesn't change the outcome or really the change the military balance.
- This is generally consistent with theory. The stronger side had achieved their war aims. The Egyptian-Israeli ceasefire would even more clearly give Israel the military edge, increasing the likelihood of settlement since Israel had achieved their war aims.
- Yom Kippur – Sinai
 - Egypt is coded as stronger party on all three measures. So, they would be expected to attack again.
 - However, this is clearly not representative of the actual power balance, and Israel is in fact stronger. Israel is also coded as achieving a partial victory, as they are in a position to force a favorable settlement after surrounding the Egyptian 3rd Army.
 - The war end is a little strange. Although coded as a local victory, Israel had captured Egyptian territory to trade, rather than directly recapturing lost territory on east bank of Suez.
 - This is potentially consistent with theory. As in the 1965 Indo-Pakistani War, future research can examine when trades can lead to war settlement and how these trades interact with defensive advantages.
- Sino-Vietnamese Punitive
 - The only campaign is coded as a partial victory. China then voluntarily withdraws and restores the status quo ante.
 - This is another odd war. It is unclear what China's war aims are or how they think war will help achieve them.

- This case is not really consistent with the theory.
- Israeli invasion of Lebanon
 - The Israeli-Syrian conflict the actual interstate war (Lebanese gov. basically neutral or on Israel's side)
 - I coded the campaign is coded as partial victory out of caution. However, Israel does achieve main objectives of driving Syrian forces away, so Israel could focus on PLO. This means Israel probably had achieved their war aims against Syria.
 - This is generally consistent with the theory, although a bit odd in that the interstate clash occurs in the context of an extra-state conflict between Israel and the PLO.
- Sino-Vietnamese border war
 - This is an odd war, and it is unclear what either side's war aims were.
 - The last campaign coded as loss by Vietnam, who is the weaker party. China had likely achieved at least their territorial aims.
 - This is consistent with theory so far. However, fighting does continue for another couple years, but without clear campaigns and at lower levels. This continued fighting would not really fit the theory, although might represent a bombardment phase of the war.
- Azeri-Armenian
 - Azerbaijan is coded as stronger on personnel and CINC, weaker on military expenditures. They thus might be expected to try to counterattack.

- It does seem the combatants were fairly evenly matched. Armenia fully achieves war aims. Defensive advantages mean that this would be difficult for Azerbaijan to reverse, even given the power parity.
- This is generally consistent with theory. One side achieved their war aims, and it is clear why the other decided not to contest the outcome.
- Cenepa Valley
 - The final campaign is coded as a partial victory, and is followed by a negotiated settlement.
 - However, the conflict very probably never got close to war levels – most sources report casualty numbers far lower than CoW.
 - Actual issue of dispute is so minor that a wide range of negotiated adjustments would be fine. This would mitigate the role of defensive advantages.
 - International pressure to settle also likely played a role in the conflict ending. This can be investigated further.
 - This is not consistent with my theory, but there is a strong possibility the war shouldn't have been in the database in the first place.